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Sustainability and antifragility

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Abstract: In this article, some general conceptual issues regarding the relevance of antifragility for sustainable development and organizational sustainability are developed. This is done against the background of the general research hypothesis which is the basis for future research, requiring a paradigm shift from resilience of systems and organizations towards antifragility: Antifragility is the basis of intra- and intergenerational sustainability as well as long-term survival. More is needed than resilience, which rather focuses on the capacity and capability to recover from different shocks. Sustainability strategies should focus on the prevention or elimination of unsustainable activities or fragilities, replacing them, when necessary, with less unsustainable activities. This is a first step in enabling organizations or systems to handle unexpected future events, potentially threatening their existence.

Keywords*:* sustainable development, sustainability, fragility, antifragility, subtractive epistemology
JEL: Q01

1. Introduction

When assessing sustainability, emphasis is often on output indicators (Commission …, 2005; Borys, 2005) where focus is on sustainable economic growth, which satisfies social needs and does not negatively influence the environment and ecosystems (Rao, 2000). While the feasibility of sustainable economic growth has been questioned (Smith, 2013), focus is often on what to do in order to develop into the right direction (see Leal et al., 2016), the creation of win-win solutions (Will et al., 2015, Lambrechts et al., 2015) as well as obtaining efficiency improvements (Słupik, 2015; Burchard-Dziubińska, 2015; Zepada Quintana et al., 2015). However, as the bottom-line of sustainability is survival (Costanza et al., 1991), an important direction of research is what not to do in order to prevent development into the wrong direction, towards collapse of ecosystems, economic systems or social systems. Removing what is

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unsustainable, what threatens survival, can be related to a concept which has not been often applied to sustainable development yet – antifragility (Taleb, 2012; Bullen, 2015; Platje 2015). As the concept is relatively new, there does not exist a proper word in non-English languages (Taleb, 2012).

Sustainability is often discussed using the concept of resilience (Rao, 2000) - the extent to which a system can recover from outside shocks. However, when only recovering, the question is whether the system is prepared for unexpected, unknown challenges which may appear in the future, and threaten its existence. The basic assumption is that we live in a world of imperfect information (Akerlof, 1970). Mankind has obtained an incredible amount of knowledge. This provides us with the illusion we know more, but the sceptic and humble scientist should be aware of the fact that we know only a bit more about a world which is more complicated and where are even more unknowns than many people ever imagined (Taleb, 2012). In other words, we live in a world of fundamental uncertainty. While most economic theories claim uncertainty is a rather negative phenomenon, the following question appears. When we try to protect ourselves from uncertainty, how can we be prepared for future surprising and unexpected event that may threaten our existence? If we do not try to find out by way of trial-and-error what functions or does not function, we do not learn and are not prepared to obtain new information. While this line of thought is well-known in, among others, evolutionary economic and the New Institutional Economics (see Furubotn and Richter, 1997) and is the basis of the subsidiarity principle and inherent in fundamental critique on the feasibility of government planning (Hayek, 1935, 1937, 1945), the question is whether individuals and systems (e.g., organizations, industries, society) can become stronger and become more able to deal with future unexpected threats has not been a topic of research in the sustainability discourse. This brings about the general research hypothesis which is the background future research:

> Antifragility is the basis of intra- and intergenerational sustainability as well as long-term survival. Focus on resilience may lead to unsustainability due to a lack of an institutional framework that provides incentives for and reduces the transaction costs of learning from uncertainties and creating a strategy to reduce the probability of a system collapse.

In this article, some general conceptual issues regarding the relevance of antifragility for sustainable development and organizational sustainability in general are developed.

2. How to reduce unsustainability

While the concept of sustainable development is considered to be of utter importance for society and is a fundament for developmental policies of many countries, there is no agreement on what sustainability or sustainable development exactly means. Although there is no agreement on a working definition of sustainable development, in general there is consensus on the importance of creating the conditions for a high quality of life for current generations, without reducing the developmental opportunities for future generations (WCED, 1987). This is a strength of the notion - everyone can agree with the principles, without consensus on the policy implications and consequences for human economic activity. At such a moment, each activity or policy aimed at supporting sustainable development can be criticized because of its potential negative side effects. Many approaches focus on what has to be done in order to enter a path of sustainable development (e.g., Szołtysek, 2015; Gądek-Hawlena and Wróbel, 2015; Piasecka-Głuszak, 2015). While there is disagreement on the meaning of sustainability, it is easier to identify what is unsustainable than what is sustainable (Van Dam and De Jong, 2015; Taleb, 2012). Keeping this in mind, an innovative approach may be required based on the following working definition of sustainable activity:

> the prevention or elimination of unsustainable activities or fragilities, replacing them, when necessary, with less unsustainable activities.

Resilience may not be enough for sustainability. A system or organization may need to become antifragile (Taleb, 2012) in order to deal with the uncertainties and threats it faces.

Taleb (2012) defines fragility as something which is threatened by uncertainty, randomness and disorder. A glass is fragile, as it will break when by coincidence dropping it on the ground. In this case, mistakes have irreversible consequences, and lead to destruction. In other words, random events may have non-linear negative effects. Random events tend to have more downside (negative) than upside (positive) effects, as losses are non-linear. As a consequence, a system which is fragile can be assessed as unsustainable. Resilience tends to be a central feature in the sustainability discourse (e.g., Rao, 2000). A resilient system is robust, and can deal with many outside shocks. Taleb uses the comparison with a phoenix, which rises from its ashes after being destroyed. However, resilience may lead to a kind of steady-state, which is

sustainable the moment problems and challenges are relatively straightforward and repeat themselves. Nowadays, all different types of systems have become more and more interconnected – computer-networks and IT (Castells, 1998), the banking system and financial markets (Akerlof and Shiller, 2009; Admati and Hellwich, 2013), international trade, transport systems, and so on. For example, the moment a banking system in one country almost collapses, like was the case in Sweden in the 1990s (Admati and Hellwig, 2013), a government may be able to nationalize them and save the system. Or individual banks may buy up threatened banks, and in this way prevent a bank run. The financial crisis has shown that currently the bankruptcy on one bank (Lehman Brothers) may cause a serious threat to the global financial system, and bailing out these banks have significantly increased government debts as a percentage of Gross Domestic Product. It has been argued that banking and financial institutions grow so much, that they are "too big to fail" (Stiglitz, 2010; Admati and Hellwig, 2013). Such banks fragilize the whole banking and financial system (Taleb, 2012). When such banks are likely to be bailed out in case of failure, there is no real downside to their actions, while the limits of gain are only the sky. This leads to a serious moral hazard problem, where excessive risks are taken and innovations focus on creating new financial products which are in fact only based on the promise that someone will pay them back in the future (Akerlof and Shiller, 2009). As long as everyone believes this, the system is likely to expand.

Efficiency improvements may lead to system threats. While bringing huge gains, the moment all informational systems rely on GPS, the drop out of satellites due to, for example, a solar storm, will paralyze everything. Or when resigning from physical coins and banknotes, like has been proposed in Denmark, this may lead to large efficiency gains (e.g., no production and transport costs, no costs related to safety). However, in the unlikely event of a complete dropout of electricity, this may cause huge unpredictable problems. While many people may think such events may not happen, they forget that hardly anyone in the 1970s thought Communism would fall, Poland would in 2004 be a member of the European Union, or IT and the Internet would radically change the world. In other words, even when an event is extremely unlikely or unknown, we should consider the possibility of such nonlinear system threatening events happening.

These are only a few example of increasing system risks in the context of increasing complexity, posing threats to long-term sustainability. These systems do not like uncertainty,

while uncertainty will only grow in increasingly complex systems. For this reason, the notion of antifragility is so important for the sustainability discourse. An antifragile organization or system gains from uncertainty, randomness and disorder They create opportunities to learn from small mistakes, trial-end-error, to deal with new challenges, to improve and innovate. Taleb uses Hydra from Greek mythology to explain the idea - the moment you cut of one head, two new ones grow. Antifragility means that mistakes have reversible consequences, and we can learn from them. In this situation, there are more upside than downside effects from random events (non-linear gains), as losses from mistakes are small, while a positive option may appear that supports development. Such a positive effect may be a breakthrough in, for example, sun energy technology, providing the planet with more than enough energy resources.

As Taleb (2012) argues, the increase in antifragility of a system (or, at least, the decrease in fragility and in turn unsustainability of the system) is related to so-called subtractive epistemology – remove what we think is wrong. If removing creates improvement, this is a sign of fragility. This is related to the idea of letting processes proceed, and via a kind of evolutionary tinkering and trial-and-error improve and strengthen itself. As systems are complex, and people often cannot oversee and model all possible interactions, intervention may lead to different kinds of negative effects, which may create fragilities. This does not necessarily imply that interventions are useless. It means what we need to be careful with intervention and eliminate factors which create disturbances, fragilities and put the survival of a system at risk.

When identifying fragilities, in fact a kind of indicators of unsustainability are developed. Errors or mistakes are rather easier to identify and less subjective than indicators of sustainability which are more outcome oriented. Like with health, it is difficult to prove which kind of food is the best for each individual, as people differ and live in different environments. However, it is easier to identify what is bad, like smoking or excessive drinking. Eliminating such consumption habits are likely to improve the health of people. Furthermore, as Borys (2005) argues, what is development for one, can be decline for someone else. For example, modern technology can be a sign of civilization, but also a sign of decadence and moral decline. The contribution of a new technology to sustainability is difficult to predict (e.g., due to different rebound effects in case of energy saving production technologies). The consequential economic growth can be considered to be good as we can fulfil more human wants. However, it can also be argued that it not only may cause environmental deterioration, but also reduce peoples' incentives to be innovative and

deal with different unexpected elements of harshness in life. For example, the loss of skills to grow their own food or to cook, which is likely to be stronger in urban areas, increases the dependency on food producers and food processors, and reduces society's abilities to deal with different potential shocks. In other words, it fragilizes the economic system.

Thus, the bottom line for sustainability is survival, i.e., to prevent collapse. Survival is threatened by what Taleb (2007) calls Black Swans. Black Swans are unexpected, often unpredicted, low probability events with extremely high impact. This is related to what Taleb, after Bertrand Russel, calls the „Turkey problem", which is inherent in the problem of induction based on observation (experience, historical data). The example is given of a turkey, who observes the goodness of the farmer, giving him proper food and a comfortable living every day. The turkey believes that the farmer is the best man in the world, and life is beautiful. And then Thanksgiving comes. Thus, it becomes a challenge not to be a turkey, and to be prepared for the expected unexpected, but also the unexpected which can threaten the sustainability of an organization or system. When using historical data (e.g., number of customers, costs per customer) for future policy, while assuming linear cause-consequence relationships, surprises are likely to appear. Using a system approach, and developing indicators of fragility / unsustainability may enable an organization to identify potential Black Swans, and prepare for it.

While the survival approach of sustainability focuses on negative Black Swans, the existence of positive Black Swans also has to be considered in the theoretical considerations as well as the empirical research. A famous example of a negative Black Swan is the disaster in Fukushima - there were no historical records of an earthquake and the resulting tsunami on such a scale. However, one could imagine that such a disaster could take place. For the unprepared company, the lack of demand for a certain product and / or the appearance of substitutes for the product currently successfully sold in the future about which we have no idea at the moment are a kind of negative Black Swan. This is just one example of corporate sustainability – are managers and owners of such potential threats, and do they prepare?

3. Concluding remarks

In this article, a general conceptual framework on the relevance of antifragility for sustainable development and organizational sustainability was presented. Of course, the concepts discussed

here cover only a small part of a complex issue, and is only a basis for deeper elaboration on using the idea of subtractive epistemology as a basis for sustainable development - prevent or elimination of unsustainable activities or fragilities, replacing them, when necessary, with less unsustainable activities.

In this context, the basis of risk management becomes: reduce threats of collapse (eliminate fragilities), while not limiting opportunities for „catching the positive Black Swan". This is a first step in enabling organizations or systems to handle unexpected future events, potentially threatening existence. Following Taleb's ideas, in the analysis and identification of fragilities as well as options for becoming antifragile, the following elements should be considered:

- Individuals' antifragility may make the organization more fragile and the other way round.
- System antifragility depends on the fragility of its elements.
- Organizational reduction of fragility may be at the expense of internal and external stakeholders as well as the sustainability of social, economic, political and ecosystems.

Concluding, a paradigm shift will need be considered in the field of system stability and sustainability from resilience (reducing positive feedback loops which may lead to explosive dynamics in a system (related to fragilities and non-linear negative Black Swans) which can lead to system collapse) to anti-fragility (an organization becoming stronger by way of learning-by-doing / trial and error in an uncertain environment).

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Trwałość, kruchość a polityka dla zrównoważonego rozwoju

Streszczenie

W niniejszym artykule opisano kluczowe założenia koncepcyjne dotyczące znaczenia antykruchości dla zrównoważonego rozwoju oraz podtrzymywalności organizacyjnej. Autor oparł się na podstawie dla ogólnej hipotezy badawczej stanowiącej fundament dla dalszych badań, wymagającej przesunięcia paradygmatu z odporności systemów i organizacji w kierunku antykruchości: Antykruchość to podstawa podtrzymywalności wewnątrz- i międzypokoleniowej, a także przetrwania w długim okresie. Potrzeba więcej aniżeli tylko odporności, która punkt ciężkości kładzie na możliwościach, potencjale i zdolnościach do powrotu do normalności po różnego rodzaju szokach. Strategie podtrzymywalności i zrównoważonego rozwoju powinny koncentrować się na zapobieganiu lub eliminacji niezrównoważonych działań czy kruchości, zastępując je, gdy to konieczne, mniej niezrównoważonymi działaniami. Stanowi to pierwszy krok umożliwiający organizacjom bądź systemom radzenie sobie w obliczu nieprzewidzianych przyszłym zdarzeń, zagrażających potencjalnie ich istnieniu…

Słowa kluczowe: zrównoważony rozwój, trwałość, kruchość, antykruchość, subtraktywna epistemologia