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PROBLEMATIC ASPECTS ENCOUNTERED UPON IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT

Danguolė Oželienė

Vilniaus kolegija/ University of Applied Sciences, Vilnius Gediminas Technical University, Lithuania

Abstract

Due to complexity of the concept of sustainable development, both traditional and contemporary approaches still do not provide an answer how to implement this concept in practice. Enterprises aiming for sustainable development must combine economic interests with environmental and social needs, while keeping economic profit as a priority. On the other hand enterprises should promptly react to changes in order to remain competitive in the present globalization process. Advanced technology of management processes is also essential for successful development of every company. The aim of the article is to reveal whether advanced technology has an impact on the implementation of the provisions of the concept of sustainable development on a micro level. The article presents an overview of contemporary approaches and problematic aspects to sustainable development, analyzes the emerging challenges for enterprises, discuss the need to integrate the technological dimension into the concept of sustainable development. The research was carried out using analysis of scientific literature, and synthesis of various approaches, critical evaluation and generalization.

Keywords: sustainable development, advanced technology, technological dimension, digital transformation, model of sustainable enterprise.

Introduction

In recent years sustainability has become an issue for both, the public and the private sectors in many countries. The term "sustainable development" was first used in the 1987 in the Brundtland report "Our Common Future". According to G. H. Brundland, sustainable development is based on the specific ability to develop while meeting the needs of the present without comprising the ability of future generations to meet the needs of their own (WCED, 1987). Due to the complexity of the sustainable development concept, its implementation is still the subject of scientific discussion. The complexity of the definition has been highlighted as a barrier to apply the concept of sustainable development into business practices. John Elkington (1997) proposed to measure sustainability by encompassing a new framework to measure performance. It is called the three Ps: People, Profit and the Planet. Sustainable business contributes to sustainability by delivering economic, social and environmental benefits (Dyllick, Hockerts, 2002). So far studies about contemprorary businesses' attitudes towards responsibility of sustainable development reveal contradicting results. Sustainability management is becoming more widespread among big companies. Dyllick, Muff (2015) notice a "big disconnect" between micro-level progress and macro-level deterioration. More and more business executives agree that sustainability-related strategies are necessary to maintain competitiveness today and even more so in the future. Increasing number of executive report that their organizations' commitment to sustainability has increased in the past and will develop further in the future. But unfortunately, these actions are not reflected in the state of our Planet. Poverty has not been eradicated, inequity is growing, hunger and malnutrition still kills a child every 6 seconds, 1.8 billion people do not have access to clean drinking water and sanitation, 2.3 billion people do not have access to electricity (Dyllick, Muff, 2015). The problem is why, despite the efforts of researchers and numerous scientific publications the implementation of sustainable development in practice is still a challenge for business. How the fourth industrial revolution is changing the implementation of the provisions of sustainable development? The purpose of this article is to reveal whether advanced technology has an impact on the implementation of the provisions of the concept of sustainable development on a micro level. The article presents an overview of contemporary approaches and problematic aspects to sustainable development, analyzes the emerging challenges for enterprises, discuss the need to integrate the technological dimension into the concept of sustainable development.

The research was carried out using analysis of scientific literature, and synthesis of various approaches, critical evaluation and generalization.

Sustainable Development Issues

The concept of sustainable development has been prioritized and criticised but its domination in present day science discussions has proven that it is indeed relevant. Analysis of scientific literature enables the author to discern the following problematic aspects: the absence of officially approved definition of sustainable development concept, variable number of dimensions, disputable significance of different dimensions and objective measurement of sustainability.

Semantic Interpretation of Definition of Sustainable Development Concept

More than a hundred different definitions of sustainable development can be found in literature. These variations mostly reflect different political or idealogical views of the authors (Hibbitt, 2001). Luchsinger (2009), Danciu (2013), Goswami (2014) noted that most widely accepted definition of the concept has been adopted from Gro Harlem Brundtland and his report "Our Common Future" (1987). This definition provides insights into the subconcept of needs and limits. Luchsinger (2009) states that this definition also includes usage of natural resources, its fair distribution as well as awareness of interconnection of three dimensions: economic, social and environmental protection. However, according to Bartelmus (2003) this definition still lacks mentioning of unidentified needs that change in time. Another author, Barbian (2013) notes five factors: anthropocentrism, protection of resources, equality and justice, holism and long term effects. Further analysis of definitions of sustainable development proves that this concept cannot be separated from ethical principals with variuos responsibilities (Pawlowski, 2008; Morse, 2008), an infinite process where people must be involved (Morse, 2008; Baumgartner, Korhonen, 2010; Panzaru, Dragomir, 2012) as well as democracy, human rights, good management practice (Dumitrache, 2013). Since there is no officially approved definition of sustainable development, some researchers take it as an inconvenience for their work, while members of academia attempt to look at this situation as to a challenge (Moneva *et al.*, 2006). Author presumes that the variability of this definition is influeced by a few factors. Firstly, the concept of sustainable development is of holistic origin and there is no final list of problems that should be addressed in order to implement the idea of sustainability. Secondly, definition of sustainable development does not entail a fully acknowledged content due to the complexity of the concept. Every reasearcher uses this term based by their own personal understanding, experiences and knowledge. It allows to anticipate that the concept of sustainable development itself as well as its content will be expanded over time to reflect changes in the society and the environment.

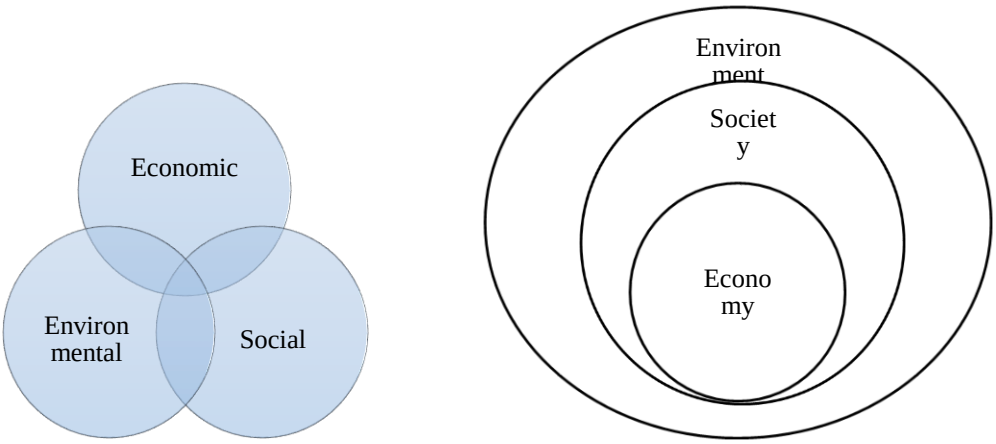
Variable Number of Dimensions

Scientific discussions are not only fuelled by the technicalities of definition of sustainable development but also by the specific number of components. So far a huge number of components, issues, aspects are being discussed and presented through the published papers and their mixture has been distributed between dimensions of sustainability (Garbie, 2014). Most commonly addressed are three dimensions also known as traditional ones: economical, environmental, social (Dyllick, Hockerts 2002; OECD 2005; Vom Brocke *et al*., 2012; Lu 2014; Garbie 2014; Dyllick, Muff, 2015; Huang, 2017). If one assumes that sustainable development is a type of politics, then implementation of sustainable ideas will be dependant on importance of institutions, i.e. institutional dimension (Spangenberg *et al.*, 2002; Pfahl, 2005; Goswami, 2014). Lozano (2017) proposes the time dimension, which dynamically interacts with the dimensions having the future in mind (i.e. the short-term, longer-term perspectives), for example how the economic dimensions of today inter-relate with the economic dimensions of the future, but also with the environmental and social dimensions of the

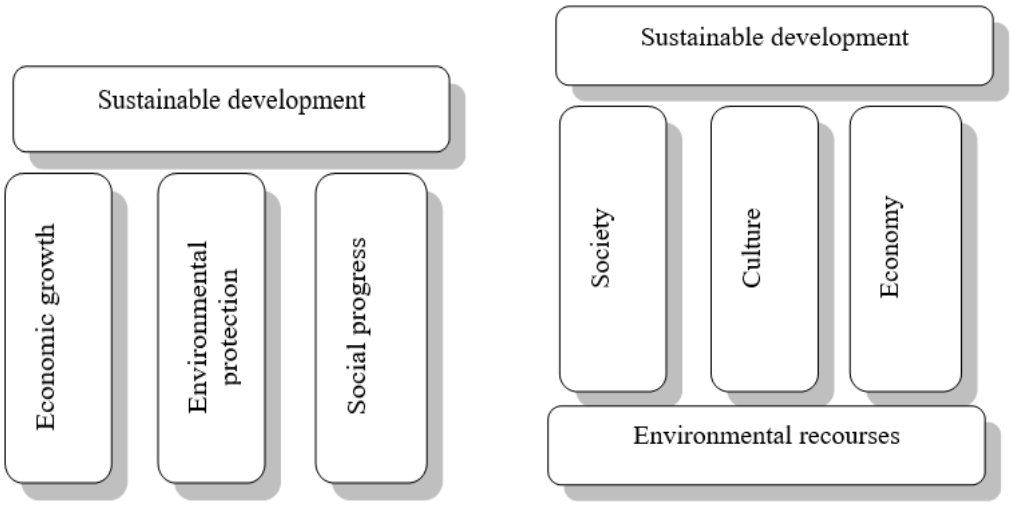
present and of the future. Leonard, Yurchyshyna (2010) adapt the context of knowledge society and enrich traditional vision of sustainability by introducing technological component. Seghezzo (2009) introduced a five-dimensional conceptual framework more sensitive than the traditional triple-bottom-line approach to understand the complex issues of sustainability. Seghezzo (2009) added a time (Permanence) and a human (Persons) dimensions. According to Juknys (2013), it is necessary to include the cultural dimension as well because culture is a factor that plays an important role in determination of human behavior. Garbie (2014) notices, despite the diversity of dimensions the economy dimension of sustainable development is still representing a lion's share of the research works. Meanwhile, the research work aimed at social sustainability is still poor and requires to be linked directly to economic sustainability. Without considering economic and social sustainability together, the value created from sustainable development will be useless. Most of the published papers on environmental dimension were concentrated on environmental concepts in general (e.g. environmental management) without any link to economic or social dimensions.

Importance of Dimensions

Sustainable development is difficult to define and therefore difficult to measure. Many researchers are in agreement that all three dimensions of sustainable development are equally important and none of them can be prioritized (Veleva, Ellenbecker, 2001; Krajnc, Glavic, 2005, Garbie, 2014, Lu 2014; Dyllick, Muff, 2015, Singh, 2016, Huang, 2017; Hansa *et al*., 2017). However, there are still a few opinions claiming that dimensions are not equal. UCN (2006) report states that the three pillars of sustainability cannot be treated as of equival importance due to the following reasons. First of all, the economy is an institution that emerges from society: the unity of a mechanism or set of rules created by society to mediate the exchange of economic goods or value. Meanwhile, the environment is different, since it is not created by society. Second of all, the environment support both society and economy. The resources available on earth and the solar system effectively present a finite limit on human activity. Effective limits are often much more specifically framing the capacity of the biosphere to absorb pollutants, provide resources and services and these aspects are clearly limited in space and time UN (2006).



***1 picture**. Overllaping and non Concentric circles. (Lozano, 2008)*



2 picture. *Sustainable Development pillars (composed by the author according Juknys, 2013)*

Juknys (2013) agrees that nature is the foundation based on which the society and the economy can exist. Environmental, social and economic sustainability have been drawn in a variety of ways, as pillars, as concentric circles, or as overllaping circles (see Pictures 1-2). The visualization of dimensions of sustainable development shows that researchers do not pay enough attention to the significance of the dimensions.

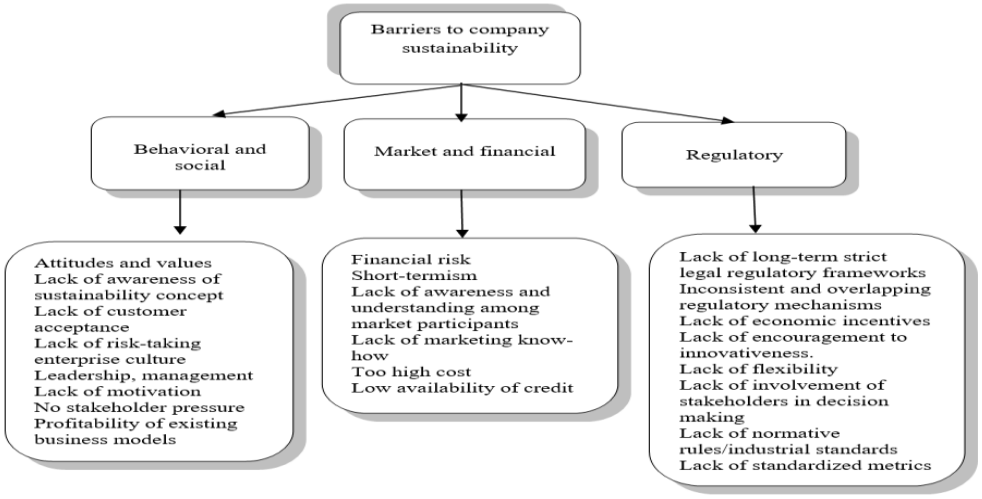
The Problem of Measurement

The measurement of sustainability is necessary to evaluate progress of a company towards sustainability as well as for a decision-making process. Dozens of frameworks, tools and metrics of sustainability assessment that focus on the performance of companies have been suggested in scientific publications. Veleva, Ellenbecker (2001) were the first authors to suggest a core methodology and supplemental indicators for measuring progress towards sustainable development at micro level. Singh *et al.* (2012) presented a review of sustainability assessment methodologies which lists forty-one globally proposed sustainability indices. Krajnc, Glavic (2005) proposes a mathematical model for the determination of the composite sustainability index that will enable comparisons of companies in specific sectors regarding sustainability performance. Singh (2016) identified more than 200 metrics focusing on performance measurement for sustainable manufacturing. Hasan *et al*. (2017) notes that suitable indicators for sustainability assessment can be found in Global report initiative (GRI), Dow Jones sustainability indices (DJSI), Organization for Economic Co-operation and Development (OECD) core environmental indicators, and United Nations Commission on Sustainable Development (UNCSD) as indicators for sustainable development. L.Dagilienė (2014) suggests to analyze a well known management systems for measurement of a company's sustainability: ISO14001 (Environmental Management System) ISO 9001 (Quality Management), OHSAS (Occupational Health and Safety Management Systems), EMAS (Eco-Management and Audit Scheme), SA (Social Accountability 8000), ISO 26000 (Guidance on Social Responsibility). Variety of tools for assessment of sustainable development can be employed in two ways. Firstly, there is a possibility of choosing a tool according to the sector of activity, the size of the company, the area to be evaluated. On the other hand, lack of experience might lead to increased risk of choosing the wrong tool. Hasan *et al*. (2017) emphasizes that risks of choosing an incorrect, misused, or misinterpreted metrics or indicators may lead to misleading decisions. Author invites for a further discussion on whether these tools can actually assess the sustainability. Could it be that all these indices actually show unsustainability? These questions shall be addressed after further investigation.

Enablers, Drivers and Barriers to Enterprise Sustainability

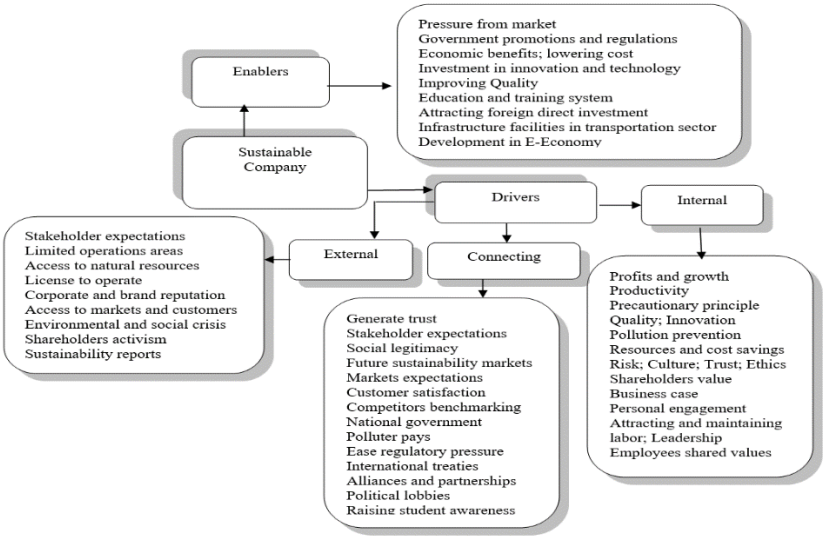
The main goal of all enterprises is to maximize profits and to minimize costs thus, profit is the main motivation of the traditional business. Bilge *et al.* (2014), Porter (1996) added – the main aim is increasing the market share and gaining a competitive advantages as well. Barbien (2013) notes that by doing this, enterprises do not recognize that they cause a huge amount of negative externalities with an extreme impact on the ecosystem and society (Barbien, 2013). Business is fundamentally a social institution and a part of civil society. Society and business had been interconnected systems since the advent of modernity (Schmitt, 2013). Enterprise is socioeconomic system. With globalization, companies take more and more importance and are in many cases more powerful than states. In these conditions, their actions can have a huge impact on the society in general, and people ask companies to have "ethic" and values (Fontaine *et al.*, 2006). According to Porter, Kramer (2011) the time for a new economic paradigm has arrived: "the current approach to value creation is out-dated and companies must bring business and society back together" (Porter, Kramer, 2011). Companies have the right to choose a sustainable development path or to change nothing in their traditional business. But why companies should choose a direction toward sustainable development? Many firms are financially successful in their current form and in the current environment, therefore, they may be unwilling to change as they have a vested interest in maintaining the status quo (Laukkanen, Patala, 2014). Dyllick, Muff (2015) notes that changing the business purpose to the common good may be too radical for existing commercial businesses. Company would choose to be sustainable if it would be financially beneficial for them. Sustainability in an enterprise is defined by its commitment to economic and environmental factors as well as factors of social commitment in a company. Sustainability is more than simply being responsive to ecological concerns. It includes economic, social concerns as well. However, today's natural environment, the diminishing natural resources, the climate change and global warming impose significant constraints to the way businesses operate (Garza, 2013). The author of this article fully agrees with Well's (2004) argument that sustainability is not a "bolt on" addition, but an issue that goes to the heart of the structure and conduct of business (Wells, 2004). In order to archieve sustainability a company must do right things, obey the law and change the management system. Cmelija (2010) concludes that the sustainability of the enterprise depends on the management system of the enterprise and the possibilities of practical application of sustainable development concept in the enterprise, taking into consideration that all the processes supporting sustainability of the enterprise are mutually connected, interact, and functional process of each management level is being implemented through dimensions of sustainability. Moreover, the success or failure of the implementation of strategic sustainability programs depends on a consensus by top management decision-makers (Garza, 2013).

Laukkanen, Patala **(**2014) carried out a qualitative Delphi study and assessed the key barriers which have an impact on the sustainable business.42 experts were categorised in six groups: business managers/executives, consultants, researchers, government/authorities, non-profit organisations, and students as the future business executives and decision-makers, were selected. Key barriers identified can be structured following three categories: regulatory, market and financial, and behavioural and social (see Picture 3).



3 picture. *Barriers to company sustainability. (composed by author according Laukkanen, Patala 2014, Bhanota et al., 2015)*

Experts pointed out that the main barriers are lack of long-term strict legal regulatory frameworks, financial risk and attitudes and values. In the opinion of the experts the technologies (such as Internet, 3D technology, renewables-based energy innovations) of today make sustainable business entirely possible. However, it is not only a question of new technologies, it is more like a question of attitudes, values and regulation mechanisms. The crowd (society) does not see sustainability attributes as dominant. Consumers appreciate good products and services at an affordable price, and they do not see environmental and social problems, until the middle of the crisis. Companies comply with regulation, but they do not take steps above it voluntarily. Bhanota *et al*. (2015) analyzed the enablers and barriers to sustainable business in the manufacturing industry and using statistical analysis assessed the differences between the opinions of various researchers around the globe and industry professionals focusing on small, medium and large scale industries of Ludhiana (a city in the Indian State of Punjab, which is also known as "Manchester of the East" as it has an established manufacturing base for engineering products).



4 picture. *Enablers and drivers to company sustainability. (composed by author according to Bhanota et al. 2015, Lozano 2015)*

The picture 4 shows that "lowering manufacturing cost", „investment in innovation and technology" and „pressure from market" emerge as top 3 priority enablers along with „lack of

awareness of sustainability concepts“ and „cost too high“ as top 2 barriers. Lozano (2015) carried out empirical research and identified the drivers for Corporate Sustainability within the context of large corporations of Europe. Sixteen interviews were conducted with corporate top-level managers, and with experts in the field from different organisations. As result of the research the author presented Corporate Sustainability driver model, which consist of internal, external and connecting drivers. Lozano (2015) states that the most frequently mentioned drivers were: proactive leadership and the business case (in internal drivers); reputation (in connecting drivers); and also customer demands, regulation and legislation (in external drivers). The big challenge for enterprises is how to manage and balance the internal, connecting, and external drivers as well as other stimuli. The company could then respond quickly to external stimuli, promote and reward the internal drivers, resulting in its proactive initiative in helping societies to become more sustainable.

Sustainable Enterprise in Digital Transformation

Beder (1994) states that sustainable development relies on technological change. But in order to achieve sustainability the existence of appropriate or clean technologies is not enough. When technology changes social environment (the work and skills of employees, the way production is organised, and the relationships between a company and its clients and suppliers) changes as well. It means that technological developments influence society and vice versa.

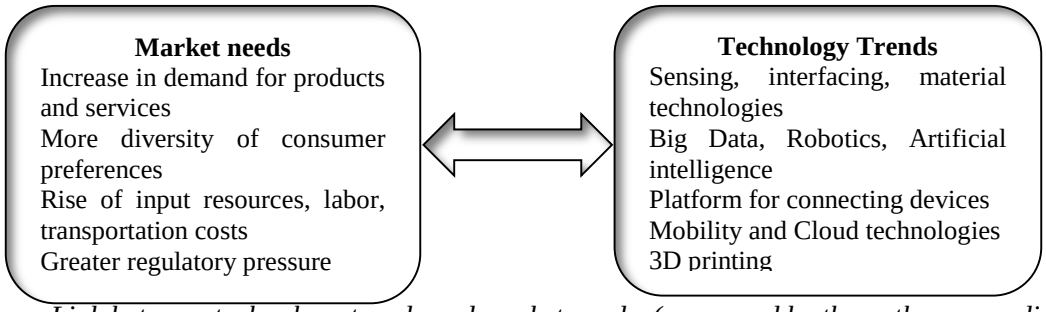
Wells (2013) adds that since innovative technology alone is insufficient to make sustainable business a reality, achieving sustainability requires:

- Socio-technical transitions that entail new technologies, production processes, lifestyles.
- Changes in production and consumption patterns where enterprises play crucial roles in mediation between sustainable production and consumption.
- Organizational innovations and new business models.

What is the role of technology in the achievement of the sustainable development goals? Scientists see technology as a major factor that can help to meet the Sustainable Development Goals. UN Report (2016) provides an overview of perspectives of more than 50 scientists on technology and the sustainable development goals. Among the 169 targets, 14 targets explicitly refer to “technology”. 34 targets relate to issues that are most often largely discussed in technological terms. In total there are 48 targets closely related to technology along with three main targets: significant overall technology performance improvement, universal access to sustainable technology, and global effective innovation system for sustainable development.

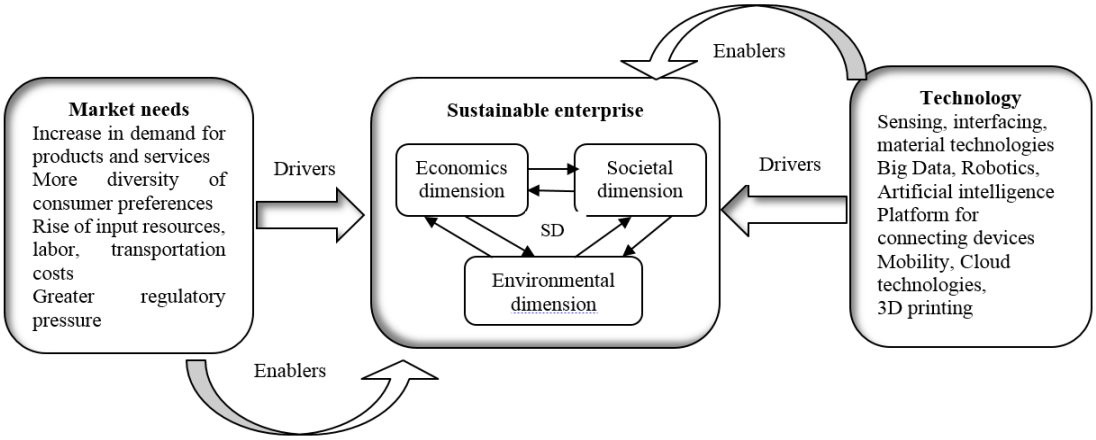
According to Vergragt, Philip (2006) definition of technology encompasses essentially three meanings: first - tools and instruments to enhance human ability to shape nature and solve problems, second - knowledge of how to create things or how to solve problems and third - the culture - our understanding of the world, our value systems (Vergragt, 2006). Schiling (2017) understands technology as the way inputs are transformed into outputs, or the way products and services are delivered to customers. Dyllick, Muff (2015) suggested the basic business process to understand as a transformation of various inputs into different kinds of outputs. Simple “input–process–output” model is appropriate when analyzing how sustainability could be integrated into business. Enterprises that seek sustainable development to become their core business philosophy should be aware that the usage of advanced technologies is potentially a powerful drive towards sustainable development goals. Application of advanced technologies has a major effect on companies, forcing latter to reevaluate and adapt such processes as: production (Hagel *et al.,* 2015), sales and marketing (Hagel *et al.*, 2015), resource management (Crosno, Peng Cui, (2014), Stock, Seliger, 2016) and decision making (Marinagia *et al*., 2014). Attitudes and behaviour of the customers are inevitably changing as well (Schilling, 2017).

Bocken *et al.* (2014) note that technology innovation can drive new business model innovation (e.g. cheaper solar technologies and the use of solar cookers in developing countries) and vice versa. Cornelis de Man, Strandhagen (2017) state that Industry 4.0 has been introduced to enable high-tech competitive advantage and could be an enabler to sustainable business, but it can also be an inhibiter by further exploiting the possibilities of neo-classical business models. According to Kavadias *et al.* (2017) transformation is usually associated with the adoption of a new technology. The new business model serves as the interface between what technology enables and what the marketplace wants. Technology trends and market needs could be seen in picture 5 below.



5 picture. *Link between technology trends and market needs. (composed by the author according to Kavadias et al. 2017)*

The fourth industrial revolution has opened the way for doing business innovatively thus more and more businesses are going digital. Changes such as digital labor robots, sensors integrated into clothing, 3D printing, sharing economy, big data, artificial intelligence and/or blockchain have a considerable impact on the business. 6 picture shows the authors understanding how a sustainable business model that reflects market needs and trends in advanced technology.



6 picture. *Sustainable enterprise in digital transformation. (composed by the author)*

A digital business requires less investment in tangible assets and more investment in intangible ones. Enterprises that seek sustainable development to become their core business philosophy should be aware that the usage of advanced technologies is potentially a powerful drive towards sustainable development goals. This model shows a way to create a sustainable value, and realise the new opportunities provided by advanced technology.

Conclusions

The implementation of sustainable development in practice is still a challenge for business due to following problematic aspects: semantic interpretation of definition of sustainable development, variable number of dimensions, disputable significance of dimensions and objective

measurement of sustainability. The complexity of the definition has been highlighted as a barrier to apply the concept of sustainable development into business practices. However, if one looks from a different point of view, it appears that there is another causative factor, no less important than the ones listed above, hindering the switch towards sustainability.

For a long time, the dominant economic structure of the world has been neoliberalism, which resulted in raising interests of the business above the concern for society's wellbeing. It is important to note that sustainability in an enterprise is defined not only by its commitment to economic and environmental factors but also to social commitment in a company itself. A big challenge for enterprises is how to manage and balance the drivers as well as enablers and overcome the barriers in helping business and society to become more sustainable.

Advanced technologies are potentially a powerful drive towards sustainable development goals and has a major effect on companies, forcing latter to reevaluate and adapt such processes as: production, sales and marketing, resource management, decision making and even attitudes and behaviour of the customers. Technology has opened the way for doing business innovatively thus more and more businesses are going digital.

The model of sustainable enterprise in digital transformation has been designed to show a way to create a sustainable value, and realize the new opportunities provided by advanced technology.

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Information about the Author

Danguolė Oželienė, lecturer at Vilniaus kolegija/University of Applied Sciences, doctoral student in Management field at Vilnius Gediminas Technical University. Scientific interests: Sustainable Development implementation in business, innovative business models. Reseach area: modelling of sustainable enterprise. d.ozeliene@vvf.viko.lt