# SLOW THINKING, OR THE ART OF NETWORK THINKING

## SLOW THINKING, CZYLI SZTUKA MYŚLENIA SIECIOWEGO

## Anna Piekarczyk[1], Szymon Strojny[2]

[1] Poland, Poznan School of Logistics, anna.piekarczyk@wsl.com.pl, ORCID: 0000-0003-4342-0921
[2] Poland, Poznan School of Logistics, szymon.strojny@wsl.com.pl, ORCID: 0000-0001-7783-0203

**Abstract:** This article presents Slow Thinking: a reason and action tool used in problem-solving, also referred to as the methodology of network thinking. This methodology allows us to better understand the working of systems, specifically complex systems. It provides a holistic approach, a broad outlook, and examination of the world and a discovering of new relations; all this requires holistic thinking. Here attention is also drawn to the pitfalls of fast thinking and the need to develop the competence of slow thinking. The authors also present exemplary applications of slow thinking with a network model that demonstrates the impact of demographic changes and globalisation on the development of Europe.
**Keywords:** slow thinking, fast thinking, methodology of network thinking, a systemic approach, functioning of complex systems

**Abstrakt:** W artykule przedstawiono narzędzie myślenia i działania oraz rozwiązywania problemów nazywane Slow Thinking lub metodyka myślenia sieciowego. Metodyka ta pozwala na lepsze zrozumienie funkcjonowania systemów szczególnie kompleksowych. Umożliwia holistyczne spojrzenie, szerokie widze-nie i badanie świata, odkrywanie nowych relacji, co zmusza do myślenia całościowego. W artykule zwrócono także uwagę na pułapki szybkiego myślenia (Fast Thinking) oraz na potrzebę rozwijania kompetencji myślenia sieciowego. Przedstawiono też przykład zastosowania metody-ki myślenia sieciowego – sieciowy model obrazujący wpływ zmian demograficznych i globalizacji na rozwój Europy.
**Słowa kluczowe:** Slow Thinking, Fast Thinking, metodyka myślenia sieciowego, podejście systemowe, funkcjonowa-nie systemów kompleksowych

*So, whatever part, element, or aspect we may abstract in thought, this still enfolds the whole and is therefore intrinsically related to the totality from which it has been abstracted. Thus, wholeness permeates all that is being discussed, from the very outset.*

David Bohm, quantum physicist and philosophers

*There is more to life than increasing its speed.*

Mahatma Gandhi

## Introduction

In a networked economy and a global society, intuitive, emotional thinking that allows is to "skip" stages of processes and actions, is gaining in importance in terms of maintaining our decision-making abilities (Muntschick, et al., 2019, p. 37).

The world as we know it is full of countless virtual and material connections, innumerable streams of information and ever growing mountains of "big data". The digitalisation of professional and personal lives has resulted in a sense of hurriedness, a life under pressure of time and a sense of failing to catch up with the rapidly changing environment. This acceleration has led to situations called "short-circuit reactions" (Muntschick et al., 2019, p. 15). Consequently, hasty decisions are made, which are then accompanied by numerous mistakes. The examples are numerous: purchasing an electric drill on Amazon only because it has the best prices, "liking" a funny online video before you have watched it because your friends have "liked" it, "accepting the regulations" because you have done so before. The sense of time pressure results in a way of thinking which can be labelled as superficial at best.

C. Honore notes that the daily treadmill of chores absorbs people so much that they rarely think beyond the next headline or a quarterly balance sheet (Honore, 2004, p. 29). While Honore also admits that speed has helped to change the world in a fantastic and liberating way, he pinpoints that there are things that take time and require for us to slow down. Hurrying in a situation when hurriedness is not recommended and forgetting to slow down come with a price.

The goal of this article is therefore to present an interesting reasoning and acting tool and a problem-solving instrument referred to as slow thinking; or the methodology of network thinking. The authors' intention is also to highlight the pitfalls of fast thinking and the need to develop the competence of network thinking.

## Why erroneous conclusions are drawn from interrelated problematic situations

The world as we know it is becoming increasingly complex and interconnected. These connections and relations are also visible in daily life when, for example, a conflict in the Middle East contributes to the price of petrol rising at your nearest petrol station. Government policies affect the supply and demand on the labour market while gossip and speculations about construction of a motorway within several years impact the prices of real estate in a specific district. Covid-19, climate change, the turbulence accompanying the euro, economic crises and fragile inter-generational relations are more examples of mutually related complex problematic situations.

The biggest challenges in the world, like for example economic crises, political reforms and climate change, are characterised by *dynamic complexity*. This indicates that human development, specifically the daily lives of specific people, determines billions of complex and mutually related systems. These are dynamic systems which typically change under the influence of invisible processes, while at the same time changing the environment (Piekarczyk, 2014, p. 9). At present, the globalised world exerts enormous pressure on people's behaviour and morality (Harari, 2018, p. 65). Every single person is entangled in numerous, all-embracing cobwebs which restrain movements; but also carry the vibrations to some distant locations. Regular daily activities affect people and animals across the globe, while somebody's personal deed can unexpectedly set the entire world on fire.

Psychologist Daniel Kahneman notes that when in a hurry, people tend to think what is easiest to think (Kahneman, 2013, p. 18). He emphasises here that a dramatic, automatic, monocausal, simple linear continuation of the familiar as projection of the future is particularly easy to fathom. In a hurry, people think in terms of practical rules and habits which save energy and effort. This takes little time and energy because it draws on the knowledge accumulated by humans. In this way, people can confirm their view of the world. When humans have at their disposal a reasonable amount of information, quick decision-making is conducive for handling the environment. However, this is operating on *auto-pilot*.

It turns out, however, that this way of thinking often fails, specifically when it refers to complex issues with consequences that arise in a longer perspective. This is distinct in projects which, originally promising, prove to be failures, when strategies turn out to be unsuccessful and actions miscalculated. In a dynamic, complex environment, what seems good today may bring about completely unknown effects tomorrow. Quick thinking has made its way to the press, television, the Internet and daily conversations. Simplified research conclusions are presented, one cause is discussed only with a single effect. "Listening to music helps to lose weight!" or "The more we earn the better it is for our health" are just examples of simplified messages. Even political decisions are partly based on simplified conclusions. They lack reflection and insight. The positive or negative "side effects", oftentimes extended over time and space, are disregarded. K. Neumann noted that many aspects are analysed in a very superficial way because to a large extent, reality is affected by this cause-and-effect thinking (Neumann, 2018, p. 26). For example, the fact that a situation or problem typically has many causes, is disregarded, while the causes are usually "deeper".

## Why societies are plagued by so many grave problems and why the difficulties keep growing

Many researchers are of the opinion that the major reason for the fact that societies are plagued by a growing number of problems is a widespread inability to solve complex problems. There are readily available examples of this state of affairs: experts and politicians, elected to solve the problems of a degrading natural environment (to name just one), or to prevent economic crises, often exacerbate the situation with their decisions (Honegger, 2008, p. 27). Most frequently, this does not stem from bad intentions but rather, limiting oneself to only simple cause and effect relations and thinking in terms of "if this then that". This is a simple cause-and-effect analysis in which only specific parts of a problem situation are viewed i.e. isolated parts of a whole (Piekarczyk, Zimniewicz, 2010, p. 16). When you lower the costs, a company's competitive

edge will grow. Therefore, an analysis covers only specific parts of a problem situation. This formula shows that the thinking of decision-makers and managers does not suffice, specifically in a long-term perspective.

Attention has also been drawn to the fact that instead of taking precautionary measures, because of the negative consequences, people in charge often react only when they start to suffer. They analyse problems and difficulties but they view them separately. They tend to forget that there are multilateral relations and dependences and that they are part of a larger complex system. As a result, society often fends off the symptoms rather than the causes. In order to rise to big and small challenges alike, the skill of network thinking is of great importance. People are not mentally ready for the contemporary "hyper-network" world. Today, companies operate in very complex, non-linear and dynamic environments. which are constantly changing. The plethora of information of frequently uncertain origin, fragmented and multi-contextual knowledge coupled with complex interactions between communication flows, pose new challenges of interpreting the reality and decision-making. Society has not been trained to exist well in the chaos of virtual reality. The way in which a person thinks and acts often leads to a sense of confusion in the vast information flows, drawing hasty conclusions on the "outer world" and therefore the person's acts end up being careless and superficial (Muntschick et al., 2019, p. 19).

Y.N. Harari has joined the discussion on the condition of society and the problems that need to be tackled. He has also noted that people have always been better at inventing tools than using them reasonably. It is easier to engineer a river by damming it than to foresee all the complicated consequences it will have for the ecological system. In the past, humans seized the power of affecting the world around them and transforming the entire planet. What they failed to do was comprehend the complexity of what is a global ecology. As a result, in the course of making various changes, the whole system was unintentionally disrupted and the world is now facing environmental collapse (Harari, 2018, p. 34).

When evaluating the conditions of the functioning of contemporary society, P. Senge emphasise that looking for a reason (typically one, sometimes more) and analysing a simple causal chain by means of the classical reduction-isolation approach (cause and effect) is a typical response in systemic reality (Senge, 2006, p. 23). Then people are far from the position where they are analysing the multi-faceted and multi-direction effects, specifically feedback loops.

On the other hand, K. Neumann pinpointed the issue of universal mental barriers. Research suggests that people are capable of picturing not more than 4 factors which affect each other in a dynamic way (Neumann, 2018, p. 32). In these situations, managers quickly start to simplify everything or make intuition-based decisions. In fact, many decision-makers take into consideration fewer than 4 factors. Neumann also reminds us that the cause-effect thinking, strongly established in consciousness, poses another problem.

T. Eriksen's reflections also relate to the latest developments in the world, when he states that it is quite clear that the contemporary information society is plagued by excess and noise (T. Eriksen, 2003, p. 15). There is too much rather than too little information; so the crucial skill entails protecting oneself against the 99.99% of the information offered that one does not want. Therefore, the overarching aim for educated individuals in the world's rich countries must now be to make the filtering of information a main priority. In this situation, there is an urgent need for a sorting mechanism. A question needs to be posed about the criteria for distinguishing between good and bad, knowledge and noise, when the supply of everything is limitless. This is why now the need for filters, radars, and rules for organising knowledge, has become overwhelming. This may also be the reason why more and more people have got accustomed to living in a world "where colourful fragments of information flit by, lacking direction and cohesion". As a result, people have at their disposal a growing amount of information and know less and less how to use this information.

P. Senge contends that this has resulted in the so-called simplification of reality, where it is easy to miss the dynamics and far-reaching effects of actions; and the seemingly unimportant reasons of serious consequences (Senge, 2006, p. 27). Senge pointed to the importance of not disregarding relations, not making decisions based on intuition or solely on a pattern from the past. As a result, by means of intuition people discover simple cause and effect chains and uncomplicated "laws" governing complex phenomena. These solutions are introduced to economic practice but typically with grave consequences, completely different from the original intentions.

This development is best described by a situation which took place several years ago in the UK. When the English queen asked experts in the London School of Economics why nobody had predicted the financial crisis, she was told that thinking had failed. While analysts worked as best they could, each had been limited to his/her area. They dealt with partial equilibrium but were not interested in global equilibrium (Kowalik, 2010, p. 45).

An analysis of the situation leads to the following question: "What in fact failed?" A hypothesis may be put forward that holistic thinking and analyses were missing during which all the phenomena need to be examined as a whole. It needs to be a systemic approach that allows for a better control over diversity, volatility and uncertainty as it shows the relations between the elements of a system.

Many researchers (including F. Vester, F. Malik and P. Senge) have noted that all the contemporary world problems are dynamically complex. They have highlighted the urgent need of changing the approach to complex problems. Of importance is not avoiding the growing complexity but rather, use it in an informed way.

## How to slow down thinking and handle the growing complexity

Slow thinking indicates a stepping away from linear reasoning, a distancing oneself from the chaos "there" and a pondering of those mental competences that cannot develop under time pressure. Holistic, systemic thinking indicates also an entering of the meta level, looking calmly at chaos and accepting it. This also entails accepting the fact that the complexity of a problem situation cannot be reduced. Slow thinking takes into account the various points of view of a problem situation including feedback. This allows to solve an assortment of complications. Therefore, hasty conclusions and evaluations are avoided whereas a decision is allowed to ripen for a long time.

Research carried out by the Boston Consulting Group suggests that network thinking is a key competence of the future (Boston Consulting Group, 2002). This type of thinking revolves around spotting interdependencies between factors and analysing them. The growing complexity and dynamics of contemporary civilisation (including politics, society, new technologies, science and economy and the natural environment) poses a challenge to all the participants to correctly recognise and analyse the relations between the factors in a system (Piekarczyk, 2014, p.12).

Therefore, network thinking makes it possible to better understand the whole and to draw attention to the processes of change and learning. This methodology allows us to reflect suppositions about the development of a problem situation. It mirrors the mutual impact of factors and each time, determines the influence of one factor on another. The methodology provides various points of view of an issue and examines the relations among the key elements by means of networks. According to the methodology of network thinking, an analysis of the points of view should be followed by a picture of a problem situation i.e. defining the most important relations between the elements and how they affect one another. Therefore, it is recommended to combine these different points of view in order to present the problem situation. Consequently, this situation can be depicted in the form of networks of factors affecting one another.
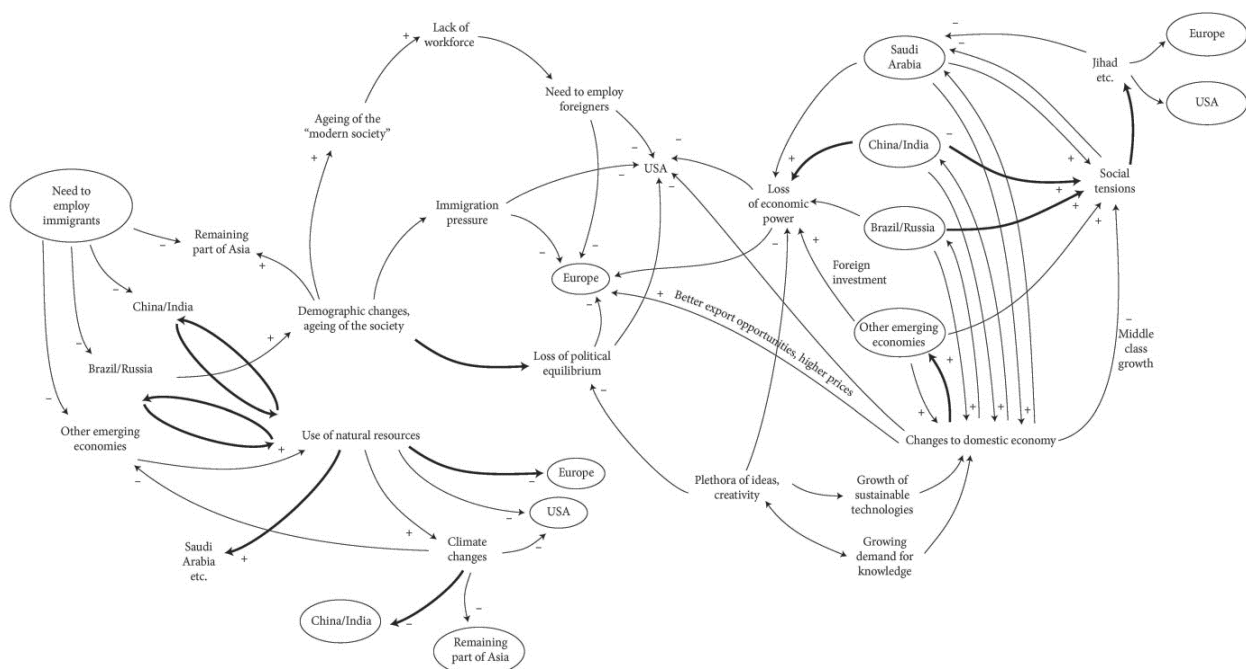


**Figure 1.** Positive and negative reinforcement – the example of a simplified model depicting the impact of demographic changes and globalisation on the development of Europe.

Source: the author's work on the basis of (Neumann, 2012, p. 35).

Gradually, the resulting network of connections creates a holistic picture of the situation which takes into account chains of interactions among the elements and loops of feedback, which either reinforce or balance off a problem situation. In order to create a dynamic network that will allow us to understand how a problem situation develops, the authors of the methodology recommend analysing interactions in three sectional views, considering their type (in the same direction or in opposition to each other), the intensity of the interaction and its time (Ulrich, Probst, 1995, p. 32).The network on Figure 1 depicts a practical example of applying the methodology of network thinking. It includes an outline of the causes and effects of the development of Europe, the major dependencies and inter-actions. This network can be changed and supplemented and therefore it can be the starting point for further discussion.

An analysis of the major relations and inter-actions on Figure 1 shows that in a short time, Europe's history will probably be most affected by the global use of natural resources coupled with the growth of China and India. Both factors will have a positive and negative impact alike, and thus their relative interaction will not be noticeable (it will balance off). On the other hand, the demographic changes, specifically ageing of the society and an emergence of internal markets in developing countries, are important factors which are strongly affecting the situation in Europe. Therefore, the resources of human capital depleting as a result of the ageing of the labour force in Europe, coupled with attempts at solving the problem by employing immigrants, will probably be key to Europe in the long term (Piekarczyk, 2016, p. 11).

## Slow thinking as a method of solving highly complex problems

Complexity is a frequently used term; people tend to intuitively associate complexity with non-transparent, complicated, multi-faceted or inexplicable situations or phenomena.

Social, economic and, equally important, environmental issues are of a complex nature. These sort of problem situations consist of many dependencies and interactions. They are of a dynamic nature i.e. they are systems whose structure and behaviour are not obvious, they need to be figured out first. In these situations, network/systemic thinking proves very helpful. It means an ability to look at a situation as a whole, adopting and considering various points of view, analysing connections and interdependencies. Therefore, it indicates abstaining from classical cause-and-effect thinking.

At first, many people think it is very hard because most people are well trained in "linear thinking". Oftentimes, cause-and-effect thinking works quite well for simple systems but proves completely ineffective in complex problem situations. P. Senge indicated that a majority of actions intended to solve complex problems focus only on the symptoms of the problem, while the causes remain "untreated". As a result, society has made a considerable effort to find a solution, but the effects have been negligible. What is more, the undesired side effects are ignored. This approach to solving complex problems is very harmful (Senge, 2006, p. 23).

For example, in managing people, we always need to consider the relations between them in a systemic way. More important than the causality is the question which factors (elements of the system) affect each other and what effects these relations have. As a result of network thinking, we can recognise and analyse the system structure in a dynamic approach.

A CEO of a company, a leader or a manager will easily see that the content-related aspect of operations is less important than the emotional relations between the parties involved. They often deal with a complex structure of relations. In order to understand or even affect the system, we need network thinking: because various relations and feedbacks cannot be described by means of linear relations. Since everything is connected, a system can be impacted from different starting points and channelled in the desired direction. In order to enjoy specific performance, affecting directly the target values is not always imperative or useful. Instead, a system can be affected indirectly, by working on factors which are far away from each other in time and space. Network thinking allows for an analysis of the dynamic relations between numerous key factors, so as to be able to draw from them ideas of actions. This is the reason why network thinking is a key competence for managers to acquire in the digital era.

In the world as we know it, all the challenges tend to be dynamically complex. What is that dynamic complexity, how should it be interpreted? According to H. Ulrich and G. Probst, to some extent, complex situations "live their own lives" because they respond dynamically to the changes in the environment (Ulrich, Probst, 1995, p. 17). By complex systems, we mean a company, a society, an economy consisting of parts which are interconnected to form a whole. These systems have "revealing" features which cannot be perceived in the course of analysing the specific parts of a system separately (Braun, 2001, p. 21). This

is because these features do not reveal themselves until a system is observed in the course of an operation. The relations between the specific parts of a system determine its mode of operation; therefore, exchange of even a single element of the system can affect the remaining parts. All the elements of the system are directly or indirectly related (Gomez, Probst, 1995, p. 18). Complex systems tend to lack transparency and have limited control opportunities (Honneger, Vettiger, 2003, p. 24). In order to understand the structure of a system and its elements, we need to learn about the whole and not the other way round (Meadows, 2004, p. 14).

Nature offers exclusively open, complex systems. This example is worth following and the knowledge should be transferred into complex systems in the realm of technology. At the same time, we should accept the fact that complexity tends to overwhelm the human brain, regardless whether a problem situation is more or less complex. On the other hand, we should be aware that in many areas, we lack the tools and the language to effectively handle complexity or describe it adequately. This indicates that network thinking helps to better understand the complex nature of an issue yet it is not a "wonder tool" that shows all the connections and feedbacks in the world. One thing is for certain: linear, cause-and-effect thinking definitely fails in handling complexity. This is the reason why "more of the same" or "continuing the old thing" is not going to lead humanity to the desired changes or development.

In order to effectively handle complex systems and environments, we need to increase our own complexity. The situation is frequently just the opposite when efforts are made to decrease complexity and to simplify a problem situation. As a result of simplification, we fail to take note of the key elements and connections in a system. Therefore, complexity requires cooperation. A single person does not have a full picture of a situation or all the required knowledge; the only possibility is to build relations and work together on the applicable solutions. In the course of solving complex problems, various viewpoints should be adopted to approach the problem in a possibly fast and holistic way. Reality has many "faces", while a change to the perception of a complex situation often involves a change to its limits, elements; and the interactions among them. It is of great importance how many factors we take into consideration, because many decision-makers and managers make decisions on the basis of several variables. The media present information in a fragmentary and simplified way whereas network / slow thinking provides a complex evaluation of reality, looking at a phenomenon from different points of view. Slow thinking helps to develop a habit of looking holistically at the world in order to see what others miss. As J. O'Connor and I. Mcdermott noted, only a good understanding of a situation or the changes affecting it as a result of external factors allows us to make the right decisions and impact further development without creating new problems (O'Connor, Mcdermott, 1998, p. 28).

Therefore, the idea of propagating holistic, slow thinking remains topical because there is no doubt that it fosters a comprehension of complex issues and the interdependencies in a system. This approach allows us to adopt a broad, holistic perception of the world; and an examination thereof. This is of special importance in the time analysed by K. Bleicher, who noted that "we work in structures of yesterday with methods of today on strategies for tomorrow mainly with people who have created the structures of yesterday and who will not experience the day after tomorrow in the company" (Bleicher, 2004). Therefore, it is crucial to "see further and deeper". "Seeing further" means that we should not focus on the direct results of a decision, but consider them in a long cause-and-effect chain. The effects will be both positive and negative alike; and over time, they will surface with a varying power. At such a juncture, new factors in a network of interdependencies will be "discovered". The time and dynamics of events will allow us to "see deeper", to discover what a superficial, stereotypical or intuitive analysis has failed to provide (Piekarczyk, Zimniewicz, 2010, p. 12). Therefore, slow thinking makes it possible to better understand a whole and its components and to draw attention to the change and learning processes.

### Final reflections

There are hardly any areas where people do not base their decisions on the evaluation of the development of the economy, the environment and society. In different parts of the world, multi-faceted analyses are carried out to make the best possible decisions and actions. Nevertheless, societies are still plagued by serious problems which are made worse rather than better.

The development of mankind, the world, as well as the daily lives of people, are determined by billions of complex and inter-related systems. They are often observed in a static form but in fact, these are dynamic systems because, as a result of frequently invisible processes, the systems change, at the same time changing the environment. This

is the reason why these processes defy direct observations.

This is one of the causes of problems now plaguing societies: "fast thinking" - simplified thinking based only on a narrow, linear and cause-and-effect lookout - leads to disregarding the complexity of the world. Most people think of certain subjects and act in a fragmentary rather than systematic way; instead of looking at the dynamics and development, they perceive situations as static. As a result of this linear mode of thinking and acting, problems are not properly solved and false conclusions are drawn. What is more, this only exacerbates the existing problems, on a micro- and macro scale alike. This is the reason why network (systemic or slow) thinking is so important: it is a prerequisite for understanding changes and problems.

## References

Bleichert, K. (2004). *Das Konzept integriertes Management: Visionen - Missionen – Programme* [The concept of integrated management: Visions – Missions – Programs]. Frankfurt / New York: Campus Verlag.

Boston Consulting Group, (2002). *Die Zukunft bilden. Eine gemeinsame Aufgabe für Schule und Wirtschaft* [Forming the future. A joint task for school and business]. München: The Boston Consulting Group GmbH.

Braun, W. (2001). Wie man mit der vernetztes Denken Probleme meistert [How to master problems with networked thinking]. *WirtschaftsBild* 23/2001.

Eriksen, T. (2003). *Tyranny of the moment: fast and slow time in the information age.* Pluto Press.

Harari, Y.N. (2018). *21 lekcji na XXI wiek* [21 lessons for the 21st century]. Warszawa: Wydawnictwo Literackie.

Honegger, J. (2008). *Vernetzes Denken und Handeln in der Praxis. Mit Netmapping und Erfolgslogik schrittweise von der Vision zu Aktion* [Networked thinking and acting in practice. Step by step from vision to action with netmapping and success logic]. Zürich: Versus Verlag AG.

Honneger, J., Vettiger, H. (2003). *Ganzheitliches Managgement in der Praxis* [Networked thinking and acting in practice]. Zürich: Versus Verlag AG.

Honore, C. (2004). *Pochwała powolności. Jak zwolnić tempo i cieszyć się życiem* [In praise of slowness. How to slow down and enjoy life]. Warszawa: Drzewo Babel.

Horx, H., Reichel, A., Schuldt, Ch., Papasabbas, L., Rapp, R. (2015). *Zukunftsreport 2016: Das Jahrbuch für gesellschaftliche Trends und Businessinnovationen* [Future Report 2016: The yearbook for social trends and business innovations]. Freiburg: Verlag Zukunftsintitut.

Kahneman, D. (2013). *Thinking, Fast and Slow.* London: Macmillan.

Kowalik, A. (2010). Jak można zobaczyć głębiej i dalej. [How can you see deeper and farther]. *Rzeczpospolita* (Dec. 6).

Meadows, D. (2004). *Limits to Growth: The 30-Year Update*. Chelsea Green Publishing; 3rd edition.

Muntschick, V., Papasabbas, L., Pfuderer, N., Schuldt, Ch., Seitz, J. (2019). *Neo-Ökologie: Der wichtigste Megatrend unserer Zeit* [Neo-ecology: The most important megatrend of our time]. Freiburg: Verlag Zukunftsintitut.

Neumann, K. (2012). *Bauch trifft Computer* [Belly meets computer] Retrieved from http://www.consideo-modeler.de/downloads/BauchVsModel.pdf

Neumann, K. (2012). *Know-why – Erfolg durch Begreifen* [Know-why – success through understanding]. Norderstedt: Books on Demand GmbH.

Neumann, K. (2009). *Know-why. Chancen für eine bessere Welt* [Know why. Opportunities for a better world]. Norderstedt: Books on Demand GmbH.

Neumann, K. (2009). *Know-why. Management kapiert Komplexiät* [Know why. Management understands complexity]. Norderstedt: Books on Demand GmbH.

O'Connor, J., McDermott, I. (1998). *Die Lösung lauert überall. Systemisches Denken verstehen & nutzen* [The solution lurks everywhere. Understand & use systemic thinking]. Freiburg: VAK Verlag Kiechzarten.

Piekarczyk A. (2016). Rola metodyki myślenia sieciowego w rozwiązywaniu kompleksowych

Problemów [The role of network thinking methodology in solving complex problems]. *Management Forum*, 4(2), 5-10.

Piekarczyk, A. (2014). Myślenie sieciowe jako kluczowa kompetencja przyszłości [Network thinking as a key competence of the future]. *Marketing i Rynek*, 5, 8-19.

Piekarczyk, A., Zimniewicz, K. (2010). *Myślenie sieciowe w teorii i praktyce* [Network thinking in theory and practice]. Warszawa: PWE.

Probst, G., Gomez, P. (1989). *Vernetztes Denken. Unternehmen ganzheitlich führen* [Connected thinking. manage companies holistically]. Wiesbaden: Gabler Verlag.

Schwiezer, P. (2008). *Systematisch Lösungen finden. Eine Denkschule für Praktiker* [Find systematic solutions. A school of thought for practitioners]. Zürich: vdt Hochschulverlag an der ETH Zürich.

Senge, P. (2006). The Fifth Discipline: *The Art & Practice of The Learning Organization*. Doubleday, Revised & Updated edition.

Ulrich, H., Probst G. (1995). *Anleitung zum ganzheitlichen Denken und Handeln. Ein Brevier für Führungskräfte* [Guide to holistic thinking and acting. A breviary for executives]. Bern: Paul Haupt.

Vester F. (2008). *Die Kunst vernetzt zu denken. Ideen und Werkzeuge für einen neuen Umgang mit Komplexität* [The art of networked thinking. Ideas and tools for dealing with complexity in a new way]. München: Deutscher Taschenbuch Verlag GmbH.