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EXTERNAL AND INTERNAL DETERMINANTS OF MODERN BUSINESS MANAGEMENT

Edited by
Andrzej Jaki, Bernard Ziębicki

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Table of contents

Introduction

The turn of the 21st century has proven to be a period of major transformations in the mechanisms of the functioning of economies that have resulted from the impact of the transformation and globalization processes that have marked out a substantially different order in the entirety of our social, economic, political, and legal systems. Supported by their growing openness and resulting interrelations, the processes of deregulating and liberalizing economies have contributed to the intensification of capital flows in the global dimension and the unprecedented development of financial markets. The domination of the ownership structures of enterprises by institutional investors has become a factor that has stimulated the merger and acquisition processes, fostering an increase in the significance of global corporations.

The first decades of the present century have also depicted the power of a critical situation's influence on the functioning of economies and their entities. The global economic crisis that started with the collapse of Lehman Brothers in 2008 (which was the first crisis of the globalization era) reminded executives that crises are an inherent element of the functioning of an economy and a factor that implies the need for searching for new management solutions that can guarantee the survival of enterprises and their abilities to fulfill their goals. Totally different conditions are currently accompanying the critical situation evoked by the COVID-19 pandemic that started in China at the end of 2019; this has contributed to the economic, social, and political destabilization in the global dimension that will reverberate for decades.

The transformations that we have witnessed in recent decades have also contributed to important transformations in corporate management. The consequences of these are changes in management paradigms and concepts (referring not only to the occurrences of new solutions within this scope but also primarily in the evolution of existing ones) and the creation of hybrid paradigms and concepts (adjusted to the undergoing changes with regard to the relationships of an enterprise with its stakeholders). As a consequence, there has been an

important redefinition of the basic goals of a business, which have also implied changes in the shaping and influence of corporate governance mechanisms as well as the emergence of new business models. These models are a response to the changes that have referred to the growing role of intangible assets, innovation, and digital technologies that we have just witnessed arising from the impact of the Fourth Industrial Revolution.

This monograph (which is an effect of the scientific cooperation among the College of Management and Quality Sciences, Cracow University of Economics, with other scientific environments as well as business environments) discusses the aforementioned problems from the theoretical, methodological, and practical perspectives that are presented in the following chapters. It has been divided into the following three complementary parts:

- Macro- and Micro-Environment of Modern Business;
- Methodological and Practical Perspectives of Managing Modern Business;
- Innovation and Digital Technologies in Face of Challenges of 21st Century Economy.

Part One, entitled *"Macro- and Micro-Environment of Modern Business,"* discusses the problems that refer to the transformations of the activities of enterprises resulting from the impact of external factors and how to manage them. Individual chapters focus on showing varied changes in the economic and social environments, implying the need for redefining corporate strategies, creating and implementing new practices in management, and using intellectual capital as the key component of the assets of a business.

Part Two of the monograph, entitled *"Methodological and Practical Perspectives of Managing Modern Business"*, substantiates deliberations that refer to the conditionings of managing a contemporary business. In this context, the authors expose the significance of process-based management and performance management as efficacious solutions that can help guarantee the effective accomplishment of corporate goals. At the same time, they emphasize the importance of IT Governance and quality management from the point of view of accomplishing stakeholders' goals and building the competitiveness of firms on the market.

Part Three, entitled *"Innovation and Digital Technologies in Face of Challenges of 21st Century Economy,"* focuses on the consequences of the impact of the Fourth Industrial Revolution on the mechanisms of the functioning of contemporary entities and economies. This refers to the growing importance of digital competencies, the creation and implementation of innovation, and the ability to use modern media and IT technologies in order to stimulate the effectiveness and competitiveness of an enterprise.

As the scientific editors of this monograph, we would like to thank all of the authors for accepting the invitation to co-create it and for sharing their research findings with the readers.

Andrzej Jaki, *Bernard Ziębicki*

PART I MACRO- AND MICRO-ENVIRONMENT OF MODERN BUSINESS

Chapter 1

Changes in Aggregate Macroeconomic Environment and Enterprise Management Strategy: Some Introductory Considerations on Role of Organizational Culture in Knowledge-Based Organizations[1]

Riccardo Valente

1. Introduction

The present work analyzes how the changes registered since the 1970s in the macroeconomic environment and management methods can be reconnected to the increased relevance of organizational culture in modern management. Moreover, it provides a classification of the features that organizational culture should most profitably assume in a knowledge-based organization. This study is part of a research program that is wider in aim and links phenomena observed in the macroeconomic environment and the evolution of economic theory and management theory and practice in the 20th and 21st centuries as to provide a better framework for the interpretation of knowledge-based economy. Although limited in scope, the present work is therefore strictly connected with other studies undertaken by the author as well as other scholars on the matter. The main hypothesis of the present work is that the increased relevance of organizational culture that is currently observed as well as the ideal features that organizational culture should assume in knowledge-based organizations are in line with the increased relevance of human capital, knowledge, and innovation registered in the current economic reality. The methodology employed in the present work is mostly a critical analysis of the academic literature, although some parts that are based on statistical data analysis and elaboration realized by the author in former research are briefly

[1] **Acknowledgement and Financial Disclosure** – The publication was financed from the statutory research funds of the Department of Organizational Behavior of Cracow University of Economics.

presented as well. Finally, it seems worth pointing out that, according to the author, the present study has to be treated as a conceptual one that is dedicated to the introductory verification of some of his research hypotheses that are instrumental to their further refinement, better elaboration, and systematization in future research.

2. Aggregate macroeconomic trends, management method evolution, and lower relevance of order and control system

2.1. Aggregate context and some linkages to knowledge-based economy

As per the author's former studies already published (Valente, 2016a; 2016b) or those awaiting publication at the moment of writing (Valente, 2020; 2021), it is possible to underline that the present phase of modern economic systems' development – also known in the literature as knowledge-based economy – as well as the overall evolution of the macroeconomic environment registered in major market economies and worldwide since the start of the 20th century through the present needs to be interpreted based on an integrated macroeconomic and management science approach. Such an approach is the main interest of the author's research and is presently in elaboration (Łukasik & Valente, 2021) or has already been autonomously elaborated by the author (at least in its basic features) as to solve the relevant controversies present between both different theoretical approaches (e.g., mainstream one and Classical-Keynesian or post-Keynesian one – Valente, 2014; 2016a; 2016b; 2020) and differences of points of view about the main features of the knowledge-based economy phase of development of modern economies (Łukasik & Valente, 2021; Valente, 2020; 2021). As a matter of fact, the main features of the analysis and research by the author have led to the main conclusions that the long-run evolution of the main macroeconomic variables taken into account – reported in Figure 1 – can be interpreted mainly based on a Keynesian approach, leading to the results that the current phase of modern economic systems development can be characterized as a period during which a step decrease of the profitability of investing in physical capital is registered (Valente, 2016a; 2020).

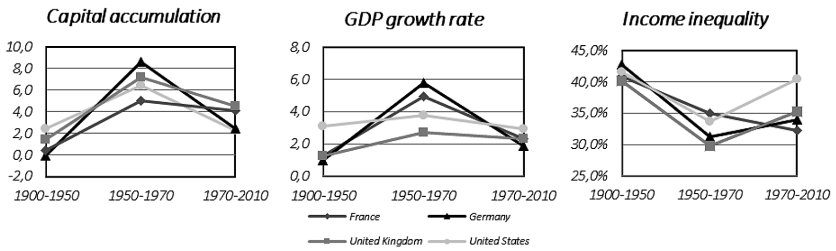

Figure 1. Macroeconomic trends registered in main market economies registered during 20th and 21st centuries
Source: own work based on Piketty (2014) and Maddison project dataset

At the same time, however, the fact that human capital, knowledge, and innovation[2] increased their relevance in the present context as well as the showing up of relevant phenomena of financialization have to be analyzed based on a mix of arguments derived from neoclassical endogenous growth models (Valente, 2016b; Jabłoński, 2012), the two Cambridge capital controversies (Valente, 2014; Galbraith, 2014), the most recent studies based on different theoretical approaches justifying the observed financial assets value increase and a systematic analysis of trends registered in managements method evolution since the first half of the 20th century or since the 1970s (Valente, 2018; 2019b; 2020; 2021). Proving a short and not completely exhaustive summing up of the author's introductory conclusions and/or the main research hypothesis under further refinement and elaboration, it then must be pointed out that, since the 1970s or 1980s, the main features of the main market economies or of the overall economic environment on a global scale became the following:

- The high and progressively rising inequalities in the distribution of wealth and income (both from wealth and work – Piketty, 2014; Kunkel, 2014), which led to the decreased profitability of standardized consumption goods produced en masse at the lowest cost possible at the firm and management levels (Valente, 2019b; Mikuła, 2006; Szatkowski, 2014; Brzeziński, 2013) and the stagnation of aggregate demand, sales opportunities, the profitability of investments in physical capital, and the average GDP growth rate (Onaran & Galanis, 2012) stably registered since the 1970s in developed market economies at the macroeconomic and aggregate levels (Valente, 2016; 2018; 2020; Kunkel, 2014; Mikuła, 2006);
- The lower stability of free-market economic systems, which can be pointed out to have taken place based on the showing up of more-frequent economic crises, lower GDP growth rates, and lower physical capital accumulation rates (Onaran & Stockhammer, 2001a; 2001b) and can be considered both as the effects and causes of the changes in management

[2] An autonomously elaborated approach to how the increased role of innovation can be explained will be presented soon by the author in future publications. As a matter of fact, this is the element of his integrated framework of analysis, which has to be soundly interpreted in the nearest future in more detail. It can be pointed out, however, that the first studies realized seem to support the integration of Schumpeterian principles and Kaleckian model of diffusion of innovation. According to Schumpeterian approach, indeed, investment in innovation generates returns or profit rates that are higher than normal (or average) market profit rate perceived by not-innovating firms, and can therefore be expected to be more attractive in periods during which average profit rate is lower and aggregate demand is stagnating. The robustness and usefulness of Kalecki's demand-led model of innovation diffusion was, instead, scrutinized in former works (Valente, 2019a) and it can account for a slower pace of diffusion of innovation, when aggregate demand and physical capital accumulation are stagnating. In current lower economic growth scenario, therefore willingness to invest in innovation will increase due to the longer timespan during which innovators can operate as quasi-monopolists in the market as well.

methods due to the nature of reciprocal two-sided inter-linkages among short- and long-run macroeconomic context evolution (Garegnani, 1983) and the management methods one (Valente, 2018; 2019a);

- The increased relevance of foreign market and product quality as compared to the dominance of sales volumes (quantity) and domestic markets in former development phases of modern economic systems, which are factors that can be logically linked to globalization, delocalization, and outsourcing, also being seen as a not very sound way of sustaining firm competitiveness in some cases (Valente, 2018) and react to the stagnation of sale opportunities stably observed worldwide in domestic markets;
- The reorientation of the whole economy and single firms from the capital-intensive and stagnating industrial and manufacturing sector focused on material goods towards the less capital-intensive services sector in which the variable costs and, in particular, those variously connected with personnel are more relevant as compared with the industrial sector in which machine and equipment and other fix costs are dominant;
- The increasing relevance of intangible assets (for example, knowledge, innovativeness, flexibility and adaptability, employee skills and abilities, broadly understood human capital, etc.), both at the aggregate level and among a firm's sources of comparative advantage against competitors as compared to tangible ones, which can also be considered to be a way of reacting to the changes of aggregate economic conditions in which business has to take place and at least partially reconnected with the financialization presently registered worldwide (Galbraith, 2014; Kunkel, 2014).

As it is possible to signalize analyzing Figure 2, moreover, these trends are perfectly in line with the changes registered in management methods, which in turn can be considered to be a very relevant factor that affects further aggregate macroeconomic context evolution in the long run (Valente, 2018; 2019b).

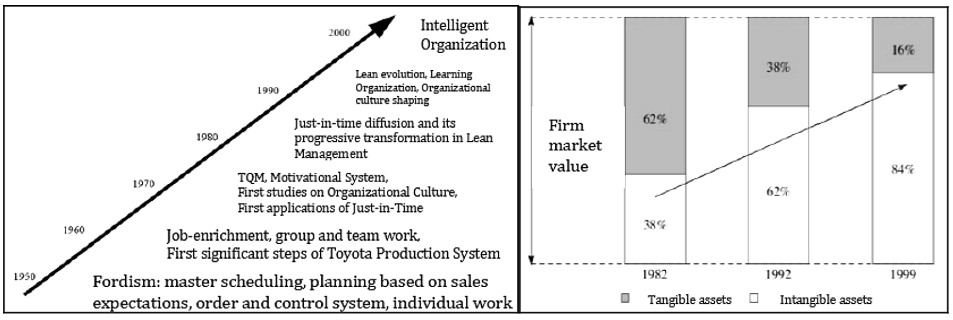

Figure 2. Trends registered in management and reorientation toward intangible assets
Source: own work based on Pietruszka-Ortyl (2006) and Czerniachowicz (2003)

It then seems worth focusing on further parts of the work on providing a short summing up of management method evolution that can be seen as both respondent to the trends observed in the macroeconomic environment and the emergence at the present of so-called knowledge-based organizations.

2.2. Fordism and crucial role of order and control system in Industrial Age

In economic history, few management methods were as popular and widespread as Fordism was. Its elaboration can be considered to predate the First World War, and its spread outside Ford factories was already on the go by the time the 1929 crisis hit (Szatkowski, 2014). However, it got more popular and widespread both west and east of the Iron curtain after the Second World War and undoubtedly dominated work organization in Western market economies until the 70s (Emiliani, 2006; Valente, 2019b). In centrally planned economies, its undisputed dominance lasted even longer, being dismissed just by the time socialist regimes fell and the Soviet Union dissolved at the end of the 80s or the start of the 90s (Bril, Łukasik, 2013). Due to its very long period of diffusion and application (Knuf, 2000; Szatkowski, 2014), Fordism has somehow permeated the public's perception of how work organization and management works or has to work so deeply that it is possibly the management method on which people who are not adept to the most recent management theory and practice evolution base their common-sense reasoning when they think about management and try to imagine what factory work looks like. Such a method can be seen as very strictly connected with what in the academic literature is defined as traditional organization (Mikuła, 2006; Valente, 2020). Public opinion, however, is absolutely not up-to-date; although Fordism is still used nowadays in some specific sectors,[3] management practice and theory evolved very deeply starting in the 1970s, leading to the emergence of management methods that were completely opposite to it in many respects. The most advanced form, which Fordism has historically assumed, is characterized by the application of master production plans or schedules (an example of which is provided in Figure 3).

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[3] For a short characterization of different management methods profitability cf. Valente, 2019b. For a short discussion of the matters connected with the concept of full capacity utilization, both in management and macroeconomics and the somehow misleading idea that full capacity utilization achievement does not leave any room for increases in production levels Cf. instead Valente, 0non-rhythmic production method can be as well-comprehended in Fordism since it is signalized in the literature as being sub-optimal in comparison with rhythmic one it will be not discussed in the present study as to allow for comparing the best method available based on the Fordistic approach with other management approaches and do not falsify the comparisons by referring to a clearly suboptimal sub-method, however perfectly in line with the same general principles on which Fordism is based (Brzeziński, 2013; Szatkowski, 2014).

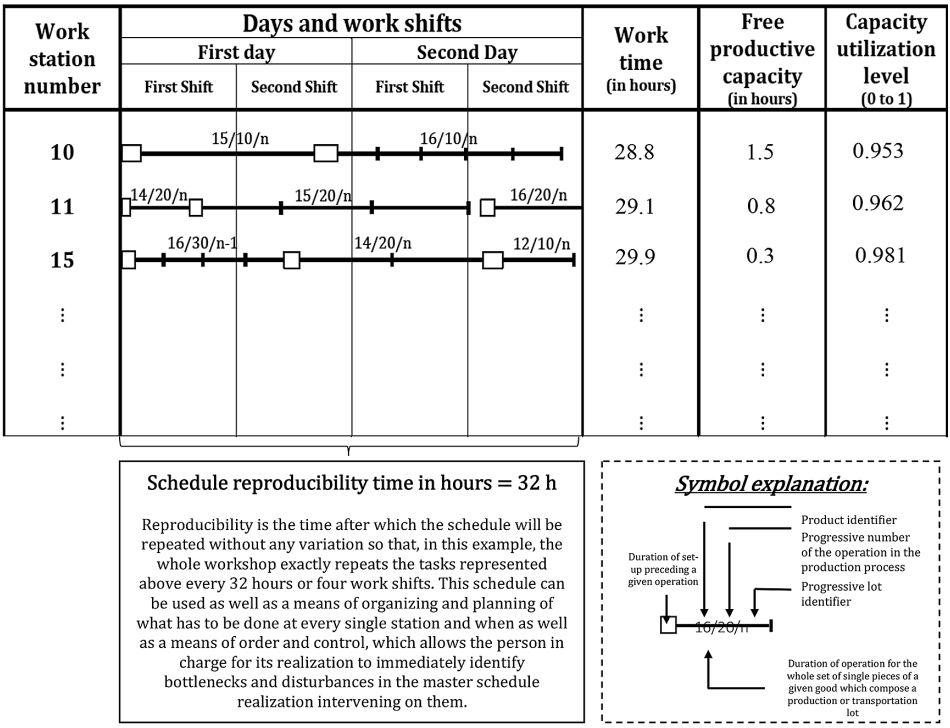

Figure 3. Master production planning in Fordistic rhythmic production
Source: own work based on Szatkowski (2014) and Brzeziński (2013)

The main advantage of a master production schedule is to allow one to plan and control the whole production process and to achieve the highest possible level of capacity utilization on the basis of which additional schedules concerning the whole rest of the production process planning and controlling are elaborated (Brzeziński, 2013; Szatkowski, 2014).

The adoption of such a rigid order and control system, however, is one of the main causes that lead to employee alienation, higher levels of unionization, and increased susceptibility to engage in strikes or passive sabotage activities on the employees' end. To these activities, firms adopting master scheduling are very sensitive due to their high reliance for profit maximization on synchronization, the timely elimination of bottlenecks, the volumes of production increases, and full capacity utilization (e.g., factors allowing us to keep unitary production costs low, justifying the usefulness and the very existence of Fordism).

The showing up in 60s and 70s of frequent conflicts with trade unions and oil shocks as well as the abrupt switch in aggregate economic conditions that lead to the systemic crisis of the formerly prevailing regime of the high rate of GDP growth, which allowed the sale of rising volumes of production, caused then the

progressive questioning of Fordism during the 70s. Although other tendencies were also relevant at first, the elaboration of the just-in-time method can be seen as the prevailing long-run alternative to Fordism in the new aggregate context since the start of the 80s. This method can be considered as the forefather of most up-to-date management methods (i.e., first, lean management, and then, knowledge-based organizations). Let us briefly see how it is possible to explain why just-in-time became so popular after the 70s and why its affirmation can be considered to be a turning point in management science evolution.

2.3. Management methods evolution leading to knowledge-based organizations

Although such an analysis is not necessarily very refined and limited in scope, it is possible to underline the main advantages of the just-in-time method over Fordism depend mostly on the fact that it is more flexible, less capital-intensive, and less reliant on economies of scale. Just-in-time has therefore demonstrated itself to be more profitable for any firm applying it in a context in which economic instability (as was the case in the 70s and 80s), more frequent economic crises, and increased concurrency become regular macroeconomic tendencies. As shown in Figure 4, the just-in-time implementation allows for higher flexibility and faster adaptation to changes in market conditions, reducing losses during economic slowdowns that were registered more frequently in the new macroeconomic context prevailing since the 70s.

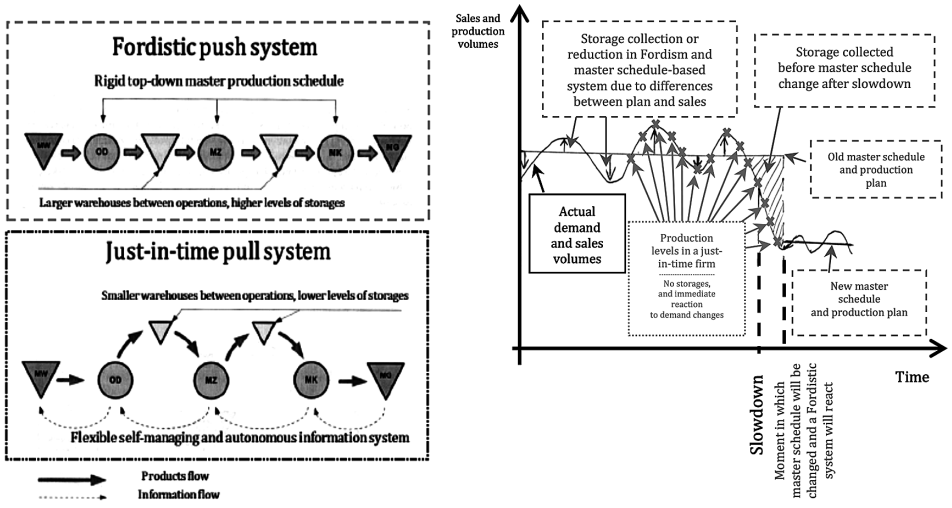

Figure 4. A comparison of Fordism and just-in-time
Source: own work partially based on Szatkowski (2014) for left scheme

It then seems possible to date back to just-in-time many of the tendencies of the reorientation of management methods from the hierarchical and rigidly

organized Fordistic method toward more flexible ones based on proper worker selection and motivation, teamwork, and replacement of rigid top-down control and orders system with organizational culture, which are relevant trends that have characterized the evolution of management methods over the last seven decades.

Taking into account Equation (1) of profit calculations[4] provided below:

$$\frac{I}{T} \leq \frac{\Pi}{T} = \frac{(p*q*Q) - \left[(k*q*Q) + \left(K/q\right)\right]}{T}, \tag{1}$$

a characterization of different profit maximization strategies on which a given management method is mostly based upon, can be provided as in Table 1.

Table 1. Different profit maximization strategies in analyzed management methods

Fordism (rhythmic production)	Just-in-time	Lean Management	Knowledge-based organizations
Profit maximization is mainly realized through two simultaneous mechanisms. The first is the reduction of unitary variable costs (*k*) and, in particular, of variable costs connected with worker selection and training, set-up times and costs, and workshop transportation ones (ambiguous effects in the case of storage, raw materials, and energy can however show up). The second one is, instead, the increase of quantity of products sold (*q*) aimed at reducing unitary fixed costs (*K*/*q*) on the basis of high capacity utilization rate achievement allowing us to make profitable through economies of scale the high capital intensity of such a method as compared to others (e.g., higher fixed costs – *K* – due to expensive and highly specialized equipment and machinery employed in productive process).	Profits are maximized mostly due to flexibility and adaptability to changes in sales opportunities in the market and product differentiation (e.g., which are factors that can be expected to allow a firm to registered on average higher sale prices – *p*) and with them connected reduction of production cycle length (*T*) and fix costs (*K*), which can be expected to be on average lower than in Fordism mainly due to the fact that storage and equipment costs are reduced. A rise of unitary variable costs (*k*) can possibly be experienced due to increases in the frequency of set-up times showing up, smaller transportation, and production lot implementation, which lead to higher transportation costs as well as increased focus on the quality of products, and on worker selection, training, and motivation.	In many respects, lean can be considered similar to just-in-time, so that profits still get maximized through production cycle (*T*) shortening and fixed costs reductions (*K*) thanks to flexibility and resignation from highly specialized, but scarcely adaptable to other productive process realization equipment and machineries. Through the value stream mapping technique and the central role played by the overall philosophy of waste elimination, an increased focus on variable unitary cost (*k*) reduction shows up and is more systematically implemented side by side with a more relevant role ascribed to clients and customer preferences and increases of quality (*Q*) of products offered, leading overall to the fact that achievable average sale prices can be expected to be higher as compared to the just-in-time method.	Although maintaining many of the features typical of lean and just-in-time and improving on that front, knowledge-based organizations start to systematically look for occasions to employ their resources (e.g., mostly intangible assets, but coordination of tangible and intangible as not to be underestimated), which allows us to increase sale prices (*p*), quality (*Q*) of products offered, and/or quantity (*q*) without facing additional costs and making the best use of the occasions offered by the emergenc e of new market segments in which the showing up of decreasing unitary costs both fix (*K*/*q*) and variable (*k*) is registered (Cf. Kelly, 2001), allowing us to partially recover the lost since resignation from the Fordism factor of economy of scale to increase profits.

Source: own work.

[4] In both Equation (1) and Table 1:

— *I* are interests paid for a credit equal in monetary term to costs sustained for productive process realization based on the condition registered in the financial market or bank sector,

As already discussed in the literature (Mikuła, 2006) and partially ignoring the present yet less relevant differences between learning and intelligent organizations (Czerniachowicz, 2003), it seems possible to sum up the differences between traditional and knowledge-based organizations as provided in Table 2.

Table 2. Traditional and knowledge-based organizations

Features	Traditional Organization	Knowledge-based Organization
Aim and main field of specialization	Increasing profits through focusing on mass production of material goods and tangible assets.	Creating global value by focusing on technology, information, knowledge, and intangible assets as main sources of added value.
Strategy	Passive (lack of reaction to environmental changes – Fordism) or reactive (lagged reaction to change – JIT and lean).	Proactive, based on anticipating change or initiating it to take advantage of the potential benefits from it.
Dominant assets and sources of market value	Physical and financial capital, organization market value depends mainly on the value of tangible assets it owns.	Knowledge and intellectual capital, organization market value depends mainly on intangible assets and the degree at which they are effectively utilized.
Approach to uncertainty	Unusual events are regarded as threats. Avoidance of uncertainty and risk reduction by mean of control system.	Unusual events are regarded as development chances. High tolerance for uncertainty and risk taking as a means to support innovativeness.
Functioning and internal organization	Formalized and stable, based on sticking to stereotypes and fixed norms, refusing information not coherent with them and focusing on the efficacy of internal organization processes.	Adaptation to every different situation based on its exceptionality, refusing stereotypes and fixed norms and relying on continuous reorganization of external and internal reality interpretation and perception.
Approach to change	Change is seen as a threat, strong reliance on the positive role of organizational stability, chance is implemented only if strictly necessary and with a given slower pace.	Strong change orientation, continuous process of enhancement and improvement through assuming an organic denial of past practice optimality approach.
Sources and approach to authority and employee autonomy	Authority is based on hierarchical position, relations are rather stable and based on leaders authority, while employees are strongly subordinated to it.	Authority relies on knowledge and its structure is unstable and based on heterarchy, employees have great autonomy based on their knowledge and professionalism.
Interpersonal relationships and prevailing organizational structures and communication styles	Stable relationships, rarely changing and based on strong exclusive affiliation to a given group, with whom a given individual is stably linked. Communication is rather vertical and formalized, while hierarchical and stable organizational structures prevail.	Relationships are fluid and often changing due to rotation. Harmony in cooperation is sought and temporary membership in different groups at the same time is usual. Communication is horizontal and informal, while organizational structures often change.

— T is the time inter-curing since first cost payment and revenue perception in the case of a productive process (e.g., production cycle length) or the duration of the borrowing in the case of a financial investment,
— P are total profits,
— p the unitary sale price,
— Q the quality of products,
— k the unitary variable costs,
— K the total fix costs,
— K/q unitary fix costs (inversely proportional to level or rate of productive capacity utilization).

Features	Traditional Organization	Knowledge-based Organization
Organization borders and style of cooperation with external stakeholders	Clear and well-defined borders between functions, organizational units, and whole organization in general that is characterized by a lack of strong cooperation linkages and contacts with suppliers, external partners, and customers, which are limited to financial benefits dimension.	Fluid and not-well-defined borders between functions, organizational units, and whole organization and external stakeholders in general. Strong reliance on tight partnership and cooperation based on reciprocal trust, engagement of customers, suppliers, and partners in the creation of value.

Source: own work based on Mikuła (2006)

It seems worth signaling that, although a traditional organization's features can be partially interpreted as mainly based on Fordism ones, they are common to just-in-time and lean management in some cases as well, while the knowledge-based organizations ones can be seen in many respects as significantly different from any of those formerly prevailing in other management styles (Mikuła, 2006). Many knowledge-based organization features can be considered to be tightly connected with an organizational culture as those presented in Table 2 and concerning strategy, approach to uncertainty, functioning and internal organization, approach to change, sources and approach to authority and employees autonomy, interpersonal relationships and prevailing organizational structures and communication styles, organization borders, and style of cooperation with external stakeholders (Mikuła, 2006). The next section underlines what kind of organizational culture can be considered the most profitable to support the knowledge-based organization features presented above.

3. Ideal features of knowledge-based organizations culture

As pointed out in the literature (Potocki, 2005), the organizational culture of a given firm or organization can be classified according to different criteria (such as the following):

- Style of reaction to change under which we are able to distinguish flexible or rigid organizational culture, being the second characterized by a lack of (or lagged) reactions to external change, while the first can be briefly defined as actively or proactively dealing with it.
- Culture influence on an organization, which leads to a dichotomy between weak or strong, with weak cultures poorly felt among organization members, leading to an overall disorientation about the organization's goals and aims, while strong cultures are heartedly felt and univocal in their interpretation (although they can tolerate different behaviors as per the softness aspect).
- Its influences on interpersonal relationships (which can be negative or positive), which can be in many respects understood as an instrumental

aspect achieved partially through the implementation of other organizational culture aspects.[5]

- Openness of an organization and risk orientation, in which case it is possible to differentiate extroverted culture (e.g., open to external environment and to risk-taking) or introverted culture (e.g., focusing on internal dynamics, internal process improvements, and negatively oriented toward both risk-taking and external change). In the most extreme cases, the last can lead to the prevailing of an insider-outsider model in the relationships between newly hired employees and their colleagues, between members of different internal departments, or with external stakeholders and shareholders.
- The orientation of the organization toward the past or future, where we have conservative cultures or innovative ones. While a conservative culture focuses mostly on its past achievement and stresses their importance through different symbols, rituals, and ceremonies, an innovative culture focuses more on promoting itself in term of readiness to unconventional undertakings and a willingness to always look forward instead of backward, systematically looking for further improvements.
- The approach to formal rule applications, in which case, we differentiate bureaucratic or pragmatic cultures, basically referring to the fact if norms and procedures are treated as some kind of laws to which every member has to adhere or just as standard practices until now elaborated, which do not have to be treated rigidly by anyone, since deviation is allowed when the situation requires so.
- Grade of hierarchization basing on which egalitarian cultures and elitist culture can be distinguished. Other than for the approach to hierarchy, which plays a much bigger role in elitist ones, the two can be differenced as well by the style of communication, dress-codes, and physical artifacts they promote, while differences in employees selection can also emerge with workers selection practices less based on uniformity of skills and experiences among workers employed in the case of an egalitarian one.
- Openness to argumentation and tolerance for errors, where we can distinguish soft cultures (e.g., tolerating errors and deviations from standard procedures) and hard cultures (e.g., not very open to errors nor deviations from standard procedures). A soft culture, then, first of all promotes

[5] The weakness of an organizational culture can, for example, be linked to the showing up of negative relationships in an organization, leading to potential conflicts in the workplace and among the different sub-structures of the organization, the higher level of employee withdrawal, motivation, and absences, lower work satisfaction among the personnel, the hampering of effective communication inside and outside the organization, and the showing up of negative effects on employees even at a personal level with harassment, alienation, and other such pathological states.

a trial-and-error approach to innovation achievement, which tend do not punish deviation from standard procedures as to do not discourage potential improvements, which can derive from successful and not-earlier codified new approaches to problem-solving elaborated from workers. It promotes moreover individualism, autonomy in decision making and lack of conformism. It can be finally characterized as sustaining institutionalized self-organization on the work-place and orientation toward argumentation and discussion, transparency of communication and the free-access to information to every member of the organization independently from hierarchical roles.

As already pointed out above, it has to be underlined that a strong reliance on effective organizational culture shaping shows up in knowledge-based organizations, leading to the connection among knowledge-based organization features and their ideal organizational culture presented in Table 3.

Table 3. Ideal features of knowledge-based organizations culture

Features of knowledge-based organization interconnected with organizational culture or aims achieved through its shaping	Organizational culture features of learning and intelligent organizations (Jabłoński, 2009; Mikuła, 2008)	Ideal organizational culture features
Proactive strategy based on anticipating change or initiating it as to take advantage of its potential benefits. Unusual events are regarded as development opportunities.	Proactive goals aimed at changing the environment. Actively seeking new opportunities. Continuous search for possible changes and improvement through experimentation.	Flexible
Strong reliance on tight partnership.	Strong team-based culture supporting free exchange of thoughts and ideas. Diffusion of knowledge in the whole organization. The showing up of common values and points of view on how success can be achieved. Elaboration of many common ceremonies and rituals and the creation of "heroes" characterized by features supporting the organization's development.	Strong
Harmony in cooperation. Cooperation based on reciprocal trust.	Affirmation of a culture characterized by openness, fairness, and high trust in learning. Orientation toward people and needs and expectations of employees. Showing systematic support and help to employees, treating them with respect, and showing them deep faith in their engagement in an organization's goal achievement and correctness towards it.	Positive
Not-well-defined borders between functions, organizational units, and of a whole organization in general. Engagement of customers, suppliers, and partners in the creation of value. High tolerance for uncertainty and risk-taking as a means to support innovativeness. Creation of global value as main goal.	Unconventional analysis of processes showing up in the organization. Support for the creation of learning partners community. Low level of uncertainty avoidance, due to need to tolerate it and undertake risky choices and experiments. Acceptation of new ideas and employees. Undertaking of brave decisions. Focus on external processes, market analysis and customers' needs. Continuous attempts to improve products quality, trying to increase customers satisfaction as much as possible.	Extroverted

Features of knowledge-based organization interconnected with organizational culture or aims achieved through its shaping	Organizational culture features of learning and intelligent organizations (Jabłoński, 2009; Mikuła, 2008)	Ideal organizational culture features
Strong change orientation, continuous process of enhancement and improvement. Continuous reorganization of external and internal reality interpretation and perception.	Continuous discussion and re-elaboration of chosen strategy. Experimentation of new ideas and approaches and implementation of new unconventional solutions. In-depth analysis of problems not based on simply finding the easiest answer possible but for more complex as well, taking into account different solutions often (even completely opposite to those that have been normally adopted until now). Focusing on strategic sphere, looking for long-term undertakings. Promotion of originality and innovativeness. Faith in the value of continuous learning.	Innovative
Refusal of stereotypes and fixed norms, organic denial of past practice optimality approach. Worker autonomy based on their knowledge and professionalism.	High tolerance for different behavior styles of organization members and partners. Reduction of planning role and avoidance of formal structure whenever possible.	Pragmatic
Communication is horizontal and informal, organizational structures often change, authority relies on knowledge and its structure is unstable and based on heterarchy. Relationships are fluid and often changing due to rotation. Temporary membership in different groups	Consideration of all employees as equals, lack of strict hierarchies. Openness of relations between superiors and based on partnership relations, trust, responsibility and open exchange of thoughts and dialog. Low distance of authority and power due to the need to reduce differentiation and inequalities among people dependent upon organization hierarchy. Removal of barriers between managers and employees. Personnel selection based on organization interests and verification of skull and abilities in practice, overall firm orientation toward practice and change. Great attention of interpersonal communication shaping	Egalitarian
Continuous process of enhancement and improvement, refusing stereotypes and fixed norms. Adaptation to every different situation basing on its exceptionality. Employees have great autonomy.	Proneness to high errors tolerance and to implement continuous learning through trial and error process. Openness to experimenting and new experiences. Strong support for the affirmation of a culture of "different opinions" and responsible risk undertaking.	Soft

Source: own work based on Mikuła (2006; 2008), Jabłoński (2009), and Potocki (2005)

Comparing and contrasting the criteria of organizational culture classification provided by Potocki (2005), the features of knowledge-based and traditional organizations provided in Table 2 and other authors' in-depth analyses of organizational culture features attributed in the world literature to learning (Jabłoński, 2009) and intelligent organizations (Mikuła, 2008), it is thus possible to ideally characterize knowledge-based organizations most profitable variant of culture as flexible, strong, positive, extroverted, innovative, pragmatic, egalitarian, and soft. Although variations on single organizational culture aspects are possible according to the author (even in the case of very successful

worldwide knowledge-based organizations),[6] the ideal features of organizational culture listed above seem to all be particularly relevant to the author as to assure such organization success in the present highly unstable aggregate macroeconomic environment in which changes in the market are more frequent and innovativeness, the adaptability to it, and flexibility achieved based on employee knowledge and the effective use of intangible assets is crucial for an organization's performance.[7]

4. Conclusion

The present work provided an introductory analysis of the main trends registered in management since the 1970s, interlinking them with changes in the macroeconomic environment that are analyzed more in-depth in former works by the author. On this basis, it was possible to first of all point out that a relevant feature of much of the management style changes registered in the last seven decades can be linked to the need for resigning from the rigid order, control, and top-down planning methods used in Fordism, while flexibility and the fast adaptation to market changes progressively become the crucial factor for profit maximization in the just-in-time and lean management methods. Second, it was possible to stress that many of the features characterizing most up-to-date knowledge-based organizations are deeply rooted in organizational culture features. Finally, the proposal of an ideal set of organizational culture features was provided stressing that, to profitably and successfully deal with the currently unstable market environment relying on the knowledge, skill, and abilities of workers, human capital, and innovativeness, a knowledge-based organization should archetypically be characterized by a flexible, strong, positive, extroverted, innovative, pragmatic, egalitarian, and soft organizational culture.

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[6] The most striking example that comes to the author's mind is Apple; although presently being a successful knowledge-based organization, it seems to the author to rather possess an elitist more than egalitarian culture. Other variations are possible, however, although it seems logical that they can rarely lead to a complete subversion of the classification provided above without deeply and severely impairing the effective functioning of the firm or leading to the complete rejection of its classification as a knowledge-based one.

[7] Although the discussion of such factors is behind the scope of the present publication, interconnections among organizational culture's role and macroeconomic environment are not unidirectional. Influences of organizational culture on macroeconomic trends can be as a matter of fact considered to exist as well. In future works, an analysis of how the features discussed above can be considered influential for aggregate trend evolution should be analyzed as well.

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Chapter 2

Transition to Circular Economy – Selected Activities[1]

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1. Introduction

A circular economy is a kind of system of exchange and production that, at all stages of a product's (goods and services) life cycle, aims to use resources more efficiently and diminish the environmental impact while fostering individual well-being and in which the values of the products, materials, and resources are maintained in the economy for as long as possible and the waste production is minimized (XP X 30-901, 2018). This protects enterprises from resource deficiency, provides business opportunities, and results in innovative and more-efficient production and consumption methods.

More and more studies on a circular economy are appearing in the literature (Kirchherr et al., 2017; Geissdoerfer et al., 2017; Stahel, 2019, Nowicki & Kafel, 2019). Until now, most enterprises operated in a linear model of the economy, which consisted of the use of available resources, their free use, the production of various goods from them, and their disposal after use (Bocken et al., 2016; Zarębska & Joachimlak-Lechman, 2016). The transition from a linear to a circular economy requires many changes within an enterprise (Garcés-Ayerbe et al., 2019). It is proposed to implement the principles of a circular economy in order to use resources more rationally, adapt enterprises to new regulations, reduce waste, recycle, reuse waste, recover materials, and restore them for reuse (Tam et al., 2019) as well as use renewable energy (Olabi, 2019). A circular economy is ecological (Zink & Geyer, 2017) and is seen as an element of environmental protection, but this is not the only way to see it. Implementing the principles of a circular economy is also the recommended solution for achieving the goals of sustainable

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development (Saidani et al., 2019; Schroeder et al., 2018; Millar et al., 2018). There are publications in which a circular economy and sustainable development are considered in the context of innovative activities and the innovative business model (Pieroni et al., 2019). Adapting an enterprise to the recommendations used in a circular economy requires taking the appropriate actions and, thus, incurring costs.

The purpose of this article is to emphasize the need for introducing changes in enterprises that are transitioning from a linear economy to a circular one. To achieve this goal, organizations can use published European standards (BS 8001:2017, XPX 30-901:2018). Such activities are associated with costs that will also bring benefits in the long run.

2. Assumptions of circular economy

A circular economy combines economic development with environmental protection and the efficient use of available resources (Foltynowicz, 2018). This is a conception that aims for the rational use of resources and reducing the negative impact of manufactured products on the environment, which should remain in the economy for as long as possible. Moreover, waste generation should be minimized as much as possible. Among others, the basic assumptions of a circular economy are as follows (Ku gospodarce…, 2014; Tundys, 2015):

- Reduction of materials required to provide specific service (weight limit);
- Reduction of energy and material consumption at stages of production and use (efficiency);
- Reducing the use of hazardous or difficult-to-recycle materials in products and production processes (substitution);
- Creation of markets for recyclable materials (recyclate) (based on standards and public orders);
- Designing products that are easier to maintain, repair, upgrade, rework, or recycle (ecoproject);
- Facilitating grouping of actions to prevent by-products being used for waste (industrial symbiosis).

The implementation of these principles in an enterprise can be achieved through the long-term design, maintenance, repairs, reuse, regeneration, and recycling of both materials and products. Existing standardized management systems or standards specifically designed for use in a circular economy (such as what is ongoing) can be used:

- Framework for implementing principles of circular economy in organizations – Guide (BS 8001:2017);
- Circular economy – Circular economy project management system – Requirements and guidelines (X PX 30-901:2018).

It has been estimated that the transition to a circular economy through the better use of resources could bring more than €600 billion in annual economic profit to the manufacturing sector in the EU alone (COM, 2014). In addition, the Ellen MacArthur Foundation (2015) estimated that the implementation of a circular economy by 2030 will achieve a net economic benefit of €1.8 billion and 2 million new workplaces in the European Union alone, which could also lead to a 48% reduction of anthropogenic CO2 emissions. The CE concept combines economic development with environmental protection and rational resource management. However, a circular economy should be mainly considered from an economic point of view, not an environmental one.

3. Standards for circular economy

So far, two national norms regarding a circular economy have been launched in Great Britain and France. "BS 8001:2017 – Framework for implementing the principles of the circular economy in organizations – Guide" was developed and launched in May 2017 by the British Standards Institution (BSI); after this, French Standard Institute (AFNOR) launched "XP X 30-901 – Circular economy – Circular economy project management system – Requirements and guidelines" in October 2018. The British standard contains useful recommendations and advice but does not include any requirements that an enterprise must introduce in order to function in a circular economy. Due to the fact that it has no requirements, it is impossible for enterprises to apply for any certification.

This standard promotes the optimal use of resources (the reuse, repair, renewal, regeneration, and recycling of materials and products) as well as the preservation and regeneration of natural capital through the return of biological nutrients to the biosphere. The design and innovation in processes and products or services (e.g., for repair, reuse, recycling) can be complemented by projects and business model innovations using different approaches, such as performance-based models to manage the circulation of products and materials in the system (BS 8001:2017).

The purpose of the standard is to give various organizations guidance on which actions to take to adapt to the principles of a circular economy. Incorporating these principles will give organizations the opportunity to think about how to conduct business, enable the rational use of resources, adopt new ways of working, increase their competitiveness, etc. Many aspects mirror what could be thought to be the basics of good sustainable business practice, but these are solely being examined from a circular economy perspective in this standard (BS 8001:2017; Pauliuk, 2018).

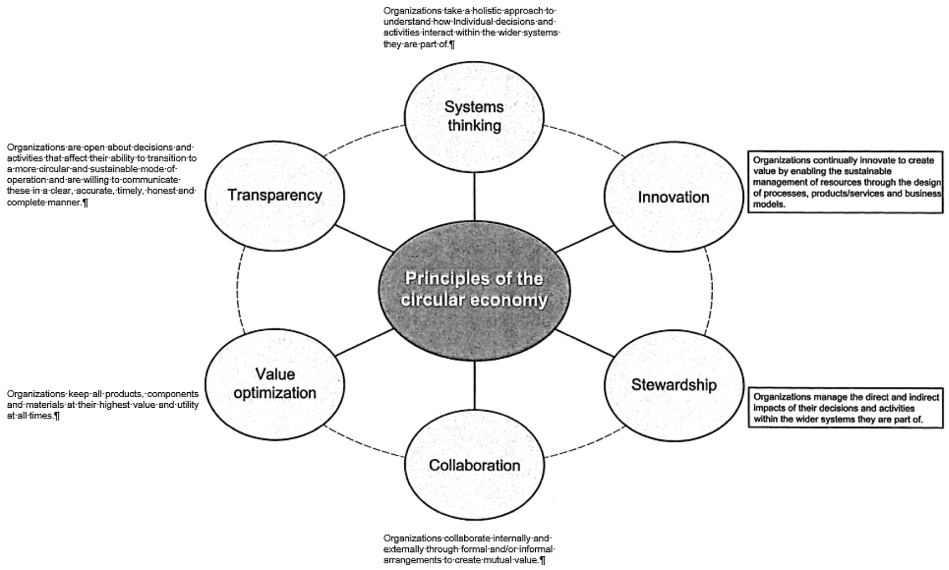

Figure 1. Principles of circular economy
Source: BS 8001:2017

The standard identifies six principles of a circular economy (Fig. 1):

- Principle 1. Systems thinking: Enterprises analyze actions and decisions they make for impact they have on environment, society, and system of which organizations are part;
- Principle 2. Innovation: Organizations constantly introduce innovations to form value and they make decisions, which lead to effective management of resources as part of creating business models and design of processes, products, and services;
- Principle 3. Stewardship: Organizations are responsible for management of all their decisions and their results in their whole lifetimes;
- Principle 4. Collaboration: Enterprises cooperate with other organizations in order to generate common value;
- Principle 5. Value optimization: Enterprises take care of their resources and products' value in their whole life cycle;
- Principle 6. Transparency: Organizations are willing to make changes in their processes that will contribute to transition to circular economy.

The second introduced standard for a circular economy are the requirements included in the XP X 30-901 French standard (Circular economy – Circular economy project management system – Requirements and guidelines). This standard contains a list of terms and definitions with a particular regard to specific guidelines for management systems and sustainable development. This document is applicable to organizations of all

sizes, types, and natures. Consequently, the standard can be adapted to any type of project such as the development of a strategy, the supply of new services, the modification of the procurement, design, or distribution process of a service or product (XP X30-901). In this document, the term project refers to any aim for change fostered by an organization with the aim of making its activity evolve in part or in whole towards a model that is more efficient in its utilization of resources, thereby limiting the environmental impact of its activities and improving individual well-being. The project can touch on the activities, products, or services with which an organization identifies and which it has the means to either control or influence. It is the first CE standard that allows organizations to apply for certification that will attest to a project's circularity credentials.

This standard has been developed and is intended for organizations that want to manage their projects in a systemic way. It contains requirements and practical recommendations for initiating, planning, implementing, measuring, and managing projects by adopting an open and comprehensive approach. In particular, it sets out the various stages that organizations need to take for their projects to contribute to the transition to a circular economy. The most important element of the standard are the requirements for a project management system in a circular economy. The standard is based on three sustainable development dimensions (XP X30-901):

- environmental – reduce environmental impact;
- economic – increase resource-use efficiency;
- societal – improve well-being of internal and external interested parties.

In addition to the requirements, the standard also has seven areas of activity regarding the management of projects in a circular economy (Tab. 1).

Table 1. Seven circular economy areas of action described in XP X30-901

Area of action	Description
Sustainable procurement of supplies	All mining and manufacturing processes' influence on environment and society have to be taken into consideration in order to realize this area.
Ecodesign	While planning a service or a product, their impact on society or the environment during their life cycle must be taken into consideration. Their negative effects must be limited; however, their quality and performance should not change.
Industrial symbiosis	In this area, it is necessary for the dependence and possibility for cooperation between business entities that together will strive for the optimal use of resources and energy. An important issue is the distance between these enterprises.
Functional or service economy	This should be taken into account primarily when it comes to selling services and also during the time when they are being used.
Responsible consumption	This is connected with informing customers and consumers about the impact of specific products or services on society and the environment during their whole life cycle.
Product lifetime duration	This applies to the possibility of a product's or service's lifetime duration to be longer.
Efficient management of end-of-life products and materials	This refers to all ways of reusing and transforming all kinds of waste.

Source: XP X30-901.

When launching a circular economy project, an organization must consider all of those areas that should be analyzed in three dimensions (environmental, economic, and social), which results from the assumption of the standard and proposed cross-analysis.

4. Chosen aspects of circular economy activities on Polish market

In March 2020, research was carried out to obtain information about the changes that organizations make while transferring from a linear economy to a circular one.

The research was carried out in one of the leading food industry companies on the Polish market. This is a company that has implemented the HACCP system and voluntary food quality and safety management systems. The study was conducted in the form of an in-depth interview with the person responsible for the functioning of the management systems based on a previously prepared scenario. The surveyed organization is one of the largest companies in the food sector in Eastern and Central Europe; it is a leader on the juice, nectar and beverage market as well as a leading producer of instant types of products.

The surveyed organization is an enterprise that has been focusing on the construction and development of its brands for years, which are deeply rooted in consumer awareness. In addition, it implements many projects that can enlarge and expand its range of brand products. The company cooperates with customers within and outside the European Union and other countries in the world. In total, their products reach more than 60 countries in the world (including the USA, Canada, and countries from the Near and Far East).

The company also implements various projects, including the implementation and improvement of activities that are related to a circular economy.

Taking actions that are in accordance with the principles of a circular economy, the surveyed company has introduced new solutions that are aimed at minimizing the negative impact on the natural environment, among others. Activities that are at the implementation stage at the company include the reduction of product packaging weights, which is associated with the introduction of smaller bottle caps. In addition, the company began activities aimed at introducing single-material packaging to the market. This will allow for the better utilization of the used packaging for recycling into secondary raw materials. According to predictions, this will significantly reduce the amount and weight of the waste. Although the current prognosis says that it is more expensive to buy such raw materials, it should bring about financial benefits in the long run.

The factories of the examined company constantly introduce new solutions to reduce energy, gas, and water consumption and also limit the amount of waste and sewage being created. The enterprise has modernized the factories' boiler rooms. During their wastewater treatment, they receive biogas, which is later on converted into electricity, heating, and cooling.

The waste generated in the production process is segregated and subjected to a recycling process. Through the use of closed water circuits, central cleaning systems, the development of recuperation systems (heat energy recovery from the processes), the continuous monitoring of the consumed resources, and the proper logistics of the processes, the company also minimizes the effects of the impact on the environment.

The company also created a solar farm, thanks to which it is possible to convert solar energy into electricity. In its production plants, the company also invests in the construction of modern wastewater treatment plants in which technological and technical solutions of the latest generation are applied, which limit the possibility of the treatment plants' negative impact on the environment.

The pro-environmental investment activities contribute to a cost reduction in the examined company. Improving its production processes, its use of modern, energy-saving, and water-saving solutions, and its most efficient technological lines all contribute to the improvement of the financial indicators. Thanks to the introduced technologies, the company has reduced electricity consumption by 15%.

5. Conclusion

A company's activities (including the implementation of investments and projects as well as innovation) lead to adapting the enterprise to operate in a circular economy.

The surveyed enterprise also bears costs while undertaking activities that are aimed at implementing the principles of a circular economy. According to the conducted analyses, the return period is 3-4 years with 50% funding; without funding, this can take up to 7-8 years., By the actions it has taken, the surveyed company sets an example for other companies and shows how the implemented systems, the company's culture, and following new trends contribute to a rationalization of resources and care for the environment. The initiatives undertaken by the company contribute to reducing the amount and weight of their packaging, reducing energy and other resources, and reducing carbon emissions, among others. The company is also preparing to use recyclable materials for packaging.

The use of recyclable materials not only has a positive impact on the environment but also allows one to use materials that have already been used,

which leads to savings. These savings arise from using recycled raw materials instead of buying new materials. The introduction of activities related to a circular economy has contributed to the review of the entire organization and arrangement of the processes and documentation in the surveyed company. Although not all activities bring financial benefits, they contribute to improving the organization's functioning and its impact on the environment.

The activities related to implementing the principles of a circular economy are costly but also necessary for organizations to adopt, as they have a positive impact on the environment. The main activities undertaken in enterprises are projects leading to the reduction of resources and their rational use as well as to the use of recyclable materials.

Initially, the costs of implementing innovative circular economy solutions are high, but they will bring economic benefits in the long run. Costs already arise during the design phase, through its production, its decommissioning, and its re-use; therefore, recycling costs and those costs associated with the use of secondary materials for production should already be taken into account at the design stage. The earlier such costs are taken into account, the better they can be planned; most likely, they will eventually have a lower value.

The activities and, thus, the costs that are incurred by a company are forward-looking. Such actions will protect the company from environmental penalties in the future. On the other hand, the company does not want to take actions that go beyond the regulatory and contractor requirements.

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Chapter 3

Financial Market Communication of Mittelstand Companies in Context of Rational, Natural, and Open Systems Organizational Theory

Matthias Kretschmar

1. Introduction

The communication of companies with the financial market has aroused increasing interest in scientific debates as well as in practitioners' discussions. Nevertheless, the investor relations activities of large listed companies are predominantly in the scope of research and public discussion so far. The focus of this paper will therefore be laid upon the particularities of the communication of the German Mittelstand companies and their prevalent counterparts in finance which are their financing banks.

This will be theoretically developed by applying the principal-agent theory of why good financial market communication potentially contributes to the better achievement of a company's financial targets. Based thereupon, it will be worked out how the organizational structures of the banks must be taken into account by companies for expedient communication with their banks in the context of the rational, natural, and open systems organization theories.

2. Principal Agent Theory applied to Corporate-Bank Relationship

Based on the new institutional economics theory (which was initially developed in "The nature of the firm" by Roland H. Coase in 1937), the principal agent theory was introduced by Michael C. Jensen and William H. Meckling (1976). An agent acts on behalf of a principal in a particular contractually defined domain of economic decision problems (Ross, 1973), which gives rise to potential conflicts between the principal (as the contracting authority) and its agent who might have different goals and different risk preferences (Eisenhardt, 1989).

In the case of a lending relationship, a company is the agent that works with a third-party property (Frère et al., 2012). The bank's expectation of the adequate capital management by the lending company is the subject of the contract in this principal-agent relationship (Bartscherer, 2004). If the company uses its privileged knowledge to maximize its benefits in a credit relationship (or the principal fears that this might happen), the monitoring costs rise for the bank (Frère et al., 2012). Therefore, it is mutually beneficial to find ways to reduce or even eliminate the actual or perceived difficulties in the cooperation between principal and agent (Püthe, 2008). If the company has successfully signaled that it executes the contract in line with the principal's expectations by good communication with the bank, this reduces monitoring costs, which equally not only has a positive effect on the financing costs but also on other features of the relationship with the bank, like the availability of new credit facilities, access to innovative commercial banking solutions, or strategic dialogue with the bank, for example (Kretschmar, 2019).

3. Impact of Different Organizational Systems in Banks on Signaling carried out by Companies

There is not one overarching theory of organizations; instead, there are many theories that attempt to explain and predict how organizations and the people in them behave in different environments. Therefore, like other types of categorizations, "perspectives" help to group compatible theories that have the same language or jargon (Shafritz et al., 2016).

This article focuses on the three perspectives on organizations in the way they are outlined by W. Richard Scott and Gerald F. Davis (2016). These three perspectives are (1) rational organizations, which are structural arrangements to achieve pre-determined targets, (2) natural systems, which can be regarded as living organisms based on members who feel responsible for the organization based upon shared common values, and (3) open organizational systems, which are just a cluster of loosely connected semi-autonomous individuals interacting with the environment.

3.1. Rational Systems Perspective

"From the rational system perspective, structural arrangements within organizations are conceived as tools deliberately designed to achieve the efficient realization of ends" (Scott & Davis, 2016). The normative structure of this type of organizational setup is best suited for sub-systems within an organization that shall be sheltered from social, cultural, and other shifts within a larger system

because they are deemed to be necessary for the maintenance of the organization (Winiecki, 2010).

Banking is a highly regulated industry, and the requirements for corporate management and strategic direction are steadily increasing, as are the requirements for the organization itself (Büttel & Sawahn, 2019). In order to comply with these regulations, bank organizations must establish efficient rational sub-systems with explicit rules for their operations. For example, "know your customer" rules must be implemented as set out in § 10 German Money Laundering Act (Geldwäschegesetz, GWG) and § 18 German Banking Act (Kreditwesengesetz, KWG), instructing banks to insist on the disclosure of the financial statements of their borrowers.

However, not only external requirements lead to rational systems elements in a bank organization. The management can define an organization's purpose, goals, and processes upfront in a rational system and regulate it accordingly (Winiecki, 2010). This is the case when there are topics that are extremely complex and outside the scope of the respective bank employees. One example is credit portfolio management, which leads to a certain credit policy or a bank's overall growth strategy in its commercial banking division.

These policies and standards do not leave any degrees of freedom in the decisions for a contact partner of a company in a bank. If a corporate customer does not cooperate with a bank with regard to the requirements resulting from rational sub-systems, it would only increase the agency costs in the sense of the principal-agent theory, as the banker would have to more intensely monitor his customer.

Figure 1 summarizes the effects of rational systems organizational aspects in banks. The rational sub-systems in a bank constitute the essential DNA of the bank, which must not be altered due to regulatory requirements like anti-money-laundering laws, corporate governance and banking act regulations, and complex bank control issues (e.g., certain portfolio considerations and overall strategic considerations) which are not overseen by the relationship manager but only by the bank's management. As far as these aspects are concerned, a company must understand that good communication (e.g., the timely provision of documents required by law or due to the overall regulations set out by the bank's management) is indispensable in the sense of the principal-agent theory; the bank's relationship manager has no choice but to request these pieces of information. Any retention of information would be counterproductive in this context and would increase the agency costs for the relationship banker as well as the bank.

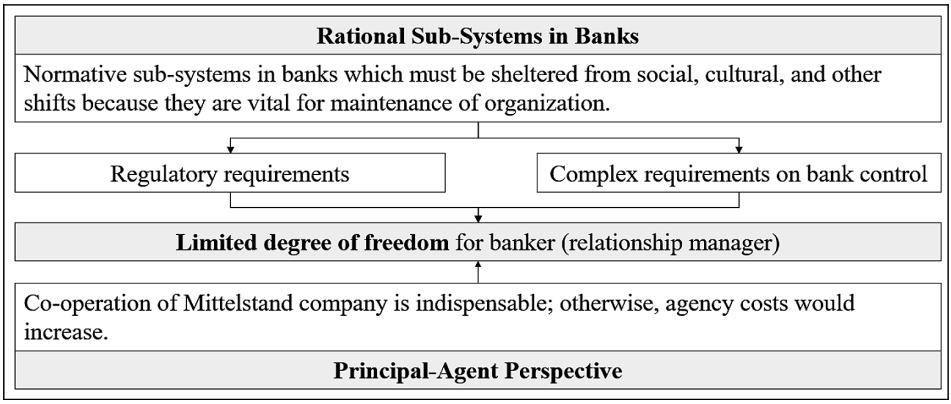

Figure 1. Principal-Agent Perspective on Rational Sub-Systems of Banks
Source: Table created by author

3.2. Natural Systems Perspective

In a bank organization, there are also elements of natural systems. A natural system implies that the organizational structures are overshadowed by the more generic systems and processes that are shared by all social collectivities (Scott & Davis, 2016). Organizations can be described as being like a living organism with unique goals, interests, and desires. Organizations pursue internal interests and attempt to control or regul ate their surroundings to survive as a unit (Winiecki, 2010). As a result, individual activities and attitudes gain much more influence in the organizational structure because the bank employees feel responsible for the development of the organization. According to Barnard (1938), "informal association is rather obviously a condition which necessarily precedes formal organization. The possibility of accepting a common purpose, of communicating, and of attaining a state of mind under which there is a willingness to cooperate requires prior contact and preliminary interaction."

The shared formal and informal generally accepted values determine the behavior of the employees in a bank organization and the way they perceive the behavior of their (corporate) clients. Commerzbank (2020) defines its values as customer orientation, performance, integrity, team spirit, and courage. Quite similarly, Deutsche Bank sums up in its non-financial report from 2018 that its "culture is guided by our values of Integrity, Sustainable Performance, Client Centricity, Innovation, Discipline, and Partnership. These values inform … [Deutsche Bank's] behaviour and decision-making, underpinning how employees interact with each other, but also with clients, investors, and society at large." However, it must be borne in mind that they will behave accordingly only if the employees of banks believe that the values that are postulated by a bank's management help maintain and develop the organization according to their own vision of the organization.

A company's good communication with its bank reflects the bank employees' shared values and beliefs by focusing on those topics that reflect these beliefs and can therefore positively impact the bank's actions. It is beneficial to learn more about the bank's attitude if the company attentively uses meetings with the bank to discover what is crucial to the bank and the banker. A call about a company's rating might be used to understand the banker's view on the hard and soft aspects which influence the bank's assessment of the company. So, if many companies feel that ratings are rather intransparent (Everding & Gleißner, 2007), a pro-active discussion of these topics would again help to reduce agency costs, as the understanding would help use the right signaling instruments in a targeted communication with the bank.

Figure 2 summarizes this natural system's implications on the perspective from the principal-agent theory. The bankers share certain values which are formalized and communicated by their bank as well as individual beliefs with regard of how their bank can best develop, which are based on the generally accepted convictions within the bank. From a principal-agent perspective, good bank communication means that the company should reflect the values and beliefs of their relationship manager in the information policy in order to signal that the company is transparent regarding information that is regarded as important by the banker for the future development of his/her bank.

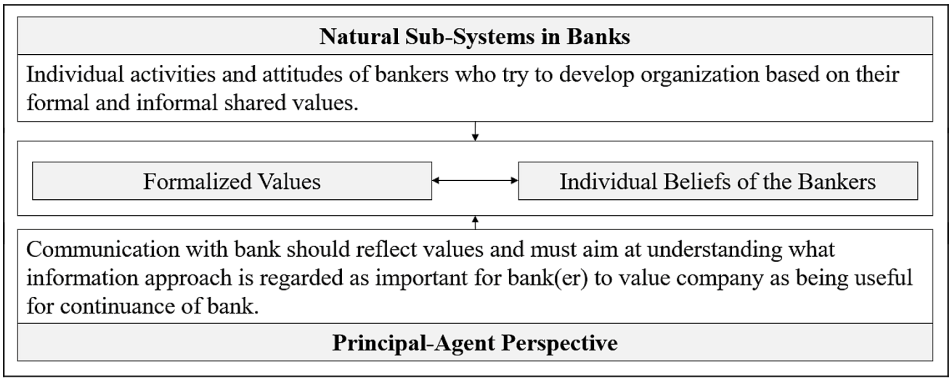

Figure 2. Principal-Agent Perspective on Natural Sub-Systems of Banks
Source: Table created by author

3.3. Open Systems Perspective

In the open systems approach, an organization is regarded as loosely connected individuals or sub-groups that are capable of semiautonomous actions (Scott & Davis, 2016). This perspective implies that there is a move "toward a social psychology concerned with social structure" (Katz & Kahn, 1978). The organization is not regarded as a closed system but rather being

interdependent with its environment. An open systems organization transfers energy from its external environment, transforms it through work activity, and returns some output back to the environment (Rosen, 1970). So, movements in one part of an organization lead to predictable movement in another part of the system that is open to environmental inputs (Katz & Kahn, 1978).

In the communication of a corporate customer with its bank, the open system aspects in the bank organization should be considered. One example is the provision of credit facilities by a company's house banks (relationship lending). Several studies confirm that mutual trust between a company and its bank improves sustainable credit availability like e.g., a study on Swiss small and medium-sized companies by Wickart & Volery (2015) or a study on small firms in the USA by Petersen & Rajan (1984) .

Relationship lending depends on soft information about a company, its owner, and the local community. The main repository of the soft relationship information is the loan officer. This might lead to agency problems between the loan officer and bank management because of the soft nature of the relationship information, which is nested in a hierarchy of contracting problems involving the borrower and loan officer as well as the bank's senior management, stockholders, creditors, and regulators (Berger & Udell, 2002).

As can be seen in Figure 3, it is therefore important from a principal-agent perspective for a company to gain a clear understanding of how a bank's organization is built up from an open system standpoint and to identify where agency problems within the bank might arise in order to implement a communication policy to best achieve the company's financial targets. This communication policy must not only focus on the information that shall be shared with the bank but also on who will be the best addressee to influence the bank organization in the company's sense and what external trends may influence the current behavior of the actors in the bank relationship. Depending on the issue, this might be the relationship banker, the credit officer, or the product manager (for example).

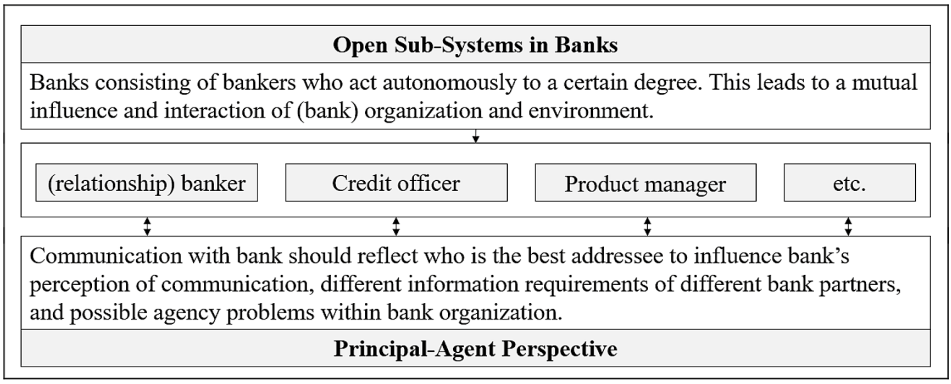

Figure 3. Principal-Agent Perspective on Open Sub-Systems of Banks

Source: Table created by author

4. Implications for Financial Market Communication of German Mittelstand Companies

The German Mittelstand companies must especially consider the communication issues that arise with their banks due to the different aspects of the organizational theory in connection with the principal agent theory, as their main source of debt financing is their bilateral credit relationships, and they are not usually funded with public equity.

4.1. German Mittelstand

So far, no universally valid definition of the term "German Mittelstand" has prevailed (Peters, 2014). Instead, a large variety of different distinctions between small and Mittelstand companies on the one hand and Mittelstand and large companies on the other have evolved depending on the respective perspectives of the defining authors or institutions.

In Mittelstand research, the threshold values for small and medium-sized enterprises (SME) as set by the European Commission (European commission, 2003) are often taken as differentiating characteristics, although this implies that the size of Mittelstand companies is capped at €50 m in sales and €43 m in total assets.

Other definitions rather focus on the identity of the ownership and management in Mittelstand companies. For example, the Institut für Mittelstandsforschung (IfM, 2019) defines that, in a Mittelstand company, at least 50% of the shares are held by the family that also executes the management.

According to the Deloitte Mittelstandsinstitut of the University of Bamberg, the definition of Mittelstand companies combines these aspects by referring to either qualitative (identity of ownership and management) or qualitative (companies with external management that have fewer than 3,000 employees and/or annual sales below €600 m) aspects (Becker et al., 2008).

For the purpose of research on the financial market communication of German Mittelstand companies, the definition that is provided by the Deloitte Mittelstandsinstitut, restricted on the lower end by excluding companies that are defined as small by the European Commission (companies with fewer than 50 employees and sales of less than €10 million or total assets lower than €10 m) is best suited. On the one hand, this range of companies reflects the fact that small companies do not have sufficient management capacities for financial market communication and do not have the need for sophisticated financial solutions. On the other hand, it leaves all of those companies out that have professional investor and creditor relations. Most banks mirror this distinction in

their coverage models which distinguish between small business clients (which are often covered within the private client segment with rather standardized solutions) and larger corporate and commercial clients (which are covered by a separate division) (Kretschmar, 2019).

4.2. Financial Market Communication of Mittelstand Companies

Financial market communication is part of corporate communication which aims at favorable relationships with the company's stakeholders on whom the company depends (van Riel & Fombrun, 2007). The focus of financial market communication in this context is laid upon all compulsive and voluntary communication measures of companies aiming at the realization of a companies' financial objectives (Verband Deutscher Treasurer, 2002).

Due to their size and ownership structures, most German Mittelstand companies are not funded on the capital market according to the definition set out in Chapter 4.1. Consequently, they do not have to cover (equity) investor relations. The focus of their financial market communication is basically restricted to creditor relations with their financing banks. However, not all Mittelstand companies are aware of the impact that this communication with their banks has on their success. As outlined by Balz et al. (2004), credit-funded Mittelstand enterprises need to realize the importance of creditor relations and actively present themselves as good borrowers to their banks to a greater extent.

The target-oriented communication of Mittelstand enterprises with their banks which reflects the aspects of the organizational theory that, in turn, impacts a bank's perception of the company on the background of the principal-agent theory is of utmost importance. Mittelstand enterprises do not have the same professional treasury entities nor experience in dealing with financial institutions as large enterprises. On the other hand, they are much more dependent on more-sophisticated bank solutions than small companies are. This explains the special attention that should be paid to this group of companies on the development of awareness for the necessities of good bank communication.

5. Conclusion

A bank can be regarded as an amalgam of the different perspectives of the organizational theory. Therefore, a Mittelstand company which is especially in a very close relationship with its bank should analyze its banks from a rational, natural, and open systems perspective and merge its findings to optimize its focused bank communication, which helps to reduce the perceived detriment of information that leads to monitoring costs in the bank-Mittelstand company relationship according to the principal agent theory.

Rational systems aspects arise primarily out of bank regulations and the complex nature of the banking industry, which require a certain set of rules and regulations. A targeted bank communication policy should therefore identify and accept a general framework that does not provide any freedom of decision for the addressees of the communication. Neglection would negatively impact the relationship with a bank and would be counterproductive with regards to the financial targets of the company.

From the perspective of the natural systems organization, the company should pay attention to the shared beliefs and values of the bank employees, who feel responsible for the preservation of the existence of the organization. The understanding of the values of those bankers who oversee the relationship helps to send the right signals to gain the best possible support from the bank.

Examining the bank from an open systems perspective should help one understand how external stimuli might change the system and output that can be received from the bank. A good bank communication should therefore be designed in a way that helps to effectively influence the open sub-systems and its protagonists in the bank. In turn, it should be kept in mind that an open systems organization also wants to shape its environment which, at the end, means that the relationship and communication requirements between the bank and the corporate customer become increasingly interdependent.

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Chapter 4

Modern Management Practices in Chinese Special Economic Zones

Jolanta Maroń

1. Introduction

Various management models are both gaining and losing popularity in the modern world. As multinational corporations expand their activities to new areas of the world with different cultures, their management policies and practices are also evolving. The management model developed in China is characterized by high specificity as compared to other management models (even including Asian ones). For example, this strongly differs from the known Japanese model.

With the rapid technological advancement brought on by external multinationals and the strengthening of existing business by revolutionary government policies, China is now emerging as a land of a multicultural and multi-linguistic market (Warner, 2013). With innovative organizational strategies and practices, China could definitely become the most serious player in the global economy. This makes the management styles that are used in China an interesting research topic.

To what extent Chinese management policies and practices draw from Western and Eastern achievements in management styles and how their model is based on the Chinese specificity will be analyzed in this article. For the purpose of drawing general conclusions, deductive, inductive, and analytical methods will be applied using the best available sources.

2. Changing managerial culture in China

The previous planned economy model of China was based on a centralized system of central management. The majority of the organizations were state-owned. They accounted for almost all of the needs of the entire population with their products and services (Schlevogt, 2000). The market economy is the

opposite, it supports the privatization of private entities. It promotes individual freedom and an equal contribution in the division of labor (e.g. the United States or United Kingdom).

Deng Xiaoping, the previous chairman of the Chinese People's Political Consultative Conference, started reforms from the market economy of an SEZ Shenzhen laboratory (Selmer, 1998). A revolution in Chinese management practices began to take place only after 1978 with joint-venture companies initially flourishing in special economic zones. Deng is considered to be the architect of the open market economy with Chinese characteristics, turning companies from a centralized management structure to a self-managed decentralized status. In 1992, the Chinese government introduced the concept of "modern enterprises" in which the managerial autonomy of companies reduced government interference in business (especially international business) (Schlevogt, 2002).

The withdrawal of the government from business decisions had both advantages and disadvantages. It led to a lack of external support and the sudden shift of decision-making to inexperienced management and a lack of internal coordination, which sometimes lead to total chaos and confusion. Yet, in a special economic zone, Shenzhen's joint ventures introduced different management styles;- namely:

- independent directors controlling decision-making;
- concept of independent directors was first introduced in China by China Securities Regulatory Commission in 1997, which led to improved performance of organizations (Tang, Ward, 2003);
- protecting minority stockholders;
- solving problems brought by shareholders;
- protection of company by managers;
- equal sharing of profit;
- promoting foreign investment, FDI inflow;
- effective overall management.

The transition from a planned economy to a market economy in China brought three different kinds of organizations into existence (Li, Tsui, Weldon, 2000):

- state-owned enterprises;
- private enterprises;
- foreign-invested firms.

The Chinese culture has always been focused on a social relationships rather than professional ones. Loyalty is expected from a person towards an individual rather than towards an organization. The Chinese leadership style is more focused on personal feelings and emotions than on factors like motivation and recognition. When a boss assigns a task, an employee considers it to be a personal favour to the boss and expects it to be reciprocated in the future.

This type of relationship is not businesslike but rather friendly and social. The venture of foreign countries in the Chinese market is making them slowly moves towards Western practices (however, also holding on to their traditional principles). Humanity comes first and then comes business. The major role of a leader is to look after the well-being of a team and its members. Taking an instance of a dispute or misunderstanding among employees may lead to a situation where one might feel like quitting his/her job. In Chinese management practice, the leader should come forward to resolve the conflict and establish peace among his/her team members.

The Chinese have proven to be the best retention managers, as they focus on collectivism and long-term commitment rather than individualism and short-term employment. Their employee turnover is lower, whereas their retention period is high (Tang, Ward, 2003). More importance is placed on seniority than on inexperienced candidates. By nature, the Chinese are self-motivated and hard - working individuals. Therefore, organizations do not make any extra efforts in motivating their employees. In recognition, they reward and recognize employees based on their commitment towards the organization.

3. Case of special economic zones in China

Starting in 1978, SEZs were gradually created in China; within them, specialized subzones were established that were characterized by various benefit packages. The first four so-called economic privilege zones were established in Shenzhen, Shanton, Xiamen, and Zhuhai. Forty years of SEZ operation in China have contributed to the country's economic success. China has become the world's largest beneficiary of foreign direct investment, an exporter and holder of foreign exchange reserves. The presence of special economic zones also positively influenced the development of other regions of the country.

In 2012, the business sector in China underwent systemic changes regarding foreign companies. The Chinese government has focused on small areas of business activity. According to the new assumptions of the long-term economic strategy, 2010 was the last year of the existing economic structure of the Middle Kingdom. The new organization of the economic system of all of China was described in the XII Five-Year Plan; although the goals included in the plan covered 5 years, they actually paved the way for transformations in the economy for at least the next 10-15 years. The new plan assumes accelerating the changes in the economic development model, including by adapting China's foreign investment policy. The reasons for this change were the imbalance between investment and consumption, low potential for technological innovation, and irrational industrial structure.

However, the implemented changes are not only aimed at improving investment conditions for foreign companies which overarching goal is to support the improvement of the investment conditions but also for foreign companies to support own market. Foreign economists talk about protecting the domestic market against external capital expansion. In order to equalize market opportunities, the regulations giving enterprises with foreign capital a privileged position were repealed in 2017. At the same time, the Chinese government identified priority sectors in which it would like to see foreign investment:

- advanced production;
- the most modern technologies;
- modern services;
- new energy sources;
- energy saving.

In connection with the growing involvement of foreign capital in the restructuring of Chinese enterprises, the Ministry of Trade issued regulations in March 2011 regulating the rules for the takeovers of domestic enterprises by foreign companies. The law is meant to protect those industries and companies that are (in the government's opinion) strategic for the Chinese economy and should be in the hands of nationals.

The new Five-Year Plan defines new areas of economic activity in the field of advanced technologies, ecology, energy, industry, and services. In practice, its assumptions are to be implemented by encouraging enterprises with foreign capital to create research and development centers in China. As emphasized by representatives of the Chinese authorities, this is meant for the opportunity for Chinese companies and Chinese managers to learn international management standards from foreign staff (among other reasons), which should accelerate China's integration with the global innovation system (Gochina, 2020).

4. Forms of foreign capital economic activity in Chinese special economic zones

Under Chinese law, foreign capital is allowed: representative offices, joint ventures, and independent companies (PARP, 2020). Chinese law allows two types of enterprises from foreign-venture capital shares: equity joint ventures (EJV) and cooperative joint ventures (CJV). Typically, a Chinese partner provides employees with the right to use industrial land and buildings. However, a foreign company brings technology, machines, capital and know-how. You cannot withdraw your participation during a joint venture agreement. The company is managed by a general director who is accountable to the board of directors, which has the highest authority and decides on all important issues. Despite

the choice between EJV and CJV, the local authority only sometimes agrees to one of them. This practice usually takes place in those areas where the so-called strategic development plan is applicable i.e. strategic development plans (their full content is in the Five-Year Plans, which was developed by the central government in Beijing). This applies to places where natural resources or key industries are located (e.g., aviation, space, energy, natural resources processing, etc.).

When a joint venture is registered, its founders should know the personal composition of the company's statutory authorities. Chinese law requires two organs: a supervisory board, and a management board. Legal regulations for both institutions resemble those that are known in the Polish Code of Commercial Companies (with the differences discussed below).

The main task of the supervisory board is to decide on the most important matters of the company. Its composition can be made up of both Chinese and foreigners. The function of the chairman may also be entrusted to both Chinese and foreign parties. The decision in this respect is left to the contracting parties. The chairman represents the company as a legal person and the term of this office lasts three to five years. The day-to-day management of a company's affairs belongs to the management board and the general director. In practice, the management is divided in such a way that the financial and developmental part of the company belongs to the Chinese side, as most often the shareholders on the Chinese side are state-owned enterprises, that are subject to the control of the relevant departments of the local offices. The foundation of the zones is the assumption that they are meant to serve the Chinese economy. Consequently, all enterprises in the zones (even foreign ones) are to operate primarily in favor of the Chinese economy. The second reason is that the proportion of shares is proportionally lower on the foreign side.

An extremely important element of a company is the activity of trade unions within its framework. Their positions, rights and obligations, employer-employee-union relations are regulated by many legal acts. The most important of these is the Chinese Labor Code. Some of the provisions are contained in those provisions regulating economic and technological development zones. A trade union representative is a member of the supervisory board and has the right to speak regarding the dismissal of employees. Consulting him is obligatory. The most important entitlement of trade unions is the negotiating and signing of collective agreements, which are concluded with the company's management on behalf of the crew. It is inevitable that a party organization can operate alongside trade unions. Contrary to popular belief, this is not an absolute condition for consenting to form a joint venture.

All recruitment is carried out through the Foreign Enterprise Human Resources Service Co. (FESCO), whose branches are located in every zone and

city of China. The selection procedure does not apply to foreign employees. Each candidate foremployment must undergo training and completed with an exam. A positive result is the condition for concluding a contract with him/her. Chinese law allows for a trial period of up to half a year. After its expiry, a permanent contract is concluded for a period of 3-4 years.One can fire an employee if his/ /her work is inefficient and of low quality. Such a decision requires the consent of the local employment authorities. If the employee is dismissed, the company must pay him compensation in proportion to the period that he has worked.

A command system is in force on the Chinese labor market. After graduating from high school or university, every Chinese citizen must return to their place of residence and wait for a work order. In practice, this looks like random people who do without the required qualifications are often directed to work in a given company. It is not unusual for a nurse for whom there is no work in a hospital or clinic to receive a referral to work at a factory or an engineer who will dig trenches or look after animals on a state farm. The situation of employees looks best in the largest Chinese cities. There, you can talk about a degree of liberalism in building a crew. Work orders generally do not apply to employed persons (who are usually rural residents).

All recruitment to work is carried out via remuneration consisting of two elements: basic pay, and allowances (with the second part as a percentage higher than the first). In practice, it looks like this:

- 31% basic salary (by grade);
- 37% functional allowance (for position held);
- 22% incentive (depends on company's performance);
- 10% separation allowance (i.e. for work in border company) or inflation (if first one does not apply).

In addition to the fixed salary, Chinese law allows for other forms of remuneration, including piecework;for example. The companies in the zones are required to develop a system of benefits and other forms of financial and material support for their employees. Each time their activities are conducted, the local authorities determine exactly what a foreign company should include in its remuneration system.

5. Management issues in Chinese special economic zones

The capital share of a foreign partner in a planned undertaking should be, not less than 25% of the initial capital; otherwise, a company will not be given the status of a joint venture. The upper limit of the foreign shareholding has not been determined. The establishment of an enterprise that is wholly owned by foreign capital is also allowed.

The period of an enterprise's activity may be unlimited. The state guarantees entrepreneurs that they will not be nationalized. A company's main body (i.e.its supervisory board) decides on all major matters related to the company's operations. The composition of the supervisory board is appointed for a period of three to five years, and both PRC citizens and foreigners can be appointed chairman of a supervisory board. A chairman has no right to make independent decisions; in the event of disputes, the principle of consultation is required. The chairman of a supervisory board is a representative of a company as a legal person, while the day-to-day operations of the company are the responsibility of the CEO (who is elected by the board).

Chinese employees' achievement motivation is consistent with the relational context and is socially oriented (Hau, Ho, 2010). They aim to achieve success not for personal glory but for the common good (e.g. family, group, team or nation). Earley made research on managers in China and established that they worked harder when related to (or as part of) a group (Earley,1993). These effects are related to a stronger endorsement of collectivist values (Smith, 2011) this shows that the distinctive work motivation of Chinese managers is collectivism as they rate charismatic leadership less highly than those from many other parts of the world (House, Hanges, Javidan, Dorfman, Gupta, 2004). In a similar way, a meta-analysis by Leong and Fisher of studies that used Bass's measure of transnational leadership showed lower scores for those respondents from Confucian Asian nations (Leong, Fischer, 2011). These conceptions of leadership are frequently studied in contemporary China, but there is also a growing interest in developing and testing an indigenous model of paternalistic leadership. Fang and Cheng (Fang, Cheng, 2000) established a model of paternalistic leadership with three dimensions of effective leadership: authoritarianism, morality and integrity, and benevolence, Measures of these dimensions have been shown to have predictive validity in China. Some leadership researchers have established the following characteristics of paternalistic leadership found in Chinese SEZs:

- Family atmosphere at work;
- Individualized relationships between supervisor and each team member;
- Involvement in employees' non-work lives;
- Expectation of subordinate loyalty;
- Status hierarchy and authority.

Another issue behind management in Chinese SEZs is guanxi which remains an indigenous characteristic of Chinese interpersonal relationships (Smith, 2011). This indicates the quality of relationship. Scientists asked managers in China to rate those people whom they considered to be important members of their personal network. The rating scales referred to both the affective aspects of trust (sharing problems, hopes and dreams with the other party, etc.) and

cognitive aspects of trust (being reliable in having competence, completing tasks, etc.). Based on a discussion of guanxi relationships, it was predicted and found that these two bases of trust would be more strongly associated with each other among Chinese managers. The respondents were then asked to rate how typical each scenario was of what happened in their context. The Chinese respondents rated the guanxi scenarios as more typical than the other scenarios, thus providing some support for the indigenousness of guanxi. Chen Y., Friedman, Yu, Fang & Lu (Chen, Friedman, Yu, Fang, Lu, 2009) developed and validated a psychometric instrument that characterized guanxi relationships between superiors and subordinates in China. These were identified as affective attachment, personal-life inclusion, and deference to one's superior (Smith, 2009).

Saving face is a key element of Chinese work relationships. It is also integral to the effective conduct of guanxi relationships. Few cross-national investigations of face have been reported, although theories have been advanced as to the cultural differences between the priority of preventing one's own humiliation versus preventing the humiliation of others. Broadly focused surveys confirm the Chinese cultural preference for the indirect communication of emotions in China as opposed to the more explicit communication in several other corporate environments of the world (Matsumoto et al., 2008).

6. Conclusion

Transnational companies constitute important players in the Chinese economy; their role is particularly visible in their cash flows, technology transfers, AI advancement, and Industry 4.0 implementation. They include almost 80% of the international trade where they can play the part of one or two parties. The paper analyzed some management practices in Chinese special economic zones and their evolution, as many companies opened up to international trends, following their entry into global markets.

According to Guichard and Burnet, China is no longer a developing country with a cheap labor force. It is the leading economic power, the largest global consumer of raw materials, and a creditor to almost all countries; (including the US). It is China that sets the conditions and decides on financial markets global situations. Its success results from implementing economic mercantilism based on a constant and methodical foreign trade surplus. China aims at leading, not cooperating thus a strong Chinese lobby represented by huge corporations invest in China, establish subsidies, make joint-ventures and draw huge profits. Understanding Chinese organizational behavior provides a rich source of insight into transnational corporations in special economic zones ontext. It appears that the scale and consequences of special economic zones phenomenon on which the

Chinese management battlefield may also find expression within the broad range of Chinese indigenous features, which are characterized as high in collectivism and power distance. This might facilitate the increasingly frequent cross-national corporate collaborative work relationships; these organizational phenomena are undoubtedly universal in some sense and distinctive to specific national cultures and specific organizations in another sense. The key to enhanced performance lies in estimating the magnitude of these similarities and differences and identifying effective ways of managing them locally. The awareness that managing Chinese organizations is not at all same as managing organizations in other parts of the world awaits future research.

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Chapter 5

How Do Sharing Platforms Change Business and Society?[1]

Adam Figiel

1. Introduction

As of 2016, there were more than 170 platform companies that were valued at $1 billion or more. The creation and use of digital platforms is not only increasing in the private sector but also in the public one. In the year 2000, there were only a handful of large firms that could be described as platform companies. A platform economy is economic and social activity facilitated by platforms. Such platforms are typically online matchmakers or technology frameworks. By far, the most common type are "transaction platforms" (also known as "digital matchmakers"). From a technical perspective, there are numerous variations of platform types that utilize divergent technology; however, an inference into this is beyond the scope of this paper. In this work, the author concentrates on sharing platforms' revolutionary impact on society, the labor market, and its structure as well as the legal norms that call for comprehensive revision in order to maintain welfare in the changing environment. As this paper remains fairly conceptual, the author attempts to indicate the major trends that are likely to emerge in society and contests the idea of the unharnessed development of sharing platforms based on a systematic review of the literature.

"Platform economy" is one of a number of terms aimed at capturing subsets of the overall economy that are now being mediated by digital technology. Some commentators use various terms to delineate different parts of the wider digital economy. From this perspective, the term "platform economy" can be viewed as narrower in scope than "digital economy" but wider in scope than terms like "on-demand economy," "sharing economy," or "gig economy." Also, some scholars have argued that "platform economy" is the preferable term for discussing several

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aspects of the emergent digital phenomena in the early 21st century. Other commentators use the terms "platform economy," "sharing economy," and "access economy" in such a broad sense that they effectively mean the same thing. As previously indicated, the aim of this paper is rather conceptual than definitional; the author adopts an overlapping understanding of the terms.

2. Growth and critique of sharing platforms

Forerunners to contemporary digital economic platforms can be found throughout recent history, especially in the second half of the 20th century. Yet, it was only during the year 2000 that the "platform" metaphor started to be widely used to describe digital matchmakers and innovation platforms. Especially after the financial crisis of 2008, companies operating with the new "platform business model" have swiftly come to control an increasing share of the world's overall economic activity, sometimes by disrupting traditional business (*Platform economy*, http). The sharing economy has generated controversy for its effects on the distribution of income and wealth as well as the organization and integrity of society and business. To some extent, this is because many of them launched with a rhetoric of common-good claims. As the companies grew, observers assessed these claims and found that many of the platforms were coming up short (Schor, 2014, http). It has even been argued that platform-based exchanges crowd out genuine sharing and that for-profit companies are 'sharewashing'; i.e., using the positive associations of sharing to hide their self-interested activities (Kalamar A., 2013, http). To some, the sharing economy is even seen as an ultra-free market that is resulting in a race to the bottom, what Robert Reich termed as a "share the scraps" economy (Reich, 2015, http). Also, the contestation of actual sharing practices appears in the literature with regard to access-based, collaborative, and sharing economy phenomena, as many scholars consider them pseudo-sharing practices (Belk, 2014, p. 7). Belk asserts that the presence of profit motives, the absence of the feelings of community, and the expectations of reciprocity make such practices pseudo-sharing. In his opinion, true sharing is about the voluntary lending, pooling, and allocation of resources as well as the authorized use of public property; it is not about contractual renting, leasing, or unauthorized use of property by theft or trespassing (Belk, 2007, p. 127). Moreover, sharing is not market-mediated and non-compensated and does not involve transfer of ownership (Belk, 2010, pp. 715-734). The pure prototypes of sharing practices are mothering; the pooling and allocation of resources within a family. This is in line with the anthropology literature, where sharing practices are associated with generalized reciprocity and are defined as an economic behavior with a heavily weighted social dimension (Price, 1975, pp. 3-27).

While some question whether productivity and growth will be accelerated and others contest the pure nature of the sharing offered by means of platforms, the more profound questions may be whether economic and social life will be transformed and whether the outcome will lead to a very different distribution of wealth and power in the global society (Kenny, Zysman, 2015, pp. 1-23). Following Kenny's and Zysman's work, one may pose a question about the impact of sharing platforms on employment, entrepreneurship, income, and inequality.

3. Consequences of platform economy for consumption, work, entrepreneurship, income, and distribution of wealth

A sharing phenomenon based on internet platforms reveals diverse practices that depart from commonly understood consumption (Guyader, 2018, pp. 692-714). One can trace the rise of anti-consumption practices such as foodsharing and swapping that are driven by ideals of reciprocity (e.g., Albinson, Perera, 2012, pp. 303-315; Gollnhofer et al., 2016, pp. 226-245). Also, the paradigm shift from ownership to access-based consumption can be observed, as service firms offer the temporary use of commercial goods to customers who are mostly driven by utilitarianism and self-interest (Hazée et al., 2017, pp. 441-456). Moreover, collaborative consumption is virtually always facilitated by internet platforms that enable the peer-to-peer exchange of underutilized goods with no employees involved (e.g., Benoit et al., 2017, pp. 219-227). Apparently, we are amid a reorganization of our economy in which platform owners are seemingly developing power that may be even more formidable than was the case of factory owners in the early industrial revolution. The proliferation of platform economy labels is a reflection of the fact that platforms are already having powerful consequences for society, markets, and firms (and that we are unclear about their dynamics and directions). The major providers of cloud services remain large American firms that developed the cloud paradigms and then cloud systems for their own internal use. The consequence is a radical reduction in the cost of computing resources. Users can rent resources in units rather than having to own or build entire computing systems. Computing and its applications are available as an operating expense rather than a capital expense (Kenny, Zysman, 2015, pp. 1-23). In this new era, firms such as Amazon, eBay, Google, Facebook, and Uber create online structures that enable users to connect and exchange goods or services for a variable or fixed price on the basis of rating systems. They open up new ways of integrating so-called outsiders into the labor market and greatly challenge how value and work is created. The increasing digitalization of the labor market through platforms is expected to boost the global GDP by $2.7 trillion by 2025 according to the McKinsey Global Institute. Also, a recent

study by the University of Hertfordshire shows that nearly 5 million clickworkers in the UK have found work via such platforms. Almost one quarter of them claim that they receive more than half of their income from work on platforms, 81% of them being the breadwinners in their households. On the other hand, there are skeptical accounts that do not directly support the notion of a rapidly growing share of platform workers, but these do recognize shifts in the patterns of self-employed work. These changes are not likely to result in a "workerless" society; rather, we risk a society within which the preponderance of work and value creation is more dispersed than ever before, even as the platform owner centralizes the transactions and captures value from the activities on their platforms. Importantly, we can only speculate on what the balance and character of the firms and jobs destroyed, created, and transformed will be as well as the character of the work and organizations generated. (Kenny, Zysman, 2015, pp. 1-23). There are now millions of digital platform workers who live all over the world, doing work that is outsourced via platforms or apps in the gig economy. Lacking the ability to collectively bargain, platform workers have little ability to negotiate wages and working conditions with their employers (who are often on the other side of the world). It is no wonder why the rise of sharing platforms has been met by a mixed response from some scholars, entrepreneurs, and politicians (to name some of the critics).

On the other hand, many have been enthusiastic, arguing that platforms can improve productivity, reduce costs, reduce inefficiencies in existing markets, help create entirely new markets, provide flexibility and accessibility for workers, and be especially helpful for less-developed countries. Arguments against platforms include that they may worsen technological unemployment, that they contribute to the replacement of traditional jobs with precarious forms of employment that have much less labor protection, that they can worsen declining tax revenues, and that the excessive use of platforms can be psychologically damaging and corrosive to communities. Since the early 2010s, the platform economy has been the subject of many reviews by academic groups, NGOs, national governments, and trans-national organizations (like the EU). Incipient reviews were generally against the imposition of heavy regulations on the platform economy.

The optimistic version of the emerging techno-economic system suggests that society can be reconstituted, with producers becoming proto-entrepreneurs who are able to work with flexible schedules and benefit from these platforms (which will certainly be the case for many). The utopians argue that platforms such as car-sharing services Uber and Lyft can unlock the commercial value in underused personal assets; other platforms such as Airbnb promote the notion that vacant rooms in one's house or apartment can become sources of income whether or not they are technically hotel rooms. Advocates believe that all of this

can occur for the greater social good without negative consequences; however, can we really foresee all of the repercussions of these new economic arrangements? For example, platform businesses matching workers and tasks may make labor markets more efficient, but if they become pervasive and organize a significant portion of the work, they are at the same time likely to generate fragmented work schedules and increasing levels of part-time work without the employment-related benefits that previously characterized much employer-based full-time work (*The Rise of the Platform Economy…*, http). For now, it is not perfectly clear whether these digital platforms are simply introducing digital intermediaries or actually increasing the extent of gig or contract work; however, the author leans to the latter suggestion of a growing precariat. Airbnb and Uber were founded in 2008 and 2009, respectively; it is widely believed that their success is due in part to the high unemployment, indebtedness, and difficult economic situations that young people found themselves in at that time (Schor, 2017, p. 269). A 2016 study of the rise of alternative work arrangements (Katz, Krueger, 2016, http) found that, between 2005 and 2015, the fraction of the labor force in non-standard work rose from 10.1 to 15.8% and that non-standard work accounted for the entire net gain in employment over this period. Online intermediaries such as Uber and TaskRabbit accounted for 0.5% of employment in 2015. In his study of platform workers in New York City, A. Ravenelle supports the idea that they work under precarious conditions (Ravenelle, 2016, pp. 279–293).

4. Surge of interventionism in sharing platform economy

Although early reviews opposed the imposition of heavy regulation for the platform economy, some jurisdictions began to take a more interventionist approach in 2016 (*Platform economy*, http). Some thought-leading organizations have produced a series of reports that center on platform workers. These reports do not see the end of salaried work but stick to the view that an increasing number of people will work as independent or platform workers (at least during parts of their careers). These new working configurations make it necessary to assert authority over the legal gray zone in which platforms currently operate. At the moment, digital business models may benefit from unlawful competition in labor where they can set a lower price than their competitors, often at the expense of worker's rights or society as a whole if social security insurance is in place.

Within the sharing sector, attention has been paid to the large fortunes being made by founders and venture capitalists (Schneider, 2014, http), which raises the question of whether the sharing economy is contributing to an increase in extreme inequality. By their very nature, many platforms have proven to be winner-take-all models in which only one or two platforms survive; a successful

platform owner is able to appropriate a portion of the entire value created by all users on the platform. The power is centralized to the platform owner who, after winning the initial competition, becomes a monopolist who can make decisions to maximize his/her own welfare. At the same time, the monopolist platform owner squeezes the platform community – the drivers on Uber, the content providers, the consigners – who are instrumental in producing the value in the first place (Kenny, Zysman, 2015, pp. 1-23). So, at the end of the day, one should pose the question of whether we are creating a new source of productivity or a new form of putting out. Are we are creating stable employment or vulnerable gig workers? As a consequence of the above, the innovative and disruptive nature of ride-hailing company Uber has brought the debate on work in the platform economy to the forefront of politics. In contrast to the US and UK, Uber has had a bumpy start in Scandinavia. In Sweden and Finland, Uber drivers have been sentenced for breaking with existing taxi regulations, having been ordered to pay fines of up to €12,000. As a result, the company suspended the operations of its famous UberPop platform in Sweden and Finland and is awaiting further developments (*Work and the 'platform economy': Lessons from Scandinavia* ... https).

Similarly, at the center of the French Strategic report stands the quest to solve the regulatory challenge of platforms acting as labor market intermediaries. This highlights three options. The first option is an ad hoc adaption of the existing statuses whereby platform workers would move up towards employee status. This option would reinforce platform workers' social protection, but it might also threaten platforms' business models by increasing their social responsibility. A second option would be to create a new hybrid status that is halfway between employees and independent workers. The third option is the creation of single worker status for all. This option is by far the most radical option, as it would mean that all workers have access to the same rights and training opportunities regardless of their status. Center-left politicians and reformist trade unions have expressed sympathy for the idea of simpler and universal rights that have the potential of smoothing peoples' careers in an ever-increasing flexible work environment. However, it is too early to predict whether this vision will play a major role in any upcoming national policy.

The debate on platform workers in France might provide other progressive parties across Europe with a solid starting point. As people feel increasingly insecure about their futures at work, there is a great need for democratic discourse and control that are related to sociotechnical changes. While conservatives and right-wing populists offer easy solutions to complex scenarios (either protecting vested interests or deregulating industries), the center-left must claim thought leadership on providing individuals with strong safety nets and empowering tools in a new work environment.

5. Conclusion

Apart from France and Scandinavia, policies and laws for the platform economy are already being written – not through deliberate social choices, but by the big players of the digital economy. This facet of the global society in the current times is evocative of the place that platforms occupy in informational capitalism, which makes them sites of extraordinary manipulability, creating new risks to the human project of democratic, inclusive, and sustainable coexistence. (Cohen, 2017, http). The impact on employment and the character of work is certainly one element in assessing whether we will have a utopia or dystopia. As a society, we will have to make further choices about how to deploy new technologies – choices that will be critical in shaping the ultimate impact. Further research should therefore focus on answering the following questions: what balance will there be among jobs created as the digital wave flows through our economy and society, and which workers will be displaced?

These days, it appears feasible to catalog existing work (particularly, work that is routine) as likely to be replaced or reconfigured by digital tools and, perhaps, to estimate the numbers of such existing jobs that will be digitized away (as some have tried). By contrast, the new kinds of work that are now being created and the existing jobs that will be redefined and reorganized in the future are more difficult to forecast, so we can only speculate. Algorithms and databases are automating some kinds of work; even as this occurs, however, other value-creating opportunities are appearing. There will be new products and services as well as new production and service processes that are likely to be design- and creativity-intensive as well as algorithm-enabled. Some of the early indicators of the new or transformed work can be enumerated but certainly not exhaustively counted. The debate over the jobs created or destroyed is useful and worth continuing, but it should be clear that it has no end and there will be no definitive answer. For now, there are only indicators and traces to suggest an outcome. This outcome will be shaped by choices about the deployment of technology that turn on entrepreneurial initiative, corporate strategies, and public policies. The exact nature of that change will be determined by the social, political, and business choices we make.

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Chapter 6

Expected Return on Human Capital – Pilot Survey among Accounting and Controlling Students[1]

Bartosz Kurek, Ireneusz Górowski

1. Introduction

The concept of human capital has been thoroughly examined in economic thought and looked at from multiple viewpoints and angles. It has been of interest to numerous researchers. The laureate of the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel in 1992, Becker (1993), investigated, *inter alia*, investment in human capital and the rates of return on human capital from a college education. Lev & Schwartz (1971) explored the possibility of measuring human capital in financial statements. Similarly, Dobija (1998) analyzed the possibility of measuring human capital and placing human resources in financial statements.

It is reasonable to claim that a successful education is associated with an increased level of human capital. Similarly, it might be claimed that a professional education is associated with an increased level of human capital. People undertake a university education and expect to receive a salary that is adequate for their knowledge and skills. Similarly, those who gain professional experience expect that it will be recognized by the market and that they will be adequately rewarded (via wages/salary).

It is further reasonable to expect that a person with a professional education should expect to receive a higher wage/salary than a person without it, *ceteris paribus*. Similarly, a person with professional experience should expect to receive a higher wage/salary than a person without it, *ceteris paribus*. The reason for the above-mentioned statements is the assumption that a minimum salary is adequate for the level of human capital. However, is an increase in salary really adequate for an increase in the level of human capital? In order to answer this question,

[1] The publication was financed from a subsidy granted to the Cracow University of Economics.

one must investigate the expected rate of return on human capital. Therefore, the important research area that we identified is whether the expected rate of return on human capital differs for various levels of education (including the existence and nonexistence of professional experience) and whether some pattern emerges from the observation.

The aim of this paper is to examine students' expectations for the return on human capital upon university graduation.

We conduct a pilot survey among second-year accounting and controlling full-time bachelor students at Cracow University of Economics. We contribute to the scientific discussion on human capital measurement and the levels of minimum wages/salaries. We measure the expected return on human capital as a ratio of the expected salary for accounting and controlling graduates (adjusted to represent the total cost borne by the employer) and human capital according to the M. Dobija model. Each return on human capital is calculated with values provided by the respondents: the expected salary for a graduate, cost of living, and cost of a professional education. Such a calculation mitigates the problem of the differences in individually perceived levels of the cost of living and cost of professional education. We find that the expected returns on human capital are not normally distributed. The median expected return on human capital for graduates ranges from 6.95 to 8.90% depending on the education level and professional experience.

The following research methods were used: an analysis and critique of the literature, and statistical tests. We used Stata/IC 14.1 for the statistical tests (Shapiro-Wilk W test, Wilcoxon signed-rank test) and Microsoft Office Excel 2013 for the initial data filtering and descriptive statistics.

The paper is organized as follows: Section 1 covers the introduction, Section 2 describes the human capital model by M. Dobija, Section 3 describes the research problem, Section 4 describes the research methodology and data, Section 5 includes the empirical results, and Section 6 concludes. A list of references follows the last section.

2. Human model by M. Dobija

Capital can be understood as an abstract measurable ability to perform labor – compare (Dobija, Dobija, 2003), (Dobija, 2007), (Dobija, 2010), (Dobija, 2014), and (Dobija, 2016). Capital is homogeneous, whereas assets are heterogeneous. Capital can be embodied not only in traditional assets (e.g., receivables, materials, machines, buildings, software) but also in human assets. Dobija (1998; 2000) and Dobija & Dobija (2005, pp. 30-34) suggested that value of human capital H(T) is determined by capitalized cost of living K, capitalized cost of professional education E, and professional experience factor Q(T) according to Formula (1).

$$H(T) = (K + E) \times [1 + Q(T)] \tag{1}$$

Capitalized cost of living K and capitalized cost of professional education E are calculated according to Formulas (2) and (3), respectively.

$$K = k \times 12 \times \frac{(1+p)^t - 1}{p} \tag{2}$$

$$E = e \times 12 \times \frac{(1+p)^t - 1}{p}, \tag{3}$$

where:

k – monthly cost of living;
p – economic constant of potential growth;
t – in formula for K – years from birth through graduation (without gap years);
e – monthly cost of professional education;
t – in formula for E – years of professional education.
Both yearly capitalization and constant capitalization can be used.

The experience factor Q(T) is calculated according to Formula 4.

$$Q(T) = 1 - T^{\frac{ln(1-w)}{ln2}}, \tag{4}$$

where:

Q(T) – experience factor;
T – years of professional experience;
w – learning rate.

Value of human capital H(T) can be used to determine the minimum fair wage/salary that an employee should receive to recover the natural dispersion of capital (destructive forces in nature affect all assets, including human assets). The average rate of the natural dispersion of capital is defined in the human capital model as 8% per year, which is also the value of the economic constant of potential growth p. Minimum fair wage/salary W is, therefore, calculated according to Formula 5.

$$W = H(T) \times pW = H(T) \times p \tag{5}$$

The aforementioned human capital model is widely used in the literature on wages and salaries – for example, Cieślak & Dobija (2007), Jędrzejczyk (2011),

Kozioł (2010), Kozioł (2011), Kozioł & Mikos (2019), Renkas (2012a), Renkas (2012b), Renkas (2013), Renkas (2014), Hołda, Renkas (2015), Renkas (2018), and Stańdo-Górowska (2014).

3. Research problem

The human capital model enables us to determine a fair minimum wage/ salary based on the theoretical value of the economic constant of potential growth, which is the theoretical fair minimum return on human capital. The theoretical fair return may differ from the individually required fair minimum return on human capital. For cognitive purposes, it is first of all valuable to examine whether our individual expectations deviate from well-established theory and, if so, to study the empirical distribution of an individually required fair minimum return on human capital. Second of all, it is valuable to investigate the factors that influence this deviation.

Therefore, the aim of this paper is to examine students' expectations for the return on human capital upon university graduation.

Formula (5) is rearranged in order to calculate expected return on human capital Exp. ROHC for every individual – Formula (6).

$$Exp.ROHC = \frac{W}{H(T)} \tag{6}$$

In Formula (6), we substituted the economic constant of potential growth with expected return on human capital Exp. ROHC, which is an observable measure for each individual (each individual expects a salary, and each individual has his/her own level of human capital). On the other hand, the economic constant of potential growth stems from the theory and is used in the model to calculate minimum wages/salaries.

Since M. Dobija's human capital model uses the education level and professional experience in de termining the minimum wage/salary, we are interested in calculating the expected return on human capital for four types of university graduates: one with a bachelor's degree in accounting and controlling with no professional experience in accounting, controlling, nor finance (B/NE); one with a bachelor's degree in accounting and controlling with three years of professional experience in accounting, controlling, or finance (B/E); one with a master's degree in accounting and controlling with no professional experience in accounting, controlling, or finance (M/NE); and one with a master's degree in accounting and controlling with three years of professional experience in accounting, controlling, or finance (M/E).

4. Research methodology and data

We conducted the pilot survey among second-year accounting and controlling bachelor students at Cracow University of Economics who were full-time. Out of 100 questionnaires that were distributed, 98 contained all of the relevant data for the analysis; i.e., individually expected salary for the accounting and controlling graduate (bachelor/master, with/without professional experience), individually assessed minimum monthly cost of living, and individually assessed minimum monthly cost of professional education. We use this data to calculate the expected return on human capital (Exp. ROHC) for each respondent separately. An illustrative calculation for one of the respondents is presented in **Table 1**.

Table 1. Illustrative example for calculation of Exp. ROHC

Variables	B/NE	B/E	M/NE	M/E
Expected monthly net salary [PLN]	3,000 (*)	3,500 (*)	4,000 (*)	5,000 (*)
W – total monthly cost borne by employer [PLN]	3,000/0.6518 = = 4,602.64	3,500/0.6518 = = 5,369.75	4,000/0.6518 = = 6,136.85	5,000/0.6518 = = 7,671.06
k [PLN] – monthly cost of living	1,000 (*)	1,000 (*)	1,000 (*)	1,000 (*)
t – years of living	22	22	24	24
K [PLN] – capitalized cost of living (Eq. 2)	$1{,}000 \times 12 \times \frac{(1+0.08)^{22}-1}{0.08} = 665{,}481$		$1{,}000 \times 12 \times \frac{(1+0.08)^{24}-1}{0.08} = 801{,}177$	
e [PLN] – monthly cost of professional education	600 (*)	600 (*)	600 (*)	600 (*)
t – years of education	3	3	5	5
E [PLN] – capitalized cost of professional education (Eq. 3)	$600 \times 12 \times \frac{(1+0.08)^{3}-1}{0.08} = 23{,}374$		$600 \times 12 \times \frac{(1+0.08)^{5}-1}{0.08} = 42{,}240$	
K + E [PLN]	688,855	688,855	843,417	843,417
w – learning rate	-	10%	-	10%
Q(T) (Eq. 4)	0	$1+1-3^{\frac{ln(1-0.1)}{ln2}} =$ = 1.1538…	0	$1+1-3^{\frac{ln(1-0.1)}{ln2}} =$ = 1.1538…
H(T) [PLN] – value of human capital (Eq. 1)	688,855	794,797	843,417	973,129
Exp. ROHC [%] (Eq. 6)	8.02	8.11	8.73	9.46

(*) data provided by respondent.

Source: own work.

In the human capital model, the value of the cost of living and cost of a professional education relates to the minimum amounts that are justified to form a healthy and educated individual. Excess spending on living and unjustified spending on education should not be included in the calculation of the minimum fair salary. For example, the cost of eating out is generally greater than the cost of cooking meals at home. The difference between the cost of eating out and the cost of cooking meals at home represents excess spending, as this is not an essential component of forming a healthy individual. By the same token, the cost of retaking the courses that a student failed represents unjustified spending on education; these costs should not increase the human capital of such a student.

A similar approach applies to the number of capitalization years. The number of years for forming a healthy human being who is ready to start a first job just after finishing one's bachelor studies equals 22 years – compare Equation 2. If somebody graduates from a university at the age of 30, the market should not reward this (the number of capitalization years should not be 30). If somebody successfully completes a university education earlier, this person should not be penalized for their success (the number of capitalization years should not be less than 22).

The number of years of a professional education should be equal to five years (three years of bachelor's studies and two years of master's studies) – compare Equation 3. If somebody spends seven years on a program that normally takes five years, this person would not receive a higher salary just for studying longer than in a normal course of action. This idea resembles the concept of the cost of production in accounting – only the essential costs of direct materials, direct labor, and overhead costs that are necessary to manufacture a product can be included in the valuation of a finished product.

The above-mentioned examples of excess and unjustified spending as well as the number of capitalization years are all straightforward. However, since students are asked to provide an individually perceived fair minimum salary for an accounting and controlling graduate, it is valuable to include an individually perceived minimum cost of living and individually perceived minimum cost of professional education in the calculations, which is the reason for our research approach.

5. Empirical results

In **Table 2**, we present descriptive statistics for expected return on human capital Exp. ROHC (medians are in bold). **Figure 1** presents boxplots for Exp. ROHC.

None of the expected returns (Exp. ROHC B/NE, Exp. ROHC B/E, Exp. ROHC M/NE, Exp. ROHC M/E) are normally distributed. In **Table 3**, we present the results of the Shapiro-Wilk W test, which we used to test the normality of the

data (according to a null hypothesis, a sample comes from a normally distributed population, and according to an alternative hypothesis, a sample does not come from a normally distributed population).

Table 2. Descriptive statistics for Exp. ROHC

Variable	Exp. ROHC B/NE	Exp. ROHC B/E	Exp. ROHC M/NE	Exp. ROHC M/E	Exp. ROHC (all four groups combined)
Minimum	3.18	3.85	3.68	3.68	3.18
Maximum	29.11	29.44	26.57	27.40	29.44
Average	7.93	9.32	8.61	10.38	9.06
Q1	5.31	6.72	6.23	7.19	6.35
Median	6.95	7.97	7.81	8.90	7.87
Q3	9.26	10.50	9.96	12.03	10.47
n	98	98	98	98	392

Source: own work.

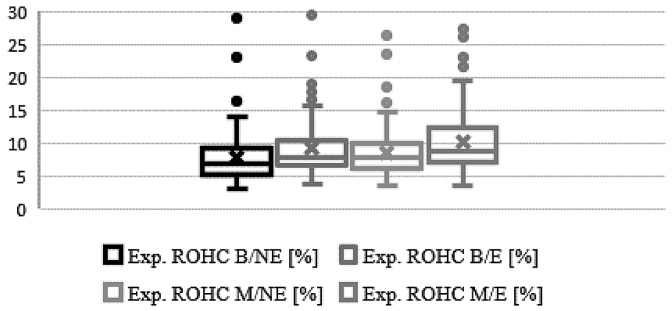

Figure 1. Expected Return on Human Capital

Explanation: "×" is average, "dot" is outlier (data point is defined as outlier if it is above 3rd quartile by more than 1.5 times interquartile range). Top whisker is maximum (excluding outliers). Bottom whisker is minimum. Box consists of 1st quartile (bottom line), median (line inside), 3rd quartile (top line).

Source: own work.

Table 3. Shapiro-Wilk W test results for variables

Variable	Exp. ROHC B/NE	Exp. ROHC B/E	Exp. ROHC M/NE	Exp. ROHC M/E
p-value	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Source: own work.

We use the Wilcoxon signed-rank test to determine whether the expected return on human capital significantly differs from the value of the economic constant of potential growth, which equals 8% according to M. Dobija's human capital model. This is the value that is used to determine a theoretical minimum

fair wage/salary (compare Equation 5) in the model. **Table 4** presents the outcome of the test (according to a null hypothesis, the median expected return on human capital equals 8%, and according to an alternative hypothesis, the median expected return on human capital does not equal 8%).

Table 4. Wilcoxon signed-rank test results for variables

Variable	p-value
Exp. ROHC B/NE	0.0466
Exp. ROHC B/E	0.1965
Exp. ROHC M/NE	0.7404
Exp. ROHC M/E	0.0003
Exp. ROHC (all four groups combined)	0.0725

Source: own work.

At a 1% significance level, we do not reject a null hypotheses for Exp. ROHC B/NE, Exp. ROHC B/E, Exp. ROHC M/NE, nor Exp. ROHC (all four groups combined). We only reject a null hypothesis for Exp. ROHC M/E. Therefore, we claim that students expect that the minimum return on human capital will be similar to the theoretical minimum return on human capital from M. Dobija's human capital model.

6. Conclusion

A higher education level is associated with a higher level of human capital (accumulated in a person); similarly, the existence of professional experience is also associated with a higher level of human capital (accumulated by a person). Therefore, it is justified that the holder of a master's degree expects a higher salary than a holder of a bachelor's degree, *ceteris paribus*. It is also justified that a person with professional experience expects a higher salary than a person without professional experience, *ceteris paribus*.

We observe that a higher level of education and the existence of professional experience are also associated with the increased expected return on human capital: the median expected return on human capital for a graduate with a bachelor's degree in accounting and controlling with no professional experience in accounting, controlling, nor finance (B/NE) equals 6.95%, the median expected return on human capital for a graduate with a bachelor's degree in accounting and controlling with three years of professional experience in accounting, controlling, or finance (B/E) equals 7.97%, the median expected return on human capital for a graduate with a master's degree in accounting and controlling with no professional experience in accounting, controlling, nor finance (M/NE) equals

7.81%, and the median expected return on human capital for a graduate with a master's degree in accounting and controlling with three years of professional experience in accounting, controlling or finance (M/E) equals 8.90%. Furthermore, our analysis reveals that the expected return on human capital is not normally distributed.

Some of the reasons for these results might include the perception of longer studies (bachelor and master) as being riskier than shorter studies (bachelor only); hence, the increase in the expected rate of return on human capital. However, in order to draw further valid conclusions, an additional analysis should be undertaken. Future research in this area should concentrate on increasing the sample size and on trying to explain the level of the expected return on human capital through a regression analysis.

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PART II METHODOLOGICAL AND PRACTICAL PERSPECTIVES OF MANAGING MODERN BUSINESS

Chapter 7

Perspectives of Implementation of Process-Based Management Method among Enterprises – Conclusions from Empirical Studies[1]

Janusz Nesterak

1. Introduction

The changes taking place in the current economic environment force organizations to modify their existing rules of functioning. The adaptation of enterprises to new conditions requires their organization to change the ways in which resources are managed. And in turn, the adaptation of enterprises to the challenges posed by the market requires the constant asking of questions and seeking answers to them. Questions about the shape, effectiveness, and efficiency of our own business processes are absolutely the top priority here. Periodic verification of the results of research on business processes may turn out to be ineffective and might not bring the expected benefits. Therefore, the continuous use of controlling mechanisms becomes a natural and necessary element of the management process in many enterprises.

As Rummler and Brache (2000, pp. 76-78) wrote, an organization is just as effective as its processes. Each of the key processes as well as each of the processes are supporting functional processes in order to contribute to the implementation of one or several organizations. Therefore, the effectiveness of each of the processes should be measured.

A. De Waal identified the features of the so-called high effectivity of process management in an organization. This is one of the empirically confirmed competencies that are responsible for an organization's ability to achieve this high performance. In de Waal (2007), the author included organization design, strategy,

[1] The publication has been financed by the funds allocated to the Department of Economics and Organization of Enterprises at the Cracow University of Economics in the framework of grants to maintain research potential.

process management, leadership, long-term orientation, continuous improvement, organizational culture, and orientation outside to be among these competencies.

Process performance is higher when the error rate the lower is during the process, shortening the process time and lowering the cost of the process (Figure 1). The process changes that only affect one of the three parameters (e.g., process time) can have a negative impact on the other parameters (quality and cost).

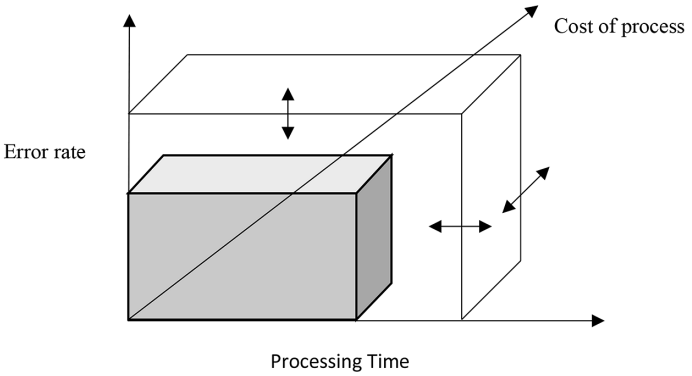

Figure 1. "Improving" the process
Source: (Scholz, Vrohlings, p. 59).

Business process monitoring is an assessment of the impact of changes in the value of the *key performance indicator (KPI)* on the one hand, but it is also a constant and methodical analysis of the existing business process model on the other (Hammer, Champy, 1993). The experience of foreign companies operating on international markets indicates that the process of the monitoring and streamlining processes should be continuous. The constant revision of the business process model requires teams to carry out such activities with the appropriate competencies and tools.

For this reason, special attention should be paid to two aspects of a company's activities, which are closely related to process-based management (PBM, business process management). These are the ability to constantly improve and the ability to make changes. The first of these requires constant monitoring and measurements at various process levels. The results of the measurements allow for the correction of activities carried out throughout an organization (Chang J. F., 2016; Hammer, Champy, 1993; Harmon, 2015; Jeston, Nelis, 2014; Van Der Aalst, 2013). If an organization only controls the value of the input and output data of a business process, process managers understand it as a "magic black box," not as a set of logically related tasks or actions. Therefore, it is important to properly configure the controlling system so that it can effectively

evaluate the business processes (Nesterak, 2015, pp. 23-41). In turn, the ability to introduce changes concerns a wide aspect of a company's operations, both in the areas of management, organization, products, or service portfolios or in the method of customer service. These factors are important for maintaining or strengthening an organization's position on the market. The implementation of changes should be a consequence of the continuous improvement process.

How does one decide that one process is better managed than another? There is more than one possible answer. Generally, the main reason is related to the management method that is conducted by an enterprise. If an organization is properly and professionally prepared for business process management (BPM), then there is a relatively big chance that a process executed by it will be more effective and the quality of customer service (for example) will be higher than an average results achieved by enterprises working without BPM methods (Anand, Wamba, Gnanzou, 2013). Buh, Kovačič, and Štemberger (2015) published "Critical success factors for different stages of BPM adoptions" in which the authors presented five stages of BPM adoption. The first one is "awareness of process problems and opportunities," while the third one is "BPM education and training; BP modeling, analysis, and redesign." Both of these presented stages showed the importance of the level of knowledge and the level of skills owned by management as well as the rest of the employees. This subject was taken as the main problem for the research presented below.

The author has designed research to build a picture of the current degree of the preparation of human resources among Polish enterprises for adoption of the stages of business process management. This picture can be automatically used to answer the question raised and how the analyzed organizations are prepared for implementing process-based management.

The capability of being a process-based organization (PBO) is influenced not only by the current accomplishments of an enterprise but also the results that the organization will achieve in the future. There are several publications that present lists of benefits that are generated by PBM. Breyfogle (2014) proposed five benefits: an organization's ability to adapt to change, cost reduction, revenue increase, efficiency enhancement, and improvement of operation transparency. The last benefit is related to security; properly defined and modeled processes help teams detect all potentials areas of threats.

It also must be mentioned that there are two other aspects of PBO that are vital for an enterprise from its market position in the future. In "Process-based Organization Design Model: Theoretical Review and Model Conceptualization" (2006), Hernaus presented arguments that clearly drew lines and areas of the influences between the business processes and the structure of an enterprise's organization. It is the business process (its model) that decides how the structure

of an organization should look. Another aspect of PBO that is crucial for keeping a competitive advantage relates to an organization's ability to create and implement innovations (Kueng, 2000, pp. 67-85; Vera, Kuntz, 2007, pp. 55-65; Vanhaverbeke, Torremans, 1999, pp. 41-52). Modeling a business process by using the business process model and notation (BPMN), an organization can find areas for innovation due to extending and sharing knowledge about the flow of the process. However, to accomplish one or more of benefits described above, the employees of the enterprise must be equipped with the relevant skills and be aware of the values of BPM and PBM, to not only make the decision to implement this method of management but also to be able to take the required actions (Muehlen, Recker, 2008).

The author put forth a thesis that the knowledge related to the BPM subject is absolutely crucial to effectively implement a PBM in an organization. The consequence of this thesis is that an organization with employees who are not equipped with this knowledge and skills will struggle with BPM and PBM adoption. This is why the main objective of the conducted research was to answer the question of how Polish enterprises are prepared for PBM and BPM implementation. To answer this question, researchers designed a questionnaire that focused on checking the level of knowledge related to BPM and the level of maturity of PBO in an analyzed group of enterprises.

The research was part of a scientific and educational project that was carried out with students. Participation in the project was treated as a way to enhance the students' awareness and knowledge of the BPM subject. During the project, the students not only filled out a questionnaire but also conducted an analysis of three selected business processes in a more detailed way. Reports from these analyses allowed researchers to verify whether or not the declarative answers from the questionnaire were true.

All of the materials, reports, and presentations prepared by the students constituted a source of data for conducting additional research on BPM using NLP – natural language processing (Bates, 1995; Bird, Klein, Loper, 2009; Manning, Schütze, 1999; Nesterak, Radziszewski, 2019, pp. 93-105; Powers, Turk, 1989). The researchers planned to find natural ways for describing the business processes that are used by persons without professional BPM skills.

2. Research and methods

The research presented in this article was designed as a double-interaction information-gathering process. The first interaction was focused on gathering information using a structural questionnaire. Most of the information collected during this stage was declarative, so this required additional effort in order

to validate it. A part of the validation process was implemented in the list of questions. The answers to some questions allowed us to verify the quality of the answers provided for other questions.

The second interaction was conducted as an interview that focused on three particular business processes. The information gathered during this interaction was used to assess the level of process-based management maturity. Thanks to the reports prepared as a result of this phase of the research, it was possible to assess the quality of the business process modeling realized by the enterprises.

The questionnaire consisted of two sets of questions. The first contained survey metrics that posed only a few general questions to categories of the researched enterprises. The second group of questions was focused on gaining information about the level of the knowledge and skills of the employees in the researched organizations. The researchers were interested in learning the approach that the enterprises used in the case of developing human resources in the area of business process management. The thesis put forward was that only a minority of the organizations invest in the development of those skills related to the business process management subject.

The described research covered 126 enterprises operating in Poland. Such a concentration of objects in one location was a result of the fact that University of Economy is located in the aforementioned region. The selection of the respondents was totally randomized from the researcher's viewpoint. It was in the students' hands to select a particular enterprise for their individual analysis. The most important factor that very often decided which company was to be interviewed was whether managers were open to cooperation and sharing their information.

The majority of the group consist of enterprises that operate in the service sector, including wholesale, retail trade, and e-commerce. The second-largest group represents the manufacturing sector. Banks and insurance enterprises represent a minority of the group of researched organizations.

From the ownership-type point of view, the significant majority of the researched objects were privately owned enterprises. The rest were owned by government, local communities, or cooperatives. The size of an enterprise defined by its number of employees is another dimension that categorized the analyzed objects. The structure of the researched group from size-of-employment point of view is presented in Figure 1. More than 60% of the surveyed organizations employ more than 50 employees, and the largest group (41.3%) consists of large enterprises that employ more than 250 employees (see Fig. 2).

The last (and definitely important) fact that described the researched objects is related to the interviewed persons. The majority of them occupy positions at the top or medium management levels (62%). Seventeen percent

of the respondents declared to be the owners of their enterprises. This number is similar to the number of micro enterprises, where the management structure is flat and consist mostly of one manager (who is the owner).

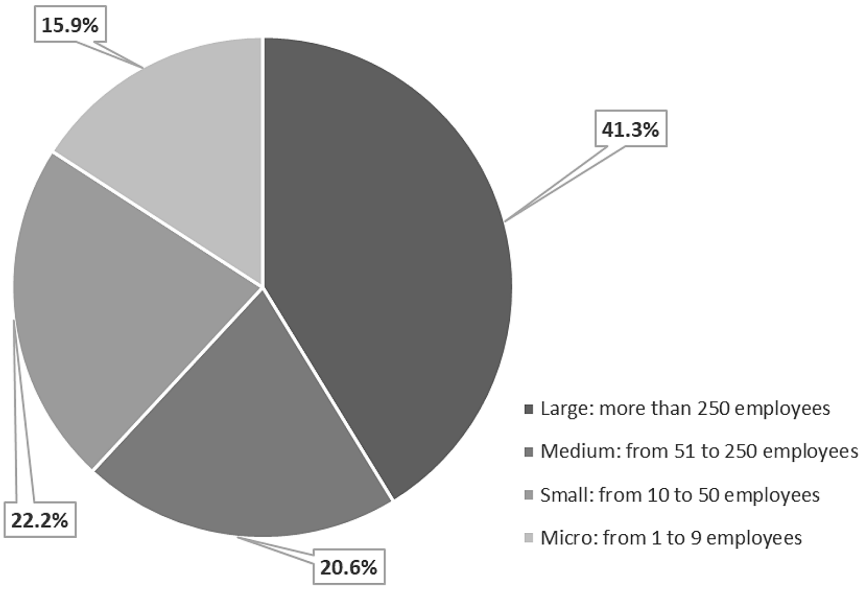

Figure 2. Structure of interviewed enterprises by size of employment
Source: own study

3. Results and Debate

An analysis of the information gathered from the questionnaires allowed the author to find out whether there is an awareness of business processes among the interviewed enterprises; however, the levels of knowledge and skills can be interpreted as representing the early stage of PBM implementation. Only 12% of the respondents answered that none of the business processes were documented in their organization. This means that the rest of them represent enterprises that are at least at the lowest stage of business process maturity. What surprised the researchers was that lack of documented processes that was declared by 10% of the large enterprises. There is nothing unexpected that 40% of micro enterprises has no documentation of their conducted processes.

Even if more than 80% of the interviewed enterprises declared that they were aware of a business process management subject and that they were active in this area, only 36% of them stated that BPM-related training is offered to its employees.

The researchers expected that none of the micro enterprises provided training for their employees in the BPM area, but the result achieved for the large enterprises could be treated as a kind of surprise. Only half of the organizations from the group (which contains enterprises where the business processes are actively and consciously managed) offer BPM training to their employees.

The researchers also asked how important the BPM-related skills of their employees were for the interviewed organizations. Only 30% of the respondents declared that their organizations require job applicants to have BPM-related skills. Interesting is the fact that, among the mentioned group, one third of the enterprises represent small enterprises.

The low interest in the development of BPM-related skills that was presented by top management can be partly explained by the results presented below. Figure 3 shows the average percentage of the researched enterprises managers who had knowledge in the area of BPM.

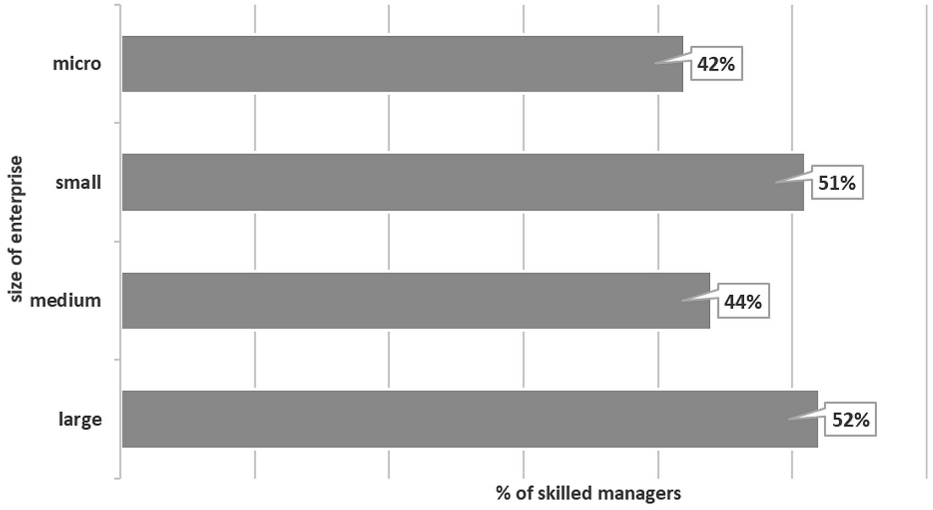

Figure 3. Percentage of management team members educated in BPM area
Source: own study

The respondents taking part in the interview were asked to assess the level of their own knowledge in the subject of BPM. The researchers proposed four values for this category: advanced, basic, low, and a lack of knowledge. Figure 4 presents the achieved results. Only 17% of the respondents declared that they were at the advanced level. Twenty percent of large enterprise representatives declared that their level of knowledge was low or that they do not have knowledge at all. This proves that the managers' level of knowledge is low regarding process management.

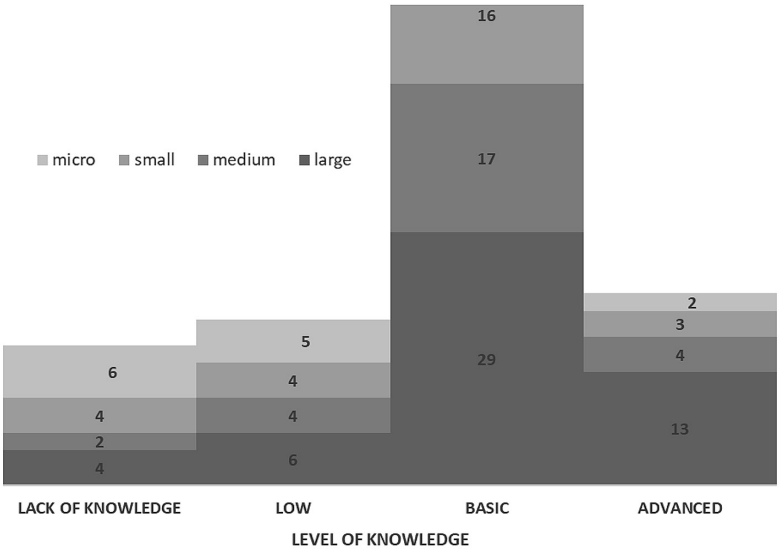

Figure 4. Declared level of knowledge in BPM by size of enterprise
Source: own study.

4. Conclusion

The scientific objective of the project and of the research that is part of this project was to learn to what degree of preparation do Polish enterprises fully adopt process-based management. The authors assumed that BPM knowledge and the skills of the employees in the mentioned subject are key success factors. So, what was found in the analyzed data was that only a small percentage of the organizations were determined to fully implement all stages of BPM adoption. To be better-prepared for process-based management, the investment in human resources is most often neglected by micro, small, and medium-sized enterprises.

The lack of knowledge issue concerns managers from all sizes of organizations. The only difference is noticed in the case of the financial sector. Generally, all enterprises where most of the employees in an organization are involved in direct contact with customers are much-better-prepared for process-based organization adoption.

An analysis of the reports prepared by the students as a result of the business process analysis has proven that a lack of properly structured and professional business process-based management-related knowledge is reflected in the quality of the business process setup.

Because the majority of the analyzed enterprises were not professionally prepared for PBM due to their lack of skills and knowledge, the recommendation for them would be to invest more in BPM training.

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Chapter 8

Information on Measurement of Performance in Non-financial Reports

Krzysztof Dobrzanowski

1. Introduction

Changes in the environment at the turn of the 21st century increased the scope and changed the nature of competition on local and global markets. The ability to gain a competitive advantage not only allows modern companies to survive but also demonstrates a company's ability to deliver maximum value to its stakeholders. The interests of investors, customers, and employees are a common subject of research (Osmanagić, Bedenik et al., 2016). A global survey of senior executives from around the world show that informing investors and stakeholders about the sustainability performance of their organizations was one of the most important long-term benefits (61%), including even 39% of the worst performers (Ibidem, p. 15). It is also worthwhile to present the results of a company's research of asset management in this context for clients in North and South America, Europe, Asia, Australia, the Middle East, and Africa. The results of the research on investors' interests show that as many as 64.5% of them regularly assess the environmental and social aspects of their business and only 35.5% do so rarely or not at all (Nelson, 2018).

Stakeholder communication is extremely important for building lasting relationships, achieving a competitive advantage, and increasing the value of a company. Providing information about a company to stakeholders is based on information about performance. Measuring performance has become one of the most dynamically developing management concepts. The modern technological "revolution of unlimited data processing" initiated the concept of "big data." Data processing has become a valuable and accessible resource (Karmańska, 2016, p. 17), and the focus on value creation has led organizations to recognize the requirement of using metrics in building a competitive advantage regardless of their size (Perera, Baker, 2007, p. 10).

Measuring performance is understood as a reporting process that provides stakeholders with information on the results of the conducted activities (Franco-Santos et al., 2007, p. 785). An exceptionally large amount of information about the measurement of performance is included in non-financial reports. In 2017, entities were required to disclose information on reporting non-financial information. The research conducted thus far indicates that the information on the achievements in non-financial reports is of poor quality and is prepared with great discretion. Moreover, it focuses only on selected aspects of business activity, most often a description of strategy and corporate social responsibility.

There is a lack of standards that would specify both the presentation of performance and its scope. This causes difficulties in comparing entities with each other, interpretation chaos, and does not always provide information on the disclosure of key performance measures.

Therefore, the purpose of this article is twofold: first of all, to discuss how information on performance is presented in organizational reports (especially non-financial reports), and moreover, to indicate the role of information about non-financial performance in the decision-making process of stakeholders. The article will use studies of the subject literature and an analysis of previous research on non-financial performance.

2. Performance of organization – essence and measurement

Meeting the requirements of a competitive environment forces organizations to constantly update their professional competencies and orientation to optimize the benefits of all stakeholders while reducing financial, social, material, and time expenditure. Taking the above-mentioned objective into account, it is necessary to carry out performance measurement, which makes it possible to assess the implementation of an entity's strategy and objectives.

There are many definitions of performance in the literature (Niemiec, 2016, p. 30). According to Grüning's definition (2002), it is "the ability of an enterprise to achieve its goals and thus meet its expectations" (Niemiec, 2015, p. 364). Nowak (2015) emphasizes that a company's performance must be regarded as a 'complex economic category' that is related to the achievement of objectives and business results. This author defines performance as "progress in achieving the set goals through appropriate actions aimed at implementing the adopted strategies" (Nowak, 2011, pp. 279-287). He stresses that it is not only about financial results but also about a company's achievements in the broad sense (Nowak, 2015, p. 364). Michalak (2008, pp. 458-459) points out that the creation of a performance-measurement system should include six consecutive stages: determining the subject of measurement, determining the unit of measurement

and scale, selecting or building a measurement system, determining the planned result as a benchmark, making an actual measurement, and comparing the obtained measurement results with a benchmark.

The measurement of performance combines many tasks, including the following (among others) (Michalak, 2008, pp. 7, 43, 51, 73-76):

- informs entity's internal and external environment about how it operates;
- it brings together past, present, and future activities into coherent whole;
- it allows us to assess decisions taken by management in terms of their relevance;
- is motivating factor for staff;
- becomes tool to link employees' objectives with those of entity;
- serves to determine company's position on market;
- determines degree of implementation of strategy;
- assesses effectiveness of use of organizational resources;
- enforces objective view of set goals;
- allows for evaluation of employees as well as for disposal of penalties and rewards.

The process of managing performance begins with setting out the vision for which an organization strives. This indicates the area of activity, the model of the organization, the future planned position of the entity, and its place in the environment (Niemiec, 2016, pp. 26-28). It is communicated by means of a mission, which is a concise understandable definition of the vision and is intended for the stakeholders. It informs us about what the organization has to offer and inspires all employees. The next step is to define an organization's strategy to clarify the strategic objectives and action programs needed to achieve them along with the resources and means necessary to achieve these objectives. Determining the key success factors is the basis for measuring performance and depends on the specific situation in a company's sector, the form of organization, and the adopted strategy for the implementation of the organization's vision and mission that determine the success of the company. The identification of key success factors is a result of a comprehensive analysis of the processes implemented in a company and the expectations of its stakeholders (Michalak, 2008, p. 185). The vision and strategy are descriptive in nature and can be interpreted in different ways; only the measurement of performance specifies the goals and makes it possible to achieve their unquestionability (Niemiec, 2016, pp. 26-28).

This concerns the following aspects:

- identification of object of measurement;
- measurement;
- evaluation and use of measurement results.

The next phase of performance measurement is the determination of meters and the measurement scale, which is the central element of a performance measurement system. These measures define the strategy, the purpose of the measurement, and its subject matter and are necessary in the decision-making process and implementation activities.

The meters have three basic functions: control, communication, and improvement (Franceschin, 2007, pp. 10-11). An orderly set of key measures is the basis for building a performance-measurement system in an organization. After selecting the subject of the measurement and the appropriate meters as well as choosing a benchmark for comparison, the meters are evaluated by the unit. This assessment concerns whether they are satisfactory and whether there are deviations from the expected values. This assessment is a feedback that signals the need to intervene in an organization, which most often comes down to introducing changes in the processes being carried out, directions for motivating employees, or the need to modify the organization's objectives and strategy.

Over the past years, an increasing importance has been given to measuring non-financial performance. As indicated by Krasodomska (2018, p. 273), integrated reporting is becoming more and more widely practiced by companies while, at the same time, being associated with sustainability or corporate social responsibility (CSR).

Wronka (2011) indicates seven basic groups of tools for measuring socially responsible activities:

- Benchmarking of achievements and ranking tools – which, according to the author, is specific to two subcategories: tools and research oriented towards investors (e.g., reputation indices; i.e., Domini Index [KLD], DJ Sustainability Index), and lists created on the basis of the available data (e.g., social ranking 100 Most Admired Companies, developed by "Fortune" magazine in cooperation with Hay Group).
- Certification and accreditation – including standards such as ISO14001 (concerning environmental issues), SA8000 (concerning working conditions), and ISO26000 (concerning corporate social responsibility issues).
- Reporting guidelines – in particular, include popular social reporting models, GRI (Global Reporting Initiative) standards, and so-called sustainability reporting guidelines.
- Networks based on the principle of voluntary participation to exchange experiences and promote good practice in sustainable development (e.g., The Equator Principles, UN Global Compact).
- An analysis of the content of corporate publications, which (as indicated by the quoted author) should be treated with some caution, as sometimes

they only serve to build a good image, having little to do with the actual activities of a company.

- Evaluation scales – measuring how individuals perceive CSR activities; e.g., the Aupperle scale (used to assess CSR aspects by managers) and PRESOR scale (perceived role of ethics and social responsibility, assessing the role of such factors as ethics and CSR in achieving organizational effectiveness).
- Creating indicators as part of a balanced score card – for example, environmental indicators (e.g., waste-to-waste ratio,) employee indicators (e.g., the Gender Index, for monitoring gender equality in the workplace) (Wronka, 2011, pp. 261-270).
- Companies need reliable information for proper and rational management, which requires an understanding of the essence of the business, not only in financial but also operational terms (PricewaterhouseCoopers, 2009, p. 9). Improving reporting standards and transparency should improve information effectiveness for stakeholders. This applies to global corporations, domestic enterprises, and non-profit entities.

3. Reporting of non-financial information

Information on non-financial performance is presented mainly in non-financial reporting that discloses non-financial information. According to Krasodomska's definition, non-financial information includes "any information (descriptive or numerical, but not necessarily expressed as a monetary measure) published (whether mandatorily or voluntarily) as part of a company's annual report, other than the financial statements and auditor's opinion and report" (Krasodomska, 2014, p. 28). In an effort to increasingly report non-financial information and its diversity, large companies are required to publish non-financial information. Directive 2014/95/EU of the European Parliament and of the Council of October 22, 2014, is limited to issues commonly associated with the concept of corporate social responsibility (CSR). The directive imposes an obligation to disclose information on the results of an organization's policy description concerning social and labor aspects, risks related to environmental issues, respect for human rights, and the fight against corruption and bribery. It can be assumed that the number of publications devoted to these will increase with the development of the organization's practice of non-financial disclosure and will be more and more frequently the subject of research conducted by financial researchers (Bek-Gaik, Krasodomska, 2018, p. 26).

In Poland, the amended accounting act was published on January 11, 2017, and introduced the following changes:

- term "key" non-financial performance indicators related to entity's operations and information on employee and environmental issues were added;
- it is indicated that entity may present separate statement of non-financial information that is necessary to evaluate its development, position, and performance;
- scope of non-financial information under directive is defined;
- possibility of applying any rules when preparing statements on non-financial information was indicated;
- "comply or explain" disclosure principle was adopted;
- decision was taken on voluntary verification of non-financial information (Responsible Business Forum, 2017, p. 5).

The occurrence of information gaps in the form of not disclosing individual components of non-financial assets is significant and may affect the system of managing intangible assets and issues related to the valuation of an organization. This results from the fact that effective communication with the environment is one of the most important contemporary tools for building a competitive advantage. It builds a strong brand, being one of the most important creators of an organization's value, along with employee qualifications, innovation, and relationships with its stakeholders. The scope of non-financial information is to show what a given entity decided to do in three areas (economic, social, and environmental) and then whether these objectives were achieved (Kamela-Sowińska, 2016, p. 19).

Non-financial information is presented in corporate documents: the annual report (more precisely, the activity report published within its framework) in the management's comments, CSR reports, and integrated reports.

Management commentary is an important element of a company's annual report that is addressed to its investors, which presents areas of financial and non-financial information that helps investors assess the strategy, performance, risk, and prospects of the business unit. (Krasodomska, 2011; Kabalski, 2012). Nowak (2015) emphasizes that the management board's report on operations is a supplement to the financial statements and is subject to accounting regulations and guidelines. This document is presented as follows:

- description of entity's activities and its environment;
- specificity of activity, services, main products, method of distribution;
- main markets, competitive position;
- most significant resources;
- objectives set by management and strategies for achieving these objectives;

- anticipated developments and major achievements in research and development;
- key performance measures and indicators to assess achievement of entity's objectives;
- explanations concerning performance and development of entity and its competitive position;
- disclosures related to identifying significant entity-stakeholder relationships;
- risks (Kabalski, 2012).

In other words, this indicates the area of current objectives adopted by the managers, the organization's strategy, and a concise description of the unit's business model. Furthermore, it indicates its own shares as well as a description of its social, employee, and environmental issues.

The variety of approaches to capturing and presenting information makes it necessary to increasingly use the advice of auditors in verifying non-financial information that is related to financial statements (Krasodomska, 2018). The analysis is significantly hampered, especially in relation to non-financial information that is difficult to measure due to the lack of comparability and diversity of disclosures. Therefore, it is proposed to increase the scope of the disclosures, which should be voluntary and based on internationally harmonized rules (e.g., for the industry).

The CSR report is another source of non-financial information and is related to the fact of implementing social responsibility activities in an economic entity. These may be voluntary or obligatory publications. The correct implementation of the CSR concept consists of the thoughtful, long-term, and planned running of an organization in a socially responsible manner. The CSR strategy puts a postulate of sustainable development into practice in which ecology, economy, and social issues are treated as equally important.

A survey of Europe's 500 largest companies showed that they are more likely to disclose more information on CSRs in countries with better investor protection, higher levels of democracy, more effective government services, higher-quality regulation, greater press freedom, and less commitment to environmental policy. The authors' analysis of the relationship between different levels of CSR disclosure and share prices indicates that high levels of CSR disclosure are associated with higher share prices, while low levels of CSR disclosure in sensitive industries are associated with lower share prices (De Villiers, Marques, 2016).

The disclosure of information on CSR activities enables proper communication with stakeholders, shapes mutual relationships, and contributes to building trust. As a result, this should lead to an improvement in the image and credibility of an entity, increase interest in the entity, and contribute to obtaining a competitive advantage by the entity (Wronka, 2011).

4. Integrated reporting

The latest approach to reporting by an organization (corporate reporting) is integrated reporting. This was created to combine financial and non-financial information to meet the informational needs of different stakeholder groups. It is assumed that integrated reporting will become a corporate standard that enables an integrated analysis and communication of an entity's achievements, replacing partial and unrelated reports that allow for only static communication with stakeholders. It is stressed that it will result in "integrated thinking leading to integrated decision-making and value creation in the short, medium, and long terms" (IIRC, The International <IR> Framework, 2013, p. 2). The literature indicates that there is a statistically significant link between integrated reporting and long-term management quality (Churet, Eccles, 2014). Studies based on an online survey addressed to CEOs and CFOs of South African listed companies on the perceived benefits and challenges of implementing integrated reporting (IR) requirements showed that they see the main value of integrated reporting in improving their corporate reputation. In addition, the significant benefits include meeting investors' needs and being more involved in stakeholder relationships (Steyn, 2014). Integrated reporting provides a comprehensive view of an organization, improving its performance and making communication between the organization and its environment more effective. Table 1 shows the structure of integrated report.

Table 1. Structure of Integrated Report by IIRC

N	Content element	Key issues
1	Organization and external environment profile	What is organization's profile? What are conditions of functioning of given entity?
2	Corporate governance	How does corporate governance support organization's ability to create value?
3	Business model	What is organization's business model?
4	Opportunities and threats	What are risks and opportunities that affect organization's ability to create value?
5	Strategy and allocation of resources	Where is organization going and how does it intend to get there?
6	Performance	To what extent does organization want to achieve its strategic objectives and what results has it achieved?
7	Summary of results (future prospects)	What challenges and uncertainties might organization face in implementing its strategy? What are potential consequences for its business model and future achievements?

Source: International Integrated Reporting Council (IIRC), 2013, pp. 24, 35.

As indicated by Krasodomska (2018), the IIRC initially proposed the integrated report as a basic company report, replacing the documents that had

been required beforehand [IIRC, 2011, p. 6]. However, the guidelines indicate that it may be a separate report or may refer to other company reports and documents; e.g., management commentary or CSR report (referred to in Section 3).

5. Conclusion

Contemporary organizations operate under conditions of constant change, which intensifies the need to base strategic decisions on the right spectrum of information. An important challenge of corporate reporting is to present a picture of an entity to investors in such a way that it can be accurately assessed. There is a consensus among researchers that financial statements can no longer be sufficient for business reporting, as they do not reflect the entire spectrum of a company's activities. The information contained in financial statements only reflects the short-term monetary aspects of a business and does not give an insight into environmental, social, and management aspects (which are much more important in the long term). Therefore, there is a need for a wider use of non-financial information alongside the traditionally used financial information.

Non-financial reporting is a "necessity" in a modern economy because it reflects a company's responsibility to conduct its business activities in a sustainable manner – financial statements have not lost their status as a reliable source of information. However, the advantage of integrated reporting is that it provides a more comprehensive scope. In addition, it provides an understanding of an organization's long-term strategy and its development opportunities. Together with other documents used to present non-financial information about an entity (i.e., management's commentary and the CSR report), these documents should constitute a coherent and mutually complementary whole.

From the literature review carried out in this paper, two important directions of further research have emerged. First, it is a question of the forms of presentation of non-financial information. Among the authors, there is no consensus on whether an integrated report should be the leading report or, as indicated by Walińska (2015), the third dimension of reporting alongside financial and non-financial reports, for example. In addition, the issue of the benefits that organizations could derive from a broader presentation of non-financial achievements requires a more empirical verification.

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Chapter 9

Method of Assessing Management in Organization as Related to Eucken's Concept of Governance

Andrzej Szplit, Izabela Konieczna, Marcin Szplit

The economist must never be a specialist.
In dealing with any problem – he must always
fix his glance upon the whole system.
L. von Mises

1. Introduction

Representatives of management sciences have long been inspired by the problem of testing the effectiveness and efficiency of various approaches: planning, evolutionary, positioning, and resource-based approaches. Specialists attach great importance to the relationships among the systems, strategies, structures, and economic results of an organization. The most frequently examined dimensions of management have been the size of an enterprise, the level of diversification, and the degree of the internationalization of enterprises. The results of the research have not led to a successful outcome as of yet. Therefore, M. Romanowska rightly assesses that, if it were possible to confirm the linear relationship between the degree of diversification (or the degree of internationalization) and the profitability of an enterprise on a representative sample of enterprises, scientists would be close to determining the true list of the key factors of a company's success (Romanowska, 2014). According to Romanowska, everything that inspires practitioners and scientists in management has arisen from the intuitive creation of theory based on general knowledge and observation. An example would be the success of a resource school. After all, the genesis of this approach was not empirical research, but a critical contemplation of existing schools and management approaches supported by a fragmentary assessment of reality (Romanowska, 2014).

One of the motivations for authors of research regarding building a management governance assessment is the relationship of the management

team with its interdisciplinary perspective, evolution, diversity of concepts, and sometimes dishonesty. Philosophy, law, psychology, and some other areas are useful here. The authors of the article believe that the scientific discussion lacks the conceptual apparatus that could be taken from other sciences. Management needs philosophy, new institutional economics, law, and ordo theory. The authors of the article analyze the conditions for the implementation of Eucken's concept of governance with the evaluation method that they developed.

2. Management governance paradigm in face of phenomenon of qualitative changes

In management sciences, governance is usually analyzed by comparing the size of the supply and demand of specific goods (market governance). Governance may occur on a microeconomic or macroeconomic scale, and it may concern the internal economy, the supranational economy, or (ultimately) the global economy. It can have static and dynamic views. It may apply to the entire economy as well as to selected spheres of economic life. Governance can refer to the real sphere (energetic governance, governance on the labor market), the financial sphere (the governance of the finances of a local government unit), or the institutional sphere (corporate governance). We can consider governance in a positive and normative way. In this context, the ideas of two scholars on the subject of governance seem interesting; namely, F.A. Heyek's and W. Eucken's. Hayek's time was the 1980s, when Margaret Thatcher quoted his classic work "The Road to Serfdom" from 1944 that was an attack on central planning. It was then that Hayek formulated the concept of spontaneous governance, while Eucken focused on the principles of established governance (Pysz, 2005). Both concepts were "covered" by Chicago's theory of rational expectations. The global crisis of 2007-2008 refuted the theory of rational expectations and renewed the dispute between the ideas of Hayek and Eucken. However, there are many indications that, in 2009, the next potential crisis was prevented by a coordinated global intervention. Therefore, Hayek (as a propagator of the concept of spontaneous governance), despite his merits in the field of the philosophy of freedom, lost to the Eucken theory of established governance in the 1930s as well as today. This fact also confirms the legitimacy of including market, institutional, and ordo perspectives in optimization processes.

W. Eucken's theory of economic governance (referred to as 'firm governance') had a great impact on the development of the social market economy. The development of the concept of governance by W. Eucken also had a great impact on shaping libertarian governance. Eucken is considered to be the main creator of the ordoliberal concept of a social market economy (Table 1).

Table 1. Directions of neoliberal thinking

Direction	Main tasks	Representatives
Traditional neoliberalism	Renewal of classical liberalism Spontaneous development of competitive governance	Friedrich August von Hayek Ludwig von Mises
Ordoliberalism and social market economy	Shaping competitive governance by state and, if necessary, interventions in economic process in line with market logic	Franz Boehm Walter Eucken Ludwig Erhard Wilhelm Roepke Aleksander Ruestow
Neoliberal supply economics	Strengthening supply side of economy	Milton Friedman Arthur Laufer Ronald Reagan Margaret Thatcher

Source: (P. Pysz, 2005)

There are many indications that the principles of economic governance not only play a very important role on the macro scale but also in the functioning of enterprises. As M. Trocki notes, "the introduction of the concept of organizational governance has led to a clear indication of the two levels of management that have existed in practice for a long time and are noticed by theory: general/directional (referred to as governance), and detailed/executive (called management). Organizational governance sets organizational goals, principles, and policies, and organization management relates to acting according to these principles and policies to achieve the set goals" (Trocki, 2018, ISO/DIS 21 505, own translation). Organizational governance is the supervision of the management of an organization "based on the rules, principles, institutions, and mechanisms that control all issues related to the management of the enterprise by their owners or other interest groups" (Koładkiewicz, 1999, own translation), thus striving to "obtain the flow of information, management, leading, and monitoring of activities in an organization aimed at achieving the objectives of this organization" (Zalega, 2003, own translation). Its essence is to ensure compatibility and a balance among the interests of all entities (stakeholders) involved in the functioning of the organization in a way that guarantees an increase in its value and its development (Zalega, 2003). Organizational governance is "the ongoing operations that maintain a solid internal control system through which the top management and other managers of an organization provide effective management systems (including monitoring and financial control systems) to protect the assets, the ability to acquire, and the reputation of the organization" (Trocki, 2018, Best Management Practice Portfolio, own translation).

According to K. Zalega, the main goals of corporate governance include the following:

- unifying interests of agency's relations sides (owner – manager);
- maximizing level of implementation of basic goals of company and, thus, creating added value for owners and other stakeholders;
- providing owners and interest groups with appropriate mechanisms and procedures to control management board and correct its errors;
- acquiring new sources of financing company's development by raising investment attractiveness (Zalega, 2000).

The role of governance principles is similar to the code (charter) of good practices in many countries. The principles of the good practices of OECD countries belong to solutions that are classified as so-called soft laws, which means that companies are not obligated to use them; however, due to the negative public perception in the case of refusal, they usually introduce them. Poland is in a period of the further adoption of these codes, and the present experience can be considered encouraging. It should be noted that these codes led to the adoption of a directive by the European Union in 2001 on the status of a European company; more precisely, its supplement regarding the participation of crew representatives in company bodies. "The presence of an effective corporate governance system (within an individual company and across an economy as a whole) helps to provide a degree of confidence that is necessary for the proper functioning of a market economy" (OECD Principles of Corporate Governance, 2004).

One of the most important issues in the functioning of an enterprise is the difficulty of measuring its results. This problem occurs at all levels of an economy – from macroeconomic dysfunctions in measuring the gross domestic product. These dysfunctions are visible in enterprises in the form of so-called toxic assets, for example. Measurement irregularities were spectacularly highlighted by the global crisis of 2007-2008. Dysfunctions in the system of measuring economic activity and the adverse consequences of this situation indicate the need to search for new measures and solutions that are focused on the symbiosis of the economic and social area. From the Polish perspective, it is important that the model for such an approach uses the ideas of the social market economy on which the constitutional model of the socio-economic system is based. These ideas are not new, but the present days confirm the legitimacy of their use; hence, the importance and usefulness of concepts aimed at alleviating socio-economic dysfunctions. This is a big challenge for Polish enterprises that is also related to the search for an assessment of governance, which provides "a structural framework for setting business goals that identify the ways and paths for achieving them and ways of reviewing performance" (Trocki, 2018, G20/OECD, 2015, own translation) and which "also provides the structure through which the objectives of the company are set and the means of attaining

these objectives and monitoring performance are determined" (OECD Principles of Corporate Governance, 2004). Good organization governance "should provide proper incentives for the board and management to pursue objectives that are in the interest of the company and its shareholders and should facilitate effective monitoring" (Corporate Governance Rules, OECD, 2004), thereby encouraging the more efficient use of resources by organizations.

It seems that the starting point for these considerations could be the following table (2), which shows a comparative analysis of the traditional management and the concept of ordo-management defined by the authors of the article as management focused on the implementation of management governance.

Table 2. Traditional management vs ordo management

	Traditional management	Ordo Management
Balance	Closed systems in equilibrium	Sustainable business environment and flexibility of economic governance
Synergy	Pressure to identify synergies	Identifying synergies and "anti-synergies"
Networks	Interaction among enterprises only through market	Organizing virtual organizations, Relationship networks change over time, Industry 4.0 (*Industrie 4.0* in Germany, and Smart Manufacturing Leadership Consortium in U.S.)
Evolution	Lack of internal creative abilities	Logical incrementalism, evolutionism, ability to take increased risk

Source: own study.

3. Method of assessing level of governance

According to the authors, the degree of governance in an organization is influenced by factors that can be assigned to the following groups:

- Strategy;
- Business model;
- Further environment;
- Analysis of financial situation;
- Social business engineering.

When assessing the degree of governance, the strategy is taken into account (in particular, whether it was developed based on a business model); then, the elements of the business model are analyzed, which, according to the definition proposed by I. Konieczna[1], include factors that affect sales revenues, value creation, value chains, resources/competencies, and activities for members of the

[1] The business model is a description of the elements that create value, both from the perspective of the organization itself as well as its clients. It includes identification based on the value chain and sources of revenue and determines how to create value based on the unique combination of the resources/competencies that an organization has. The goal of the business

organization. Next, the organization's further environment, financial situation, and social business engineering are analyzed.

In governance, the following questions must be answered in order to determine the level of governance:

I. Strategy:
   Is the organization's strategy based on the business model?

II. Business model:
   Has the organization identified factors that affect sales revenues?
   Does the organization create customer value in the following spheres:
   - product?
   - innovation?
   - packaging?
   - sales marketing?
   - distribution?
   - research and development?
   - quality?

   Does the organization implement activities within the value chain in the following areas:
   - supply logistics?
   - production logistics?
   - distribution logistics?
   - research and development?
   - marketing?
   - financial services?
   - licensing products/trademarks?

   Has the organization determined the competitive potential of its resources/competencies in the following spheres:
   - research and development?
   - production?
   - quality management?
   - supply logistics?
   - marketing?
   - finance?
   - employment?
   - organization and management?
   - general?

   Does the organization take action for its members?

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model is to obtain the conditions for doing business to meet the needs of the owners and act in their interest (Konieczna, 2015).

III. Further environment:
Does the organization know the market and its limitations?
Is the organization sensitive to changes in legal regulations?
Does the organization know the rules for inter-organizational relationships?
Does the organization know the determinants of the institutionalization of the business environment?
Is the organization sensitive to changes in fiscal policy?
Is the organization sensitive to changes in monetary and credit policy?

IV. Financial situation analysis:
Does the organization show a steady increase in sales revenue?
Does the organization show a positive result on operating activities?
Does the organization show an increase in returns on sales, assets, and equity?
Does the organization have a positive and stable cash flow?
Is the organization guided by the principle of at least the silver balance sheet rule?
Does the organization maintain financial liquidity?
Is the generated profit largely allocated to the development of the organization?

V. Social business engineering:
Does the organization use social business engineering mechanisms?
To determine the degree of governance in an organization, use the following formula:

$$S = \frac{1}{40} \sum_{w=1}^{3} K_w \times w,$$

where:
S – degree of governance;
40 – number of factors;
Kw – number of answers for w = 1, ..., 3;
w – response value with use of three-point Likert scale (1-3, where 1 is not applicable, 2 – partly applicable, and 3 – completely applicable).

Depending on the results of indicator S (which can take values from 1 to 3), one can assess the degree of governance in an organization according to the scale given in Figure 1. As it shows, the lowest scale value describes chaos, and the highest – the appropriate degree of governance. Particular levels of governance have been given the proper colors to better illustrate the significance of the phenomenon of governance in an organization.

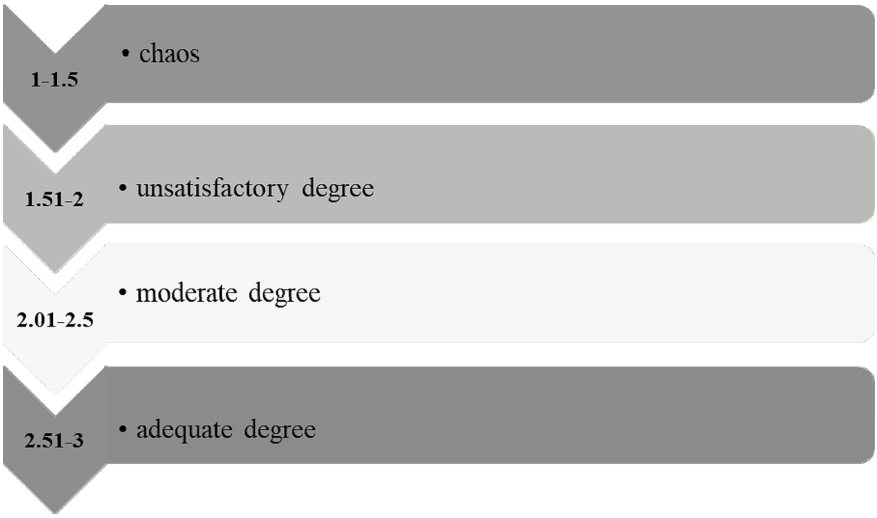

Figure 1. Degrees of governance in organization
Source: own study.

Red indicates a lack of management order, no relationship between the strategy and the developed business model, and the operation of the enterprise without any control over its individual areas. Individual elements are not implemented at all, and those that are implemented do not harmonize with each other. Orange is an indicator that not all elements that constitute the business model are implemented. A lack of control over most of these can result in chaos and lowering a company's level. Yellow is a warning and a piece of information that some elements should be dealt with so that there is full control over the processes carried out in a company; otherwise, the company is in danger of falling to lower levels. Green represents a situation in which management order occurs. All of the elements result from the adopted business model and fully implement the company's strategy. This is the optimal situation, which should be sought by all enterprises that want to achieve success; those that are at this level of governance should strive to continue what they are doing. The full control of individual elements and awareness of the implemented business model will contribute to their further development and increase their competitiveness.

By assessing the degree of the implementation of certain elements that constitute order and by referring the results of the calculations to the diagram, a management team can take the appropriate actions by shaping individual elements in such a way as to establish an appropriate level of governance in an organization.

4. Conclusion

Due to the fact that governance principles play a very important role not only on a macro scale but also in the functioning of enterprises, the authors propose the assessment method and, thus, implement the Eucken concept of order in management. Organization order seems to be the basic criterion for assessing the effectiveness of its policy. The shaping of order depends on many different elements and processes that are combined in organizations as a coherent whole. Using an analysis of a number of factors that shape governance (which include the strategy, business model, further environment, analysis of the financial situation, and social business engineeri ng), a method was proposed to determine the degree of order in an organization., when analyzing the degree of governance, the management team can realize whether their governance has been violated and can determine which factors have a positive impact and which adversely affect the functioning of the company.

The method presented in this article gives a theoretical basis for verifying its correctness by conducting empirical research, which will result in determining the degree of governance that exists in particular organizations. On this basis, itwill be possible to implement this method as an internal control system tool for business practice in order to ensure an effective organization management system by establishing an appropriate level of governance in an organization.

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Chapter 10

IT Governance – Effective Standardization Using Modern Management Methodologies

Dagmara Modrzejewska

1. Introduction

IT Governance is becoming increasingly important in the co-creation of value, both for organizations and their stakeholders. In this context, value is understood as a "business benefit for an organization stemming from the application of a specific solution, frequently supported by IT[1]." This support, in turn, is understood as both the work of IT specialists in a given area as well as the hardware and software used to create customized solutions; i.e., solutions parameterized according to the specifics of a given customer's business. IT Governance should be considered in correlation with Corporate Governance in order to link strategic business objectives with IT objectives. The standardization developed under IT Governance should also be adapted to the specifics of the functioning of an entire organization but without excessive bureaucracy so that the standardization can be associated with improvements that actually function, not with superfluous procedures that hinder, lengthen, and complicate work. This is because both of the above – IT Governance together with Corporate Governance – constitute a single management system; for this reason, coherence at the strategic and operational levels manifested as transparent communication, efficient cooperation, and a clear vision for improvement and development is so important. This is helped by establishing a center of excellence as a liaison among business, IT, and stakeholders.

[1] for more information, see ITIL version 4, owned by AXELOS LTD.

2. Definition and scope of Corporate Governance

Let us start from the beginning; i.e., from defining what Corporate Governance is. Corporate Governance is defined as "a system that specifies the rules that govern the management and control of a company to be followed by company authorities (management boards, supervisory boards, owners) so they can fulfill their duties in a proper manner" (Marcinkowska, 2014, p. 45); in other words, it is the entire set of formal rules underlying the business of a company as well as its vision and directions for future development expressed in a document known as a "company strategy," which typically covers a period of several years.

The most important elements of Corporate Governance include the following (Odpowiedzialny Biznes, accessed on April 30, 2020, at 4:36 PM):

- fair dealing with stakeholders and employees;
- acting in interest of company;
- risk management;
- disclosure of conflicts of interest;
- effective information and communication system;
- design of organizational structure, division of roles, functions, responsibilities, powers, and duties;
- establishment of objectives, determination of indicators, and mechanisms for monitoring their achievement;
- independent internal and external auditing;
- effective internal control system.

Furthermore, Corporate Governance is strongly linked to the cultural background of a given society (e.g., legal culture, entrepreneurship culture), which strongly affects both the structure of the legal system and the set of informal standards of conduct (Polskie Forum Corporate Governance, accessed on April 30, 2020, at 5:42 PM).

Nowadays, virtually all business activity is supported by IT solutions to some extent. For this reason, it is crucial for Corporate Governance to be integrated with IT Governance[2]; otherwise, chaos will ensue, and the company's actions will be inefficient. These areas in organizations must, therefore, closely cooperate with and motivate each other to improve, develop, and communicate in an effective manner as well as ensure the quality of information, data, and the created know-how (and its protection) in order to retain knowledge within the organization.

[2] For more information on integrating Corporate Governance and IT Governance, see https://www.isaca.org/resources/news-and-trends/newsletters/cobit-focus/2014/4-steps-to-integrate-it-and-corporate-governance, accessed on April 30th 2020, at 8:00 P.M.

3. Definition and scope of IT Governance

Going further, it is also very easy to create a definition of IT Governance as a set of rules that specify how the IT area is meant to function and in what direction it should be developed, who is responsible for the above and to what extent, and in what way; i.e., using those indicators and thresholds that will help this person operationally monitor whether IT is functioning properly. In other words, "the behavioral side of IT Governance defines the formal and informal relationships and assigns decision rights to specific individuals or groups of individuals, while the normative side defines mechanisms that formalize relationships and providing rules and operating procedures to ensure that the objectives are met" (Weill & Ross, 2004, p. 10). Example components of IT Governance are presented in Figure 1 below.

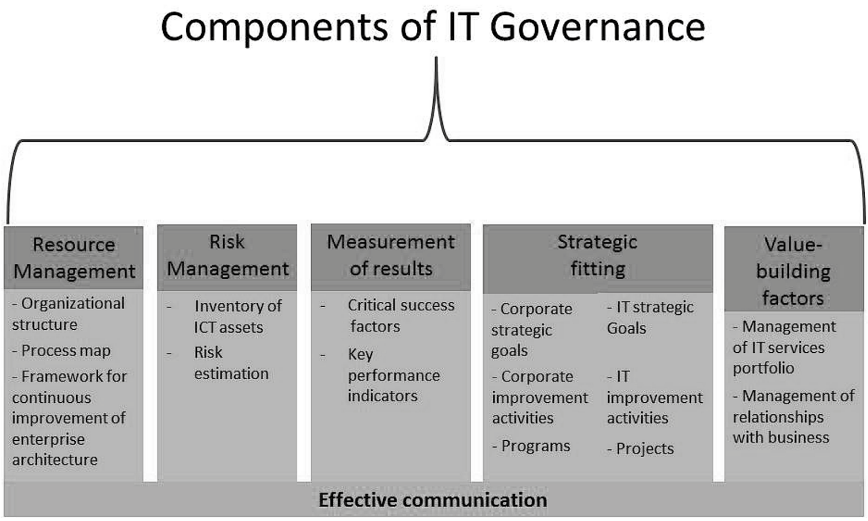

Figure 1. Components of IT Governance

Source: own work based on (Kralewski, 2012, p. 96).

With respect to resource management in the context of IT Governance, the following scope has been proposed:

- organizational structure, including organizational chart (to see business areas into which company is divided as well as to see who is responsible for each area and to what extent);
- process map (to see where given process begins and ends and to see interfaces and contact points between processes);

- framework for continuous improvement of enterprise architecture (as standardization introduces order into organization and indicates best practices, methodologies, and models for use in organization).

Risk management in the context of IT Governance includes the following:

- inventory of ICT assets (choice must be made as to what organization recognizes as value to be protected; this knowledge needs to be systematized and formalized as list of ICT assets);
- risk estimation (as it is not sufficient to merely identify ICT assets; each time, it is also necessary to examine the risk, assess whether it occurs and to what extent, and take appropriate preventive measures to minimize it).

The measurement of results includes the following:

- critical success factors; i.e., something that needs to happen for program or project to be successfully completed (Governica.com, accessed on April 23, 2020, at 3:00 PM);
- key performance indicators; i.e., in figures (percentages), way of showing whether and how program, project, or process functions (correctly or incorrectly) (Governica.com, accessed on April 23, 2020, at 3:01 PM).

Strategic fitting includes the following:

- linking corporate strategic goals with IT strategic goals;
- linking corporate improvement activities with IT improvement activities;
- linking programs (which cover an entire organization) with projects (which cover smaller areas and parts of organization).

Value-building factors include the following:

- management of IT services portfolio (i.e., single place within company that gathers information concerning all services, both planned for implementation and implemented as well as those that have already reached their end-of-life);[3]
- management of relationships with business (as this is where creation of every need, requirement, and vision concerning form and content of IT services [including direction of their development and their function in future] begins).

Effective communication and the quality of the data[4] is essential for the proper functioning of IT Governance and each of its components.

Security, monitoring, and auditing is also very important in all of this to ensure the continuity, improvement, and development of both Corporate

[3] for more information, see ITIL Version 4, owned by AXELOS LTD.

[4] for more information about data quality in DAMA methodology by DAMA International, see https://dama.org/sites/default/files/download/DAMA-DMBOK2-Framework-V2-20140317-FINAL.pdf, accessed 30th April 2020 at 10:45 P.M.

Governance and IT Governance in terms of the entire organization and individual processes; this is shown in Figure 2.

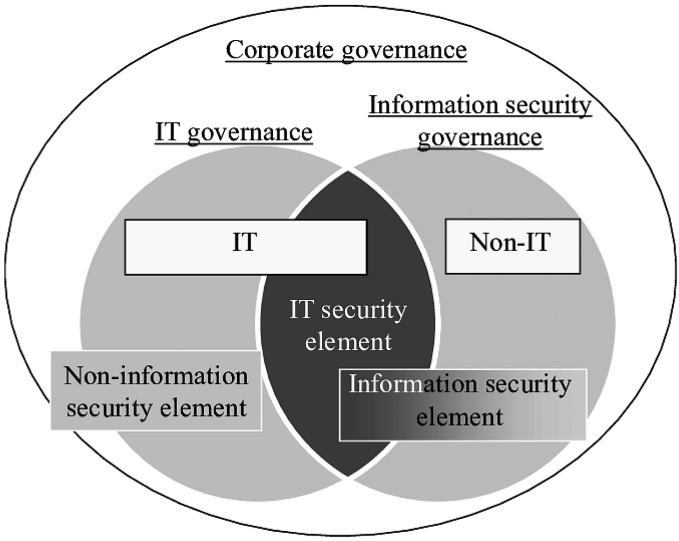

Figure 2. Relationship among Corporate Governance, IT Governance, and Information Security Governance

Source: A.D. Veiga, J. H. P. Eloff (2007): An Information Security Governance Framework, Information Systems Management, Vol. 24, 2007, p. 361-372.

4. Center of Excellence (CoE)

A common denominator for Corporate Governance and IT Governance (areas described earlier in Sections 2 and 3) is a center of excellence, which ensures the communication and flow of information, standardization, and consistency of an IT strategy with a business strategy as well as their improvement and development, linking the world of business reality with the current achievements of science. A correctly functioning center of excellence joins the areas of business and IT through the possession of knowledge and data concerning interfaces between individual areas of a company's activity (from business processes to operational processes, including IT systems, databases, data warehouses, big data, and the entire IT infrastructure) as well as the knowledge and data concerning the current global business trends, best practices, and research in this aspect. Through this compendium of knowledge, experience, and skills, a CoE indicates the direction for improvement and development for both an organization and its employees. An example of the scope of activities of a center of excellence is presented in Figure 3.

Figure 3. Scope of activities of center of excellence
Source: http://www.firstalign.com/services/center-of-excellence.html, accessed on April 30th 2020, at 9:00 P.M.

One example of a center of excellence is a part of the ArcelorMittal Group, a world leader in the mining and steel industry (website of the ArcelorMittal Business Center of Excellence, accessed on April 27th 2020, at 7:15 A.M.).

5. Conclusion

The role of IT Governance and a dedicated center of excellence will become increasingly important over time for every organization; this is because full development requires a wide range of information and data to build knowledge about a given phenomenon, which must be looked at in a comprehensive, multifaceted, and holistic manner. This requires close cooperation and knowledge-sharing, mutual penetration, and project collaboration between scientists and business experts in order to create new knowledge and the best practices. Centers of excellence should, therefore, also be established at universities and agencies, not just in the private sector. Cooperation among science, practitioners, and local government is necessary in order to be able to determine the model for proceeding in a given scope as well as the direction for improvement and development. An argument can be made that the greatest challenge in today's world will be for such centers of excellence to be established in every organization in the private, public, and non-profit sectors; at all places that deal with improvement and development, knowledge exchange, knowledge development,

and knowledge sharing. This argument will be investigated within the planned research process. The creation of a concept for researching small and medium-sized enterprises in terms of the need to launch a center of excellence in one's organization is the starting point of a planning research's project. Considerations resulting from an analysis of the literature on the subject (including publications on the current research results, in the field of cooperation, and support of the areas of IT Governance with Corporate Governance) have given rise to actions in this direction.

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Chapter 11

Diversity Management in International Tourism

Marian Bursztyn

1. Introduction

In the modern world, a phenomenon that leads to the increased integration of societies and cultures has a significant impact on the global economy. This is particularly evident in the development of tourism. In the world of today's reality, tourism has become one of the most visible elements, and the expression of this situation is its rootedness in its diversity of services and people management. One of these important issues has become the issue of understanding the conditions of international tourism and its importance among people from different cultures. This work addresses the issue of demonstrating that the development of the tourism sector is conditioned by the creation of the appropriate human interactions, with a particular emphasis on those factors influencing the creation of these relationships at the level of diversity management. At the same time, proposals will be made to enable the creation of appropriate intercultural relationships in the tourism sector that result from cultural diversity.

2. Concept and essence of globalization of tourism sector

The concept of globalization is a very complex and ambiguous term, especially when viewed from different perspectives. The idea of globalization can be understood as "a process of making tastes and product offerings around the world more similar, with the result that demand is satisfied by a global product rather than a local one" (Koch, 1997, p. 76). The definition thus adopted should refer to a phenomenon that covers a much broader context and a far-reaching scope. It should therefore be understood in more detail and extended, covering both customers and technology, strategic alliances, costs incurred, and competitiveness issues. Within the scope of the concept, an emphasis should also be placed on those elements related to natural resources and human capital

through which the manufactured or produced products can be sold in different parts of the world.

The lack of an unambiguous definition of this process may be treated in a very different way (often very extreme) or in the context of the ideological assessment of the defining person. As a consequence, this is intended to lead to an understanding of integration as a process that treats all actors involved in an equal and comparable manner as much as possible (Bielański, Biernat, 1999, p. 148). An interesting definition in this respect was formulated by A. McGrew, who believes that "globalization is about the multiplicity of connections and reciprocal interactions between states and societies that make up the current world system. This process has two dimensions: scope (range) and intensity (depth)" (McGrew, 1992, p. 28). This indicates this element of the described phenomenon, which covers a significant part of the globe or functions on a global scale and also concerns the tourism sector. He believes that, in its proper sense, integration is based on dynamic interaction and the creation of global interconnections in various contexts and scopes among countries and societies. This points to the gradual expansion of the various relationships that involve the development of links on a global scale (McGrew, 1992, p. 28). In this context, it is worth pointing out the diversity and unpredictability of the processes taking place in the global economy, which reacts to a constantly changing situation. An example is the area of tourism activity, which includes a wide range of services that integrate different regions of the world.

The process of international links in this area should be treated in a cause-and-effectual way, as all technological, political, economic, and social changes are aimed at creating a unified community. The existing processes are oriented towards integration of the human sphere and have a significant impact on economic, political, and social life in all countries of the world while, at the same time, being a driving force for the development of modern civilization. Such a description of the existing phenomenon favors the unification of markets, production systems, trade and services, and capital flows as well as the polarization of the population living in individual countries and regions.

The creation of an interdependent system that covers different areas of the economy (including the tourism sector) should be based on the development and subsequent introduction of norms and standards, the deepening of multinational working organizations, the creation of regional economic trading blocs, and the building of people-to-people links at not only the local level but also the transnational level. These elements can lead to increased interrelationships between societies, which cover many areas of life.

The perspective of the multiplicity of dimensions of the interdependence process in diversity management adopted by G. Stonehouse, J. Hamill,

D. Campbell, and T. Purdie (Stonehouse, Hamill, Campbell, Purdie, 2001, p. 25) is economic, cultural, social, environmental, political, and technological.

In the first economic dimension, this process integrates the various world economies and, at the same time, leads to their interdependence and, consequently, to their economic liberalization. Thanks to the activities of the tourism sector in public spaces and the media (TV, film, radio), this process contributes to the homogeneity of the various links in everyday life (culturally speaking). In technological terms, this process leads to rapid innovation while increasing the links between information and communication services. In technological terms, this process leads to rapid innovation while increasing the links between information and communication services. It seems that this knowledge-based factor is one of the most important elements that determine a person's standard of living (more than capital or work). Another important dimension is the social process of integrating people into one community of people in the world. In this context, an important factor is the political dimension of initiating the process of economic management and international tourism institutions (World Tourism Organization), as well as adapting the management policy to the types of tourism services provided. The last adopted dimension of this process is the development of the intensification of interrelationships among different local systems of the functioning of tourism increasing the possibilities of the sector's influence on global social processes. It is worth mentioning that the process of combining many economic areas requires skillful human resources management, which can be implemented in the case of the tourism sector thanks to many processes, which include changes in the economy as well as those based on free trade ethics and standards aimed at improving the standard of living and proper interpersonal communication (Anioł, 2002, p. 190). The factor that accelerates the changes and dynamics of this process is the development of tourism. It is worth noting that many economic sectors are dependent on tourism. Today's growing demand for tourist offers (both local and international) strengthens the process of economic links between individual regions of the world.

3. Development of tourism sector

A reflection on the impact of the phenomena taking place in the modern world in the field of tourism indicates that the affiliation of the area of tourism to the service sector becomes important in this respect. This makes it possible to consider the functioning of the tourism sector in the same way as industrial activity is understood, although it cannot be fully applied in the tourism sector for material reasons (Theuns, 2008, pp. 99-105). The tourism sector is obliged to maintain a balance between the accepted principles of functioning on the

international level (including multicultural standards and requirements of local communities) and the needs of international communities (taking into account the needs of the natural environment). According to the adopted Cooper's position, these are the basic challenges that constitute the links of managing a given market sector (Cooper, 2008, pp. 109-111). A good example that confirms the declining importance of national borders in the conduct of business activity are tourist enterprises.

The proper planning of the development of tourism in the modern world is of great importance, as it indicates that tourism in its economic, social, cultural, and ecological scopes is an attractive form of spending one's free time. The distinguishing factors include cultural processes; these can take various forms, starting with the creation of global villages, the globalization of culture, global, and uniform tourist behavior, cultural changes emerging in the local context, and the global identity of the human being leading to the emergence of diverse consumer behavior. Another important issue from the point of view of this study is that of preserving and managing the diversity of the tourism sector. At this level, factors such as orientation towards organizational behavior, dependence on information technology, and the use of self-service tools and personal reservations should be mentioned. These factors enable people to acquire new experiences and reduce the uncertainty and fear of new travel-related motivations.

Other factors resulting from a proper understanding of diversity management are the price sensitivity of the client, reduction of travel costs, and individual travel, transport of travel (car, bus, train), and accommodation conditions other than hotels (visiting family and relatives). One of the most important tools for international tourism in particular is the interconnected reservation system, offer distribution networks, and telecommunications technology as well as many other tools for the proper management of many sectors of the international economy, including those affecting the development of tourism. In this sphere, the main scope of interest is the economic dimension manifested by strategies of the horizontal and vertical integration of tourist enterprises and the implementation of foreign hotel investments (including various tourist attractions). This includes various international tourism management entities. Other aspects of tourism development are the relevant policy (which is related to the growing importance of international tourist organizations) as well as the coordination and regulation of passenger traffic. The last dimension of sector diversity management is the environmental aspect. This includes degradation of the natural environment and climate change (a factor that significantly affects tourism activities) (Reisinger, Yvette, 2009, p. 11).

Managing diversity in the process of implementing international tourism is to place an emphasis on the creation of ever-increasing integration dependencies of many countries, societies, and cultures, which directly translates into the

development of the tourism sector. The result of such a situation is the creation of many tourist organizations of an international range, which leads to the creation of a unified process in building an international tourism sector (taking the diversity of human behavior into account).

4. Managing diversity in tourism sector

As with the term globalization, the term "cultural diversity" has many definitions and different approaches. When we talk about cultural diversity, we usually refer to racial and ethnic differences as well as national, religious, or linguistic differences between different groups within a community, organization, or nation. However, cultural diversity refers to a much broader scope, which is the diversity of human groups, societies, and cultures not only in a given area or region but also worldwide. Consequently, it is about the heterogeneity of coexistence not only of individuals or groups with different backgrounds, characteristics, and values but also of beliefs, customs, and traditions. From the perspective of this paper, diversity refers to the existing social structures, belief systems, and strategies for adapting to the situation in different parts of the world.

Managing cultural diversity by those organizations operating in the global tourism industry is not an easy task. The managers of a company may face various cultural problems related to the system and style of work, an individual employee's ethics, and even their expectations towards the employer. It seems that the reasons for this are either due to ethnocentrism or the limited knowledge of the culture of the organization. It is worth remembering that each situation entails the appropriate consequences. In this case, even if the reasons for the wrong situation are simple, the consequences for the work environment may be far-reaching and sometimes may prevent an objective assessment and understanding of culturally different people. In the international tourism sector, cultural misunderstandings are important factors that influence the quality of the services provided; in most cases, these become apparent when providing services to clients. It is worth noting that there is a link between a staff's actions and the expectations of clients (whose actions are often based on cultural prejudices). Therefore, there is an awareness among tourism professionals that there are many aspects of cultural differences that can cause many misunderstandings and cultural errors. Due to the awareness that the quality of the social contacts created between clients and employees has a significant impact on the perception of the offered services (and generates the final effect of satisfaction with the proposed product as a result), representatives of the tourism industry should pay attention to managing cultural differences in the personal relationships among the participants of the professional situation. The awareness and management

of cultural differences is one of the key factors for future success in the tourism sector (Reisinger, Yvette, 2009, p. 36).

Companies operating in the tourism industry have the characteristics of a multicultural organization (in the broadest sense of the term) and operate in a multinational space that exploits cultural diversity (which can be considered to be realizing a competitive advantage through their diversity). This diversity has its roots in the field of human resources from different environments and with different values and expectations. From this perspective, diversity management in a multinational organization can take advantage of the diverse skills and abilities of its employees, assuming these as a major asset for its productivity by paying attention to the cultural differences among its employees. The practice of a multicultural organization has shown that the wider the range of cultural differences in a workplace, the greater the organizational resources and performance of the company (Reisinger, Yvette, 2009, p. 40). For this reason, it can be assumed that managing diversity in the ever-changing environment of the tourism sector stimulates greater innovation, creativity, and the ability to respond and meet consumer needs, which in turn contributes to an improved reputation for the workplace. The reputation of the international tourism industry is not only dependent on its managers; the professionalism is determined by the interaction of its employees (i.e., service standards). In order to maintain a high level of international professionalism in a tourism organization, the managers of the various elements of the sector are subject to constant movement and rotation within their companies. It is worth noting that the above-mentioned processes in the tourism sector enable continuous training, the acquisition of new experience, and the creation of opportunities for professional advancement.

Moreover, the use of expatriates is an excellent method for deploying talented managers where they are needed most. Apart from expatriates in the tourism sector, it is important to employ emigrants who understand the importance of the local culture. As a consequence, this can lead to the development and economic growth of companies that operate within the tourism sector (Clark & Chen, 2007, p. 239). It is important that an emigrant manager must have the ability to adapt to a foreign environment and must be very flexible at work, especially if he or she is in a host country with an unstable political situation. The preparation or development of an expatriate manager is a long-term task; it requires the systematic relocation and rotation of many positions. All of this makes the process of preparing the right people for the functioning of the tourism sector expensive but at the same time necessary. A well-prepared international manager is characterized by many years of work experience at different levels of acculturation in different countries. A well-prepared and qualified manager is a key factor in the success of a company, regardless of where it operates (Rocco & Andy, 2007, p. 387).

It should be pointed out that an expatriate manager at his place of residence acts on behalf of the company and represents it externally, maintaining contacts from the local population, collaborators, and local and state officials. Maintaining contacts with such a wide range of people requires the ability to use one's foreign knowledge. However, there are cases when, despite his/her preparation in the field of foreign culture, a manager may miss an aspect that should be known to him/her and for which he/she should be prepared (employee ethics); some difficulties may be encountered in dealing with this aspect of his/her work. As a result, this will have a negative impact on the image of not only the manager but also of the organization he/she represents (Gee, Chuck Yim, 2008, p. 270). Another option for shaping proper relationships with the local community is to employ competently prepared local citizens who will be able to obtain qualifications for possible senior management positions in the future. Functioning in the tourism sector creates opportunities for promotion for various reasons (often including political ones). It should be remembered that there are situations when the only person who can function in a given area will be an expatriate, having the right to use the operating system and safe procedures defined in the activity of each organization and who will be able to make decisions without the need to contact headquarters (Gee, Chuck Yim, 2008, p. 279).

The issue of diversity management in the tourism sector is an important part of the success of a business. Combining all of the factors described in a harmonious way (taking the local community and the place of tourist activity into account) will contribute to increasing the attractiveness of an organization. Two perspectives of creating the process of international tourism are worth noting: one from an expatriate's point of view, and the other from the point of view of a tourism organization. In terms of common factors, it should be noted that the knowledge and understanding of an organizational culture along with the strategies and objectives of a tourism organization also include a certain amount of knowledge and experience at the international level.

The entire tourism sector is people-based, which means that it is run by and for people. The actual potential of this sector lies in the people and the cultural differences that they represent. This diversity can be a reason why the tourism industry will develop.

5. Conclusion

The starting point of the work was to identify and highlight the issue of diversity management in international tourism, which should be considered to be a strategic factor for the development and competitiveness of this sector in the current context of a tourism organization. The conclusion that can be

drawn from the above analysis is that the tourism sector is an area that belongs to the service sector with its own unique characteristics. This area of activity is considered to be an intangible good in which man is undoubtedly the most important element. Therefore, the skillful management of diversity in tourism is becoming a key factor in achieving sustainable development in this sector. The strategic importance of interpersonal interactions in a space of diverse human characteristics and aspirations is becoming a foundation to increase the attractiveness of the international tourism sector.

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Chapter 12

Resources in Area of Quality Management and Financial Situation – Comparison of Dairy Cooperatives from Świętokrzyskie and Małopolskie Voivodeships

Izabela Konieczna

1. Introduction

Every organization is focusing on the quality improvement of their products to gain a bigger share of the market than their competitors. Providing high quality for a product or service has become a strategy for achieving a greater market share and has also become a necessary tool in every organization (Kumar & Raju & Kumar, 2016, p. 142). In order to avoid the long-term dissatisfaction of buyers and the termination of their implicit agreement, companies are forced to pay ever-increasing expenditures on increasing the quality that they offer (Bludnik, 2010, p. 238). In the market orientation of enterprise management, product quality is a determinant of enterprise development and survival. The state of a product's quality determines the achievement of the material ratios of a company's development (Lisiecka, 1993, p. 19).

The aim of this article is to analyze the state of the resources and competencies as compared to competitors in the area of the quality management of selected dairy cooperatives from the Świętokrzyskie and Małopolskie voivodeships. This analysis is based on the results of direct interviews conducted with the help of a questionnaire. Additionally, the results of this analysis are compared with an analysis of the financial situation of diary cooperatives from these voivodeships. The author intends to check whether there is a relationship between the state of resources and competencies in the sphere of quality management and the financial situations of the cooperatives. To fulfill this aim, following questions were posed:

1. Is the financial liquidity better when the competitive potential in the field of quality management is assessed to be higher?

2. Do the performance indicators shape more favorably when the competitive potential in the field of quality management is assessed to be higher?
3. Is the debt lower when the competitive potential in the field of quality management is assessed to be higher?
4. Is the profitability better when the competitive potential in the field of quality management is assessed to be higher?

2. Essence of quality management

Quality management is all of the management activities that determine the quality policies, objectives, and responsibilities as well as their implementation under the quality system by means such as quality planning, quality control, quality assurance, and quality improvement (Sikora & Kołożyn-Krajewska, 1999, p. 45). Quality management includes those aspects of the overall management function that determine and implement a company's quality policy and quality objectives (Manghani, 2011, pp. 34-35). In practice, quality management involves the implementation, maintenance, and improvement of a quality system as well as proving these activities to clients, including through certifying the quality system and demonstrating that the system in question meets their expectations. The latter is a task for quality assurance (Kołożyn-Krajewska, 2001, p. 35). A quality system is defined as the organizational structure, responsibilities, processes, procedures, and resources for implementing quality management (Manghani, 2011, p. 34). The top-level management in an organization is responsible for establishing the firm's commitment to quality (Christensen & Betz & Stein, 2014, p. 1). Quality is an important determinant of satisfaction. In itself it is also a competitive fighting tool. Quality management should be a process that is thoroughly planned and regularly improved upon (Kowalik & Klimecka-Tatar, 2018, p. 40). Quality planning always entails establishing which needs to be accomplished or which products and services need to be provided. This is often not an easy task, as the various stakeholders in any process often have significantly different perspectives of what needs to be accomplished (Christensen & Betz & Stein, 2014, p. 3). The findings indicate that attaining quality superiority produces the following organizational benefits: 1. Greater customer loyalty; 2. Market share improvements; 3. Higher stock prices; 4. Reduced service calls; 5. Higher prices; 6. Greater productivity (Omachonu & Ross, 2004, p. 15).

Quality assurance is focused on providing the confidence that the quality requirements are being fulfilled, while quality control is focused on fulfilling these quality requirements (Manghani, 2011, p. 34). Implementing a quality management system affects every aspect of an organization's performance. The benefits of a documented quality management system include the following:

- Meeting the customer's requirements, which helps to instill confidence in the organization; this in turn leads to more customers, more sales, and more repeat business;
- Meeting the organization's requirements, which ensures the compliance with regulations and provision of products and services in the most cost- and resource-efficient manners, creating room for expansion, growth, and profit (https://asq.org/quality-resources/quality-management-system).

These benefits offer additional advantages, including defining, improving, and controlling the processes, reducing waste, preventing mistakes, lowering costs, facilitating and identifying training opportunities, engaging staff, setting organization-wide direction, and communicating a readiness to produce consistent results (https://asq.org/quality-resources/quality-management-system).

A quality management system is a model (design) solution as well as its actual mapping in practice, the determinants of which are company organization, pro-quality mechanisms, and resources that ensure the proper functioning of an enterprise (Janasz & Wiśniewska, 2013, p. 141). Among the resources/competencies in the field of quality management, we can distinguish owned quality assurance systems, the owned certificates of the quality of products, the use of a "philosophy" of total quality management (TQM), motivation systems used for high-quality performance, the use of systems of quality improvement of processes and products, awareness of the "pro-quality" of the employees, the degree of involvement of top management in the implementation of high-quality assurance programs, the knowledge and abilities of those personnel responsible for the improvement and control of the quality, and the level of computerization of the applied quality management systems (Stankiewicz 2002, p. 119).

3. State of resources and competencies in area of quality management as compared to competitors and financial situation – analysis of research results

The research was conducted among the cooperatives' executives who were asked to assess their state of resources and competencies in the area of quality management as compared to their competitors. All of dairy cooperatives from the Świętokrzyskie and Małopolskie voivodeships were asked to take part in the research; however, because of the tendency of the representatives of cooperatives to participate in the research, the research was conducted on a sample of 7 out of 17 dairy cooperatives from the Świętokrzyskie and Małopolskie voivodeships; i.e., 41% of the cooperatives functioning during the year of conducting this research, using an interview questionnaire. The interview results are shown in Table 1. Additionally, these results are enhanced by an analysis of the financial ratios (which is shown in Table 2).

Table 1. State of resources and competencies in area of quality management as compared to competitors – average rating

Resources/competencies of cooperative in field of quality management	Świętokrzyskie Voivodeship	Małopolskie Voivodeship
Owned quality assurance systems	2.5	1.25
Owned certificates of quality of products	3	1.25
Use of "philosophy" of total quality management (TQM)	3	1.5
Motivation systems used for high-quality performance	3	1.75
Use of systems of quality improvement of processes and products	3	1.75
Awareness of "pro-quality" of employees	2.5	2
Degree of involvement of top management in implementation of high-quality assurance programs	3	2
Knowledge and abilities of personnel responsible for improvement and control of quality	3	1.75
Level of computerization of applied quality management systems	3	1.75
Average rating for all resources/competencies in field of quality management	3	2

State: 3 – better; 2 – similar; 1 – worse.

Source: own work.

While taking the assessment of the resources/competencies that are shown in Table 1 into account, the following can be seen:

- cooperatives from Świętokrzyskie Voivodeship claim that they have a better competitive potential of such resources/competencies as the owned certificates of the quality of products, the use of a "philosophy" of total quality management (TQM), motivation systems used for high-quality performance, the use of systems of the quality improvement of processes and products, the degree of involvement of top management in the implementation of high-quality assurance programs, the knowledge and abilities of those personnel responsible for the improvement and control of the quality, and the level of computerization of the applied quality management systems. At the same time, the competitive potential is rather better in the case of the owned quality assurance systems and the awareness of the "pro-quality" of the employees.
- cooperatives from Małopolskie Voivodeship claim that they have similar competitive potential of such resources/competencies as the awareness of the "pro-quality" of the employees and the degree of involvement of top management in the implementation of high-quality assurance programs. At the same time, the competitive potential is rather similar in the case of those motivation systems used for high-quality performance, the use of systems of the quality improvement of processes and products, the knowledge and abilities of those personnel responsible for the improvement

and control of the quality, the level of computerization of the applied quality management systems, and the use of a "philosophy" of total quality management (TQM). According to these cooperatives, the state of the owned quality assurance systems and the owned certificates of the quality of products is worse than their competitors.

Table 2. Selected financial ratios – average rating

Ratios	Świętokrzyskie Voivodeship	Małopolskie Voivodeship
Current ratio	2.73	3.74
Quick ratio	2.03	3.48
Days Inventory Ratio	23.50	10.7
Days Receivables Ratio	23.93	61.1
Days Payable Ratio	36.10	50.5
Debt-to-Total Assets Ratio	0.35	0.28
Debt-to-Equity Ratio	0.55	0.43
Long-term Debt-to-Equity Ratio	0.06	0.06
Tangible Fixed Assets-to-Long-term Debt Ratio	4.58	1.20
Return on sales (ROS) (%)	1.18	4.53
Return on average assets (ROAA) (%)	2.76	4.52
Return on average equity (ROAE) (%)	7.00	6.66

Source: own work.

Taking the financial situation of the cooperatives from both voivodeships into account, it can be seen that they have financial liquidity. We can say that there is even an overliquidity. The difference exists in the days when the inventory is renewed. In the case of the cooperatives from Świętokrzyskie Voivodeship, inventory is in the warehouse for more than 13 days longer than in case of cooperatives from Małopolskie Voivodeship. A different situation occurs in the case of receivables. The cooperatives from Małopolskie Voivodeship wait longer to obtain cash from collecting receivables. They wait 18 days longer than cooperatives from Świętokrzyskie Voivodeship. The same situation is in the case of the days payable ratio. However, a higher ratio is better, as cooperatives have more time to pay off short-term liabilities. The cooperatives from Świętokrzyskie Voivodeship have a more comfortable situation than the cooperatives from Małopolskie Voivodeship because they collect money before they have to pay off their short-term liabilities. A good situation is in the case of such ratios as the debt-to-total assets ratio, debt-to-equity ratio, and long-term debt-to-equity ratio, as they are rather low. The total assets from the cooperatives from both voivodeships are indebted in a comparable manner, having a similar relationship between the total debt and long-term debt and equity. Greater security for long-term liabilities by tangible fixed assets occurs in the case of the cooperatives from

Świętokrzyskie Voivodeship. While taking profitability ratios into account, it can be seen that ROS and ROAA are higher in the case of the cooperatives from Małopolskie Voivodeship. At the same time, ROAE has a similar value in both voivodeships.

4. Conclusion

As the research results show, cooperatives from Świętokrzyskie Voivodeship assess the state of their resources and com petencies much higher in the area of quality management. All resources and competencies are assessed as better than their competitors. At the same time, cooperatives from Małopolskie Voivodeship owned quality assurance systems, and the owned certificates of the quality of products were assessed as worse as compared to their competitors. Other resources and competencies were assessed as similar to the competition or rather similar.

The answer for the first question is 'no,' as cooperatives from both the Świętokrzyskie and Małopolskie voivodeships have high financial liquidity in spite of the fact that they have assessed their competitive potential differently. Moreover, cooperatives from Małopolskie Voivodeship have much higher liquidity than those from Świętokrzyskie Voivodeship. In the case of the second question, the answer is 'yes,' but only to some extent, as the situation looks better in the case of the time of settlement of the current liabilities and the collection of receivables in the cooperatives from Świętokrzyskie Voivodeship, which assessed their competitive potential better. The answer for the third question is 'no,' as both cooperatives from the Świętokrzyskie and Małopolskie voivodeships have similar levels of debt and assessed their competitive potential differently. Only cooperatives from Świętokrzyskie Voivodeship have greater security for long-term liabilities by tangible fixed assets. The answer for the fourth question is 'no,' as the profitability ratios were much better in the case of cooperatives from Małopolskie Voivodeship, which assessed their competitive potential worse. It can therefore be concluded that there is no relationship between the assessment of competitive potential in the field of quality management and a better financial standing.

Further research should focus on an analysis of the relationship between competitive potential in the field of quality management and the financial situation of cooperatives while taking all of Poland into account as well as a larger research sample.

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PART III INNOVATION AND DIGITAL TECHNOLOGIES IN FACE OF CHALLENGES OF 21ST CENTURY ECONOMY

Chapter 13

Model of Digital Competencies in Fourth Industrial Revolution[1]

Małgorzata Tyrańska, Jadwiga Stobiecka
Małgorzata Marchewka, Anna Dolot

1. Introduction

With the Fourth Industrial Revolution, certain consequences of economic, social, technological, environmental, and political changes can be observed. Among others, there are proceeding automatization and digitalization, high demand for innovations, global integration, and virtual cooperation (Hecklau, Galeitzke, Flachs, Kohl, 2016, p. 3). The turbulent environment imposes a growing complexity on organizational structures, and the increasing importance of knowledge and information, automation, Internet development, and the implementation of artificial intelligence determine the emergence of new digital competencies. These competencies enable the conscious, critical, and creative use of digital technologies, facilitate the acquisition and analysis of information, and help in solving decision-making problems as well as in communication within and among teams.

Understanding these new types of competencies requires some assumptions regarding the business consequences of the Fourth Industrial Revolution. In the concepts of Industry 4.0, future factories are going to be intelligent and self-managing, networks are going to be self-organizing and able to respond in the real-time responses, products are going to be smart, and customers are going to be given the opportunity to fully customize products (Enke, Glass, Kreß, Hambach, Tisch, & Metternich, 2018; Kazancoglu & Ozkan-Ozen, 2018, p. 893). Even though the emphasis is on digitalization (Johansson, Abrahamsson, Kåreborn,

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Fältholm, Grane, & Wykowska, 2017), automatization, and technological progress, the role of human capital management in Industry 4.0 remains very important (Agolla, 2018).

The main objective of the article is the presentation of the model of digital competencies designed on the basis of a systematic literature review. Digital competencies are described from the perspective of their elements, including knowledge, skills, and attitudes as well as their relations to traditional competencies (often called 3.0 competencies).

2. Digital competencies

The problem of competencies appeared in the literature at the cusp of the 1960s and 1970s with publications by two psychologists – R. White and D.C. McClelland – who were looking for methods of diagnosing the cognitive processes and behavior of highly effective people (White, 1959; Mc Clelland, 1973). The growth of the popularity of this problem was noted in the 1980s because of works by R.E. Boyatzis (1982). This was due to the following factors (among others): the increased complexity of market competition, the need for professional reorientation, increasing multifunctionality, the need for an employee's polyvalence, and the perception of "learning" as a key success factor (Czekaj, 2005).

It is important to distinguish three elements of competencies (Baartman, & de Bruijn, 2011, p. 128; Grzelczak, Kosacka, & Werner-Lewandowska, 2017, p. 140; European Commission, 2018):

- knowledge, including know-what, know why, know-how, and know-who;
- skills understood as practical abilities needed to perform tasks and achieve results;
- attitudes regarding openness and emotional readiness for using knowledge and skills in actions.

Successful performance is determined by the coexistence of these three elements.

Currently, the interests of management theorists and practitioners are focused on digital competencies. In the case of practitioners, digital competencies appear as part of the competency standards taken into account in the certification processes of project managers' competencies and as the subject of research carried out by consulting companies such as International Project Management Association (IPMA), Project Management Institute (PMI), APM Group (APMG), Astor, and PWC.

From a narrow perspective, "digital competencies" is a general term used to describe the ability to use information technology in a specific context (Rizza,

2014). However, digital competencies do not only involve knowledge and skills in ICT management but also the proper use of information and collaborative work in a network (Sánchez, Lagunes, Torres, Judikis, & López, 2019, p. 191). According to such an approach, digital competencies are complex constructs that consist of two components: hard competencies and soft competencies. The first component includes such elements as the ability to analyze data, create digital content, and operate IT systems as well as digital machines and devices. These competencies facilitate data selection, content categorization, and the transformation of data into information and (on its basis) into the necessary knowledge for rational decision-making. The second component of digital competencies are soft competencies, which include the following competencies: strategic thinking, communication, and cooperation in and among teams.

Despite the fact that many academicians point to research gaps in the area of digital competencies (more than 400 articles in the EBSCO database; e.g., Săvulescu, & Antonovici, 2017; Nyikes, 2018; Borodkina, & Borodkin, 2018), still only a few authors consider the problem of digital competencies in the context of Industry 4.0 (e.g., Batorski, & Płoszaj, 2012; Murawski & Bick, 2017; Jabłoński, 2016; Pinzone, Fantini, Perini, Garavaglia, Taisch, & Miragliotta, 2017; Moldovan, 2018). The main goal of this study is to fill this gap.

3. Model of digital competencies

In order to develop a model of digital competencies, the Q-technique proposed by W. Stephenson was applied (Brzezińska, & Brzeziński, 2004; Barry, & Proops, 1999; Steelman, & Maguire, 1998; Stephenson, 1953). After a comprehensive literature review on the Fourth Industrial Revolution in the context of required competencies, 17 articles were selected for exploratory research regarding the problems of digital competencies in Industry 4.0 (Calvani, Cartelli, Fini, & Ranieri, 2008; Ala-Mutka, 2011; Batorski, & Płoszaj, 2012; Ferrari, 2012; Jasiewicz, Filiciak, Mierzecka, Śliwowski, Klimczuk, Kisilowska, Tarkowski, & Zadrożny, 2015; Vieru, Bourdeau, Bernier, & Yapo, 2015; Hausegger, Scharinger, Sicher, & Weber, 2016; Hecklau, Galeitzke, Flachs, & Kohl, 2016; Vuorikari, Punie, Carretero Gomez, & Van den Brande, 2016; Capgemini, 2017; Cotet, Balgiu, & Zaleschi, 2017; Grzelczak, Kosacka, & Werner-Lewandowska, 2017; Grzybowska, & Łupicka, 2017; Murawski & Bick, 2017; Pinzone, Fantini, Perini, Garavaglia, Taisch, & Miragliotta, 2017; Moldovan, 2018; Włoch & Śledziewska, 2018). As a result of the review, 303 items (knowledge, skills, or attitudes) were identified for the analysis.

In the next step, the Q-Technique was applied. It requires us to develop a set of statements (called Q-sorts), which are evaluated by the respondents

(by five experts in the presented study) according to previously set criteria. The statements consisted of definitions of detailed competencies (303 items were distinguished in the areas of knowledge, skills, and competencies). As not all of them were defined in the original articles, our own definitions were prepared for the needs of this study. As the number of statements exceeded the number of items suggested in the literature (100), the first task was to divide similar competencies into coherent groups. In the result, 13 groups of competencies were identified: digital, cognitive, analytical, information processing, communication, physical (manual), psycho-social, HR management, business, principals, creativity, specific job-related (technical), and security. Next, the items were qualified as one of three elements of competencies: knowledge, skills, and attitudes. Finally, the experts decided whether a given item should be classified as specific or non-specific for Industry 4.0.

The first research question regarded the nature of the competencies required in Industry 4.0. On the basis of the experts' evaluations, 67% of the items are needed but are not specific for Industry 4.0 (Figure 1), which shows their huge importance nowadays. At the same time, more than 30% of the items are specific for the current business revolution, resulting in the high need for the training and development of new knowledge, skills, and attitudes.

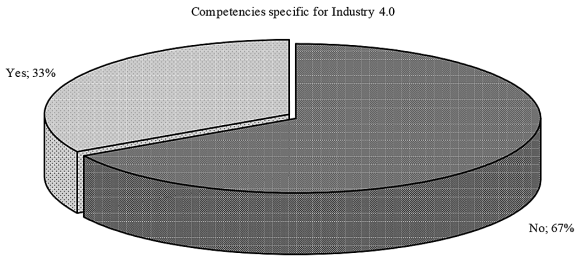

Figure 1. Specific and non-specific competencies for Industry 4.0 (percentage of cases)
Source: own work.

Further analysis was focused on the distinguished general groups of competencies and their three elements (Table 1). Digital competencies appear to be the group of competencies that is most specific for Industry 4.0 (with the highest results in knowledge and skills) (Figure 2).

Another observation regards the importance of specific job-related skills. This may be the result of jobs emerging as a response to technological changes. As for attitudes, a fresh approach is required in the case of cognitive competencies and those competencies related to security. In other words, Industry 4.0 enhanced a new openness to the perception of technology and, at the

same time, of the safety challenges caused by this technology. Interestingly, the group of competencies that seems to be least specific for the current industrial revolution is related to business competencies.

Table 1. Percentage of specific and non-specific competencies for Industry 4.0 with differences in areas of knowledge, skills, and attitudes

Groups of competencies	Analyzed competency area								
	Knowledge			Skills			Attitudes		
	Competencies specific for Industry 4.0		Difference	Competencies specific for Industry 4.0		Difference	Competencies specific for Industry 4.0		Difference
	Yes	No	C2-C3	Yes	No	C5-C6	Yes	No	C8-C9
	n=18	n=24		n=58	n=116		n=25	n=62	
C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Digital	82.4	0.0	82.4	76.4	0.0	76.4	48.0	0.0	48.0
Cognitive	0.0	8.3	-8.3	3.6	8.8	-5.1	20.0	3.3	16.7
Analytical	0.0	0.0	0.0	1.8	19.3	-17.5	4.0	0.0	4.0
Information processing	11.8	4.2	7.6	29.1	32.5	-3.4	0.0	6.7	-6.7
Communication	5.9	8.3	-2.5	18.2	14.0	4.1	4.0	10.0	-6.0
Physical (manual)	0.0	0.0	0.0	3.6	5.3	-1.6	0.0	0.0	0.0
Psycho-social	5.9	8.3	-2.5	3.6	11.4	-7.8	36.0	40.0	-4.0
HR management	0.0	4.2	-4.2	9.1	11.4	-2.3	0.0	5.0	-5.0
Business	5.9	41.7	-35.8	14.5	22.8	-8.3	0.0	25.0	-25.0
Principals	5.9	4.2	1.7	0.0	0.9	-0.9	20.0	16.7	3.3
Creativity	0.0	8.3	-8.3	10.9	5.3	5.6	4.0	3.3	0.7
Specific job-related (technical)	23.5	33.3	-9.8	27.3	12.3	15.0	0.0	1.7	-1.7
Security	11.8	4.2	7.6	3.6	0.9	2.8	20.0	5.0	15.0

Source: own work.

Summarizing this part of the analysis, it is worth emphasizing that, in the case of Industry 4.0, the most specific element of competencies is skills (57%). Far less important is attitudes (29%), and knowledge is of little significance (only 14%). In comparison to so-called traditional competencies or (Competencies 3.0), the structure of competencies is reversed: knowledge followed by attitudes are fundamental, and skills are of lower importance.

Finally, the analysis of the items enabled a description of the model of digital competencies in Industry 4.0 (Figure 3). First of all, digital competencies consist of elements that are specific and non-specific for Industry 4.0. This observation suggests that a narrow approach to digital competencies is inappropriate. Similar to the previously presented general conclusions, knowledge and attitudes are essential in the case of elements that are not specific for Industry 4.0, and skills are of a tremendous

importance among the specific elements. The model brings a new understanding of the nature and structure of digital competencies in the Fourth Industrial Revolution, inspiring further reflection on the ability to develop these competencies.

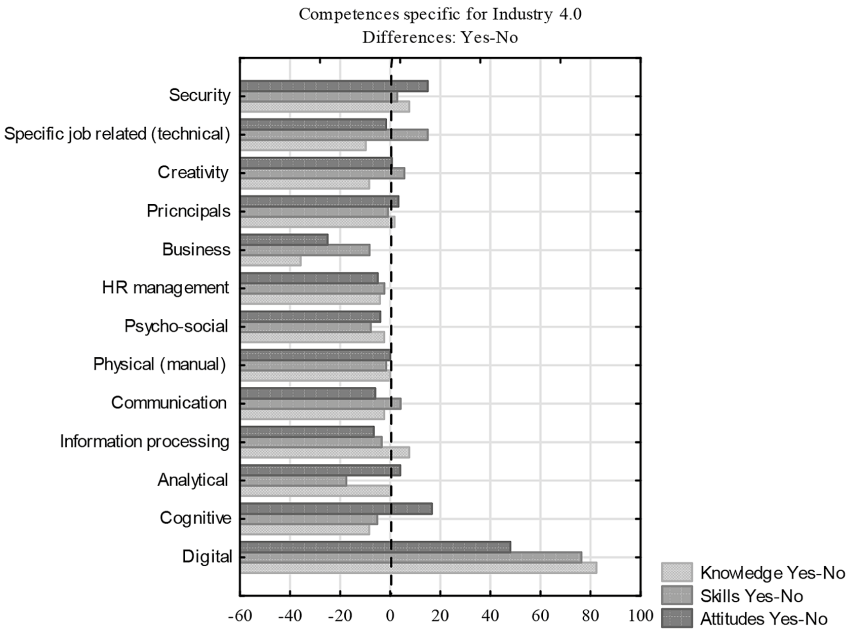

Figure 2. Percentage differences between specific and non-specific competencies for Industry 4.0 in areas of knowledge, skills, and attitudes

Source: own work.

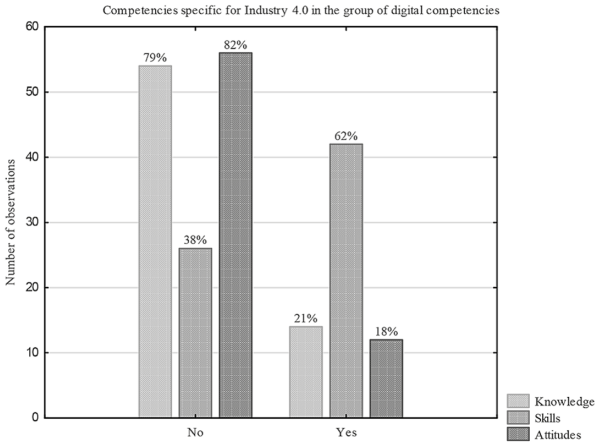

Figure 3. Model of structure of specific and non-specific competencies for Industry 4.0 in group of digital competencies (percentage of cases)

Source: own work.

4. Conclusion

The problem of the consequences of the Fourth Industrial Revolution on the development of the workforce is currently one of the most troublesome for managers. In this context, a deep understanding of the nature of competencies (and of digital competencies in particular) appears to facilitate adequate human resources management. This is why the main objective of the article was to present the model of digital competencies designed on the basis of a systematic literature review. Moreover, the results of the study fill the existing research gap.

The results of the analysis suggest that digital competencies are embedded in traditional competencies with special regard to knowledge and attitudes. Their innovation is in the specific skills of Industry 4.0.

Given the results, further empirical studies may regard the hybrid nature of digital competencies as well as the potential difference in their necessity in the cases of managers and employees. Apart from academic considerations, the model can serve as a starting point for planning the development of digital competencies among employees.

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Chapter 14

Impact of Decision-Making Quality on Innovation Process Efficiency

Dawid Szutowski

1. Introduction

Decision-making is at the heart of management. It constitutes an attempt to determine paths for a future transformation of the current state of affairs based on the available data. As James March stated, decisions are the occasions where individuals and institutions achieve coherence and reduce equivocality (J. March, 1994). In the context of low-quality information overflow and high-quality information scarcity, making a decision becomes a complex issue. For this reason, decision-making remains an important topic for both scientific investigation and business practice.

In the present study, decision-making quality constitutes the starting point for the analysis, which focuses on the effects of making high/low-quality decisions in the specific setting of an innovation process. Therefore, the study continues and expands the stream of research concentrating on decision-making in the context of innovation. Its purpose is to measure the impact of decision-making quality on innovation process efficiency. The study exploits previous studies on decision-making quality, decomposes it into efficiency and effectiveness, and links these constructs to a seven-stage representation of the innovation process. As a result, it measures both decision-making efficiency and effectiveness seven times throughout the process. Next, the results are regressed against a measure of process efficiency. Such an analysis allows for determining what drives the overall efficiency of the innovation process.

Once a theoretical background has been built, an empirical analysis was undertaken to measure the impact of decision-making quality on innovation process efficiency. The empirical investigation included 107 companies listed on the Warsaw Stock Exchange in Poland. However, the final set is comprised of 64 companies due to missing information. The data was gathered during the third

and fourth quarters of 2019 and the first quarter of 2020 with the use of a specially designed questionnaire consisting of 41 questions concerning decision-making quality and innovation process efficiency. The results demonstrated that decision-making efficiency and effectiveness tend to differ from each other throughout consecutive stages of the innovation process. Furthermore, they emphasized the role of idea selection as a crucial stage in the process: this was characterized by a low decision-making efficiency (significant time and effort was needed before a decision was made); at the same time, it played a decisive role in steering the whole innovation process. Such a conclusion seems consistent with the general logic behind the innovation process. Selecting an inappropriate idea produces a domino effect that affects all of the subsequent stages. The resources spent on research, development, testing, etc. become misplaced. Furthermore, the results indicated the great importance of decision-making efficiency at the testing stage. This result seems to be driven by the composition of the sample, where 22% of the companies represented the field of life science and medicine. This sector is characterized by long testing procedures (lasting eight years on average).

The paper is composed of four sections. First, a theoretical background in presented. Second, the methods used in the empirical study are briefly described. Third, the results are provided. The paper terminates with conclusions.

2. Theoretical background

2.1. Decision-making quality

In numerous situations, making a decision boils down to a selection between available alternatives. In this vein, Cooper et al. described the screening of decisions as a dynamic decision process wherein new product proposals are evaluated, selected, and prioritized and resources are allocated. The purpose of the process is further described as ensuring that selected projects correspond to a company's strategy, maximize benefits (value) for the company, and maintain an internal balance in terms of such parameters as project type, risk, target markets, used technologies, etc. (Cooper et al., 2001).

Reaching high-quality decisions becomes especially challenging in the presence of high levels of uncertainty. As established in previous studies, routine decisions are made frequently; thus, historical data can be gathered for use as a guide in the decision-making process, while non-routine ones are seldom made and historical data is not available (Noorani, 2010). By definition, innovation projects involve elements that are hard to predict; therefore, their management is especially challenging for executives. The more groundbreaking the innovation under development, the smaller the number of comparable solutions and, therefore, the greater the information deficiencies (Szutowski, 2018).

While decision-making in a routine situation tends to be repetitive, little to no repetition is possible in the case of innovation processes.

The context of an innovation process calls for both a system of information provision and a decision-quality assessment method. The requirement of providing desirable information may be satisfied by the management control system in place (Ylinen and Gullkvist, 2014). However, evaluating the quality of the decisions made in such a dynamic environment appears to be a complex task.

In order to evaluate the quality of decisions, the present study adopts an approach that distinguishes decision-making effectiveness and decision-making efficiency. Both notions were defined by Noorani in the context of decision-making. Effectiveness was defined as the "capacity of a system to generate an output as its intended benefit. This is the main goal of managing any system. Although it is not the only goal, its absence definitely indicates that the system was either unmanageable or mismanaged," and efficiency was defined as the "system output divided by its input. It is a measure of how well the system converts its inputs into the desired benefit that it generates. It represents the costs associated with the desired benefit. A benefit such as survival is worth any cost. Other benefits are worth only up to a certain cost. For this reason, goals of effectiveness and efficiency must be set together so as to maintain a rational balance between a benefit and its cost" (2010, p. 46). A similar distinction was applied in studies on screening decisions. Decision-making effectiveness was defined as the extent to which a screening decision met the expectations established by top management regarding the outcome quality in terms of the optimization of resource allocation and the strategic fit of the innovation project (Hammedi, Van Riel, Sasovova, 2013). On the other hand, efficiency was defined as the ratio of the input and output of a process (Charnes, Cooper, and Rhodes, 1978).

Furthermore, Anthony and Govindarajan explained that effectiveness represents the relationship between "outputs and objectives" (2001, p. 111). According to van Riel et al. (2011), reaching high effectiveness protects companies from two types of potential errors: (1) Type I errors, which occur when a company's scarce resources are spent on "failures" (De Brentani, 2000); and (2) Type II errors, which occur when potentially successful ideas are overlooked (Baker and Albaum, 1986). In order to minimize the risk of making these errors, decision-makers should select projects that strike the right balance between value and risk and fit the firm's strategy (Cooper et al., 2001).

Efficiency was further explained as using fewer resources while maintaining the same output quality or yielding better output quality with a lower level of input (Hammedi, Van Riel, Sasovova, 2013). According to Baker and Albaum (1986), the input of the process may be conceptualized as the time and effort needed to reach a consensus and to make a screening decision. An efficient

decision-making process rapidly leads to consensus and produces a commitment to the decision.

2.2. Innovation process

Since the early 1950s, scientists have produced numerous models of the product innovation development process. Over time, the approach to innovation process modeling changed. Each decade was marked by a different dominant logic (Hobday, 2005; Kotsemir & Meissner, 2013). During the period of 2000-2010, open innovation was at the heart of scientific discussion. The focus was placed on innovation collaboration and multiple exploitation paths. The novel approach that emerged in the early 2010s focused on an open innovator and on the framework conditions under which one becomes innovative (i.e., on the individual).

The novel generation of innovation process models needs to support the management of not only quantitative but also numerous qualitative variables. The processes must be flexible and allow companies to proactively manage market trends and customer needs (Louw et al., 2018). During the last decade, there have been at least a dozen or so scientific attempts to represent an innovation process model (Bowers & Khorakian, 2014; Guan & Chen, 2010; Hallstedt, Thompson, & Lindahl, 2013; Havlíček, Thalassinos, & Berezkinova, 2012; Kamps, 2013; Louw, Schutte, Seidel, & Imser, 2018; Penidea, Gourc, Pingauda, & Peillonb, 2013; Szutowski, Szulczewska-Remi, & Ratajczak, 2019; Lakshmanan, Ramachandran, & Ram, 2016; Vitezić & Vitezić, 2015; Zizlavsky, 2013).

In the present study, a conceptual representation of an innovation process model was adopted from a literature review that summarized previous evidence in the field (Szutowski, 2019). This represents the general process at the company level and, thus, contains numerous individual innovation projects. The model took a graphic form with a descriptive component (Figure 1).

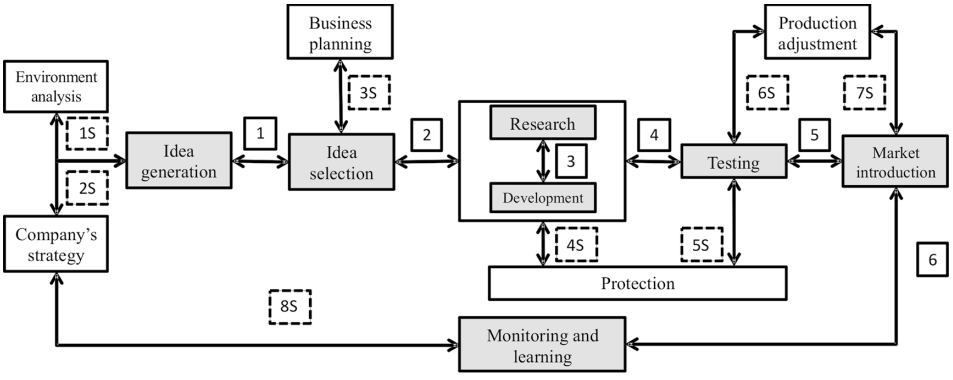

Figure 1. Innovation process model
Source: (Szutowski, 2019).

The model is comprised of seven main stages (represented by the gray boxes). The five complementary stages are represented by the white boxes. All of the stages are mutually linked. Due to the subject of the present investigation (i.e., decision-making quality), the most important part of the model is represented by the gray boxes. The numbers represent key go/no-go points, which separate the main stages of the process (the numbers 1S-8S represent supplementary go/no-go points). The two-headed arrows at the go/no-go points connect the consecutive stages of the process. This allows for the continuation of the process from the earlier to later stages and for feedback loops that draw the process back from the later stages to prior ones. The overall efficiency of the innovation process depends on the quality of the decisions made at the seven consecutive stages of the process. Thus, the quality of decision-making was measured seven times throughout the process (at each main stage) in the present study.

Importantly, the model represents the innovation process at the company level, which means that the representatives of different functional areas of a company undertake their activities within the stages simultaneously. Despite the logical sequence of the stages, the process should be perceived as combining different functional areas working at the same time (idea generation happens year-round, R&D is performed year-round, etc.), rather than as a sequence of stages following one another. This constitutes one of the major differences between the company level (adopted here) and the single project level (which is not the subject of the present analysis). The model guarantees flexibility at the single project level, as not all projects need to pass through all stages (the stages may overlap, the activities may be moved from one stage to another, etc.). Furthermore, the departments were not strictly attributed to particular stages; instead, it is assumed that they may all contribute at different stages.

2.3. Innovation process efficiency

Efficiency is understood as the ability to reach the desired outcome with minimum input. This is successfully reached when a specific application of effort produces the anticipated outcome with a minimum amount of waste, expense, and effort (Sickles and Zelenyuk, 2019). Achieving high efficiency is not an easy task, as it requires the unit to be continuously operating at the optimum operating point (Kilian, 2018). Efficiency is a common scientific term and a subject of analyses in very different contexts (also in process and innovation management).

There have been numerous attempts to conceptualize the efficiency of an innovation process (e.g., Rothwell, 1994; Arundel and Kemp, 2009; Cazares, Saez, and Marco, 2013). It appears, however, that all of them relied on the relationship between some input and some output measures. A fairly straightforward approach

was proposed by Haustein, Maier, and Uhlmann (1981), who presented efficiency at the innovator level as the relationship between input-related factors (the necessary quantities and qualities of factors related to production) and output-related factors (the knowledge and utilization of the properties and possible applications of the technique). In a more recent approach, Cazares, Saez, and Marco (2013) distinguished such innovation inputs as R&D capital stock and high-skilled staff and such outputs as new products and patents.

It seems that one of the most comprehensive publications on innovation process efficiency originates from a study on eco-innovation (Arundel and Kemp, 2009). This expands on the original approach by Acs and Audretsch (1993) and distinguishes four different groups of measures: input measures, intermediate output measures, direct output measures, and indirect impact measures. This comprehensive approach to innovation process efficiency encompasses the following (2009, pp. 15-22):

1) input measures:
   - R&D expenditures,
   - R&D personnel,
   - innovation expenditures (including investment in intangibles such as design expenditures and software and marketing costs);
2) intermediate output measures:
   - number of patents,
   - number and types of scientific publications;
3) direct output measures:
   - number of innovations,
   - descriptions of individual innovations,
   - sales of new products;
4) indirect impact measures:
   - changes in resource efficiency,
   - changes in resource productivity.

The analyses performed in the present study will follow the main structure of innovation process efficiency based on the four elements: input, indirect output, direct output, and impact measures.

3. Research methods

The purpose of the present study was to measure the impact of decision-making quality on innovation process efficiency. In line with the theoretical considerations, both decision-making quality and innovation process efficiency were complex measures. The former was composed of decision-making efficiency and decision-making effectiveness, and the latter – input measures, intermediate

output measures, direct output measures, and indirect impact measures. Moreover, in order to capture the different functional areas represented in the process, the decomposition of the process into seven different stages was adopted. As a consequence, decision-making quality was independently measured seven times (at each stage of the process).

The quantitative cross-sectional study was conducted during the third and fourth quarters of 2019 and the first quarter of 2020. It targeted companies operating in Poland that were listed on the main market of the Warsaw Stock Exchange as well as those on the NewConnect market (an alternative trading system operated by the Warsaw Stock Exchange). The entire population was comprised of 838 companies. No sampling procedure was applied, as the entire population was studied. Data was gathered for a total of 107 companies; however, only 64 responses were subsequently analyzed due to missing data. In the companies of interest, the respondents represented senior management, management, CFOs, innovation managers, and project leaders. Such a composition corresponded to the issue of decision-making. The respondents answered a total of 41 questions concerning the impact of decision-making quality on innovation process efficiency. Due to the substantial coverage of the questionnaire, a general tendency was observed whereby the representatives of companies in which an actual innovation process is in place responded more frequently than representatives of other types of companies. The sectorial composition of the sample was as follows: 5% agricultural companies, 17% service companies, 5% trade companies, and 73% industrial companies. The single most represented sector was life science and medicine, which accounted for 22% of the population.

Data was collected by means of a computer-assigned telephone interviewing survey technique by a specialized agency. The specially designed questionnaire was divided into five sections: introduction, innovation process efficiency, decision-making quality, determinants of decision-making quality, and management control. For the purpose of the current investigation, the data that was gathered within the first three sections was used.

The “innovation process efficiency” section was comprised of six items. The first three items were open-ended and concerned (1) the total annual innovation cost incurred at all stages of all innovation processes, (2) the total number of people involved in all stages of all innovation processes, and (3) the number of groundbreaking new products developed and introduced to the market within the last five years as a result of the innovation processes carried out. In the next three items, the respondents were asked whether (4) introducing a single new product to the market increased the average sales volume of their companies, (5) the advancements made in one innovation project were used to support other

innovation projects, and (6) the advancements made in one innovation project were used to minimize the resources spent on other innovation projects. These questions were closed-ended.

The "decision-making quality" section consisted of five items. Seven-point rating scales were used, ranging from 1 ("strongly disagree") to 7 ("strongly agree"). The items were expressed in a clear, concise, and specific way and were based on scales that were validated in previous research. Two items referred to decision-making efficiency:

- Workload used to make a decision is optimal (not too much and not too little research, consultations, etc.);
- Decisions at this stage are made rapidly.

The remaining three items concerned decision-making effectiveness:

- Decisions at this stage are consistent with company strategy;
- Decisions at this stage are made in accordance with available financial resources;
- Decisions at this stage contribute to overall company performance.

The respondents evaluated each item seven times (for each stage of the innovation process). Therefore, each respondent provided a total of 35 scores in this section (5 items X 7 stages).

In order to minimize the desirability bias, the respondents were informed that there were no right or wrong answers and that the survey was anonymous. They were asked to provide responses that best illustrated the issues under investigation (Podsakoff et al., 2003). All of the items were based on prior studies (although some adaptations were made), and a few new items were specifically developed to fit the subject of the analysis.

The questionnaire was tested and revised in three preliminary studies. The first one included eight scholars working at the Poznan University of Economics and Business. The second one was administered to nine managers in medium-sized local companies. The third one was web-based and included 23 respondents.

The respondents were asked to rate the items based on their companies' experiences within the last five years. Thus, the data gathered reflect the period of five years prior to the date of the survey — in most cases, from 2015 to 2019 (or 2020). In total, 107 responses were gathered. The overall response rate was 12.77%. However, a radical approach to the case selection was adopted whereby only complete responses were analyzed and no missing data was allowed (i.e., even a single missing value eliminated the case from analysis). Therefore, the final set of observations included only 64 cases for which a complete questionnaire was delivered.

As stated previously, two main statistical tools were employed. First, principal component analysis was used to aggregate the data. Second, a regression

model was employed to analyze the relationship between decision-making quality and innovation process efficiency.

Principal component analysis (PCA) is designed to represent a set of variables by a smaller number of variables called principal components. Although PCA is designed for interval data (like factor analysis), it may also be used for ordinal data (Cornish, 2007). All of the aggregated variables were at least moderately correlated to one another. In the PCA procedure, regression was used to estimate the factor score coefficients. The scores that were produced were standardized, which means that they have a mean of zero and a variance equal to the squared multiple correlation between the estimated factor scores and the true factor values. These standardized values were the input variables for the regression model.

The dependent variable was innovation process efficiency. Its calculation consisted of three steps: the calculation of a single variable for the input measures, the calculation of a single variable for the output measures, and the calculation of the actual process efficiency. In the first step, principal component analysis was performed for the two variables representing the input measures: the total annual innovation cost incurred at all stages of all innovation processes, and the number of people involved in all stages of all innovation processes. In the second step, PCA was performed for the four variables representing the output measures: the number of groundbreaking new products developed and introduced to the market within the last five years, the potential increase in sales volume due to the introduction of a single new product, the potential use of the advancements made in one innovation project to support other innovation projects, and the potential use of the advancements made in one innovation project to minimize the resources spent in other innovation projects. The above procedure resulted in two variables: one representing the input measures, and the other – output measures. Finally, innovation process efficiency was calculated as the relationship between the "output measures" and "input measures" variables.

In the study, a total of 14 independent variables were calculated. They represented both the efficiency and effectiveness of the decision-making at all seven steps of the innovation process. Each independent variable was calculated with the use of PCA. For each stage of the innovation process, items related to decision-making efficiency (the workload used and decision-making time) were first aggregated to form a single new variable representing efficiency. Then, items related to decision-making effectiveness (consistency with the company strategy, consideration of available financial resources, contribution to overall company performance) were aggregated to produce a single measure of effectiveness.

Due to the application of PCA, the variables representing decision-making quality at consecutive stages of the innovation process were transformed so that

their mean equaled 0 and both the standard deviation and variance equaled 1. Thus, instead of these values, the minimum, maximum, median, 25th, and 75th percentile values are presented in Table 1.

Table 1. Descriptive statistics

Variable	Minimum	25th percentile	Median	75th percentile	Maximum
Process_efficiency	-47.220	-3.462	-0.948	3.026	25.680
Efficiency_IG	-2.712	-0.646	0.058	0.773	1.965
Effectiveness_IG	-2.885	-0.383	0.181	0.744	1.262
Efficiency_IS	-2.385	-0.570	-0.218	0.727	1.949
Effectiveness_IS	-2.969	-0.422	0.152	0.718	1.340
Efficiency_R	-3.104	-0.436	0.180	0.795	1.493
Effectiveness_R	-3.397	-0.244	0.175	0.581	1.000
Efficiency_D	-2.901	-0.722	0.128	0.569	2.147
Effectiveness_D	-3.286	-0.522	0.034	0.619	1.361
Efficiency_T	-4.020	-0.622	0.228	0.614	1.927
Effectiveness_T	-4.307	-0.375	0.154	0.656	1.198
Efficiency_MI	-4.298	-0.324	0.149	0.622	1.511
Effectiveness_MI	-4.966	-0.459	0.140	0.733	1.344
Efficiency_ML	-3.215	-0.360	0.154	0.811	1.501
Effectiveness_ML	-3.955	-0.274	0.221	0.483	1.210

IG – idea generation; IS – idea selection; R – research; D – development; T – testing; MI – market introduction; ML – monitoring and learning

Source: own development

In order to analyze the dependencies, a regression model was estimated in which innovation process efficiency constituted the dependent variable and the 14 measures of decision-making efficiency and effectiveness at consecutive stages of the innovation process constituted independent variables. The relationships were considered significant at a p-value below 0.05, although ones with p-values below 0.1 were also reported.

4. Results and discussion

The results of the study demonstrated that decision-making efficiency and effectiveness differ throughout the innovation process. Figure 2 presents their standardized median values.

Figure 2 indicates a strong differentiation of decision-making efficiency throughout the process. While the initial stages (and especially idea selection) are characterized by low efficiency levels, efficiency tends to stabilize at a relatively high level starting at the research stage. Effectiveness is relatively stable – the

only exception is the development stage (when it reaches its bottom). This means that, at the beginning of the process, the time and effort needed to reach a conclusion are non-optimal and that the quality of the decisions with regard to company strategy and available resources at the development stage could be improved.

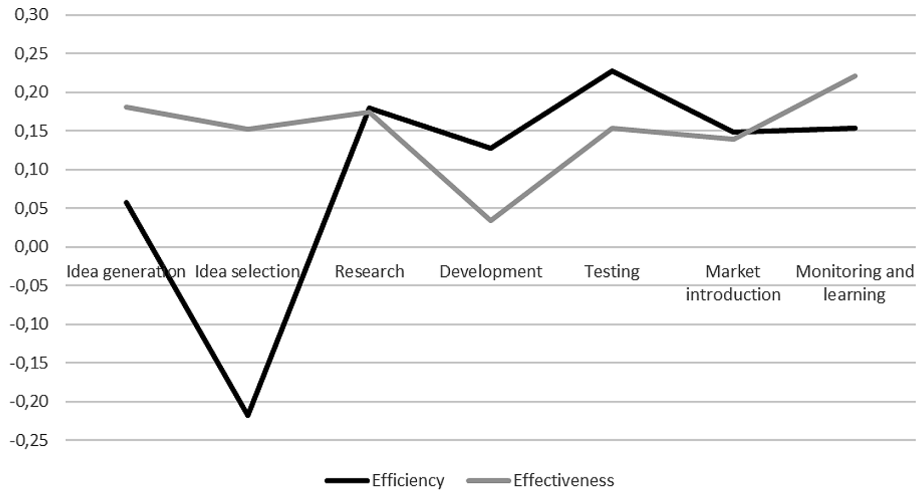

Figure 2. Decision-making efficiency and effectiveness
Source: own development

The verification of the research hypotheses started with the estimation of the regression model. The most important results are summarized in Table 2. Furthermore, the results of ANOVA are provided in Table 3. These results are especially important, as they demonstrate that innovation process efficiency may be predicted to some extent. The predictive power of the model was 0.286. The 1.987 level of the Durbin-Watson test result indicated few autocorrelation issues; however, these general considerations require in-depth analysis. The estimated parameters for the individual predictors and standard errors are shown in Table 4.

Table 2. Model summary

Model	R	R^2	Adj. R^2	Std. error	Change Statistics				
					ΔR^2	ΔF	df1	df2	ΔSig. F
1	0.535	0.286	0.082	8.96698	0.286	1.404	14	49	0.187

Source: own development

Table 3. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1580.777	14	112.913	1.404	0.187
	Residual	3939.932	49	80.407		
	Total	5520.709	63			

Source: own development

The impact of decision quality on innovation process efficiency was statistically significant. The respondents judged that high decision-making effectiveness is especially needed at the idea-selection stage. This seems consistent with the general logic behind the innovation process. Selecting an inappropriate idea produces a domino effect that affects all of the following stages. The resources spent on research, development, testing, etc. are misplaced in such a case. Therefore, it is the selection of the right idea that validates all of the further actions that are undertaken. In this context, the low overall efficiency of decision-making at this stage (see Figure 2) does not seem problematic. Significant time and effort are indeed needed and much desired at this stage. The benefits of good idea selection exceed the disadvantages of low decision-making efficiency. Thus, a consistent image emerged from the data where significant time and effort are expended before a decision is made at the idea selection stage, which, at the same time, is deemed crucial for the efficiency of the whole process.

Table 4. Model specification

Variables	Unstandardized Coefficients		Standardized Coefficient Beta
	B	Standard error	
(Constant)	-2.706	1.328	
Efficiency_IG	-1.265	2.119	-0.113
Effectiveness_IG	-7.231	4.802	-0.568
Efficiency_IS	1.412	2.408	0.136
Effectiveness_IS	8.082*	3.376	0.733*
Efficiency_R	0.882	2.886	0.099
Effectiveness_R	-2.144	3.187	-0.255
Efficiency_D	-3.449	2.638	-0.348
Effectiveness_D	4.239	2.798	0.358
Efficiency_T	4.913*	2.256	0.575*
Effectiveness_T	-4.879	2.451	-0.539
Efficiency_MI	-1.822	1.629	-0.202
Effectiveness_MI	0.598	2.089	0.063
Efficiency_ML	-1.880	3.238	-0.202
Effectiveness_ML	1.890	2.896	0.225

** — $p < 0.01$; * — $p < 0.05$; + — $p < 0.1$

Source: own development

Regarding the significance of decision-making efficiency at the testing stage, it seems that the final composition of the sample was a decisive factor. Twenty-two percent of the companies in the sample represented the life science and medicine sector. In their case, a three-stage drug testing procedure applies (Phase I — testing on healthy volunteers; Phase II – testing on patients to assess efficacity and side effects; and Phase III — testing on patients to assess efficacity, effectiveness, and safety). Among all of the stages of the innovation process, testing seems to be the most challenging, as it involves large patient groups and a review by a national regulatory agency. In Poland, the whole process takes eight years on average (PwC, 2010). Considering how lengthy the testing phase is, the results indicating that the efficiency of decision-making is crucial are not surprising. Shortening the testing stage was the priority for more than 20% of the studied population.

5. Conclusion

The purpose of the present study was to measure the impact of decision-making quality on innovation process efficiency. In order to achieve this, a quantitative study was conducted in a group of companies that were listed on the main market of the Warsaw Stock Exchange as well as on the NewConnect market. A research questionnaire consisting of 41 questions was addressed to senior management, management, CFOs, innovation managers, and project leaders. The results indicate that decision-making efficiency and effectiveness differed throughout the innovation process. Significant time and effort were spent before a decision was made at the idea-selection stage, and this stage was crucial for the efficiency of the whole process. High efficiency at the testing stage was deemed important, as 22% of the companies represented the life science and medicine sector, where the stage lasts eight years on average.

The present results may be ultimately transformed into a managerial tool; however, further quantitative and qualitative research is needed. The conclusions in their current form may only be used as a context-specific guideline. The study targeted companies listed in Poland; therefore, expanding the spatial scope to account for other European economies is warranted. Moreover, the identification of the mediators and moderators of the studied relationship could deepen the understanding of the studied issues. Furthermore, an analysis of the reasons for the high/low decision-making quality found at specific stages of the process appears to be essential.

The study provided answers to all of the initial research questions; however, it was not free of limitations. The research protocol was rather extensive, and the questionnaire completion was time-consuming; this resulted in missing data

found in 40% of the gathered responses. Strict control over the data-gathering process in further research is necessary.

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Chapter 15

Notes On Managing Innovation: How to Deal with Challenges of Precautionary Approach

Jan Jekielek

1. Introduction

The application of precautionary approach to innovation limits the development and discourages the adoption of new solutions. This leads to slowing progress as well as undermining growth, social progress, and competition. It slows down Western economies giving an undue advantage to those nations that did not abandon a faster and less expensive technocracy.

Sustained courage drives inventors to take risks of challenging the positions of the majority that surround them (i.e., mediocrity). Mediocrity prevents and removes anxiety, while innovation wakes up reluctance if not fear of the unknown. The first major obstacle inventors usually meet is facing the administration of their inventions or innovations.

Top game-changers of our times appreciated all inventors as those who change the world and express that in many ways e.g., "if an idea at first is not absurd, there is probably nothing in it" (Einstein, 2005), "be free, be not afraid" and "when learning what exists, dig deeper into the unknown" (Frossard, 1984), „A society that puts equality before freedom will get neither. A society that puts freedom before equality will get a high degree of both" (Friedman, 1962), and "decision making is to be "sufficing" (sufficiently satisfying), i.e., good enough, not costly, trying to be perfect" (Simon, 1982).

2. Contemporary Challenges of Innovation

Innovation means change but organizations are often resistant to it; they feature 'dynamic conservatism', a preference for status quo out of the fear of uncertainty of outcomes of the change (Schön, 1973).

One of the feelings that are shared with the upper part of the animal kingdom, fear is one of the most negative factors that limits or distorts human activity.

Since the Western world generally embraces democracy by the majority i.e., the voice of an average person, it keeps drifting toward the average person perception of life that in fact merely means an unavoidable path to mediocrity. Mediocrity fears novelty.

For the purpose of a crude, but useful classification, the author places working people in three categories: 1 active (smallest group, rather silent); 2 representing (bigger group, rather laud; and 3 catalog using (the majority). For example, active engineers are doers with little patience for anything else. Representing ones are busy doing just that; representing. Some may rubberstamp superiors' wishes. Catalog users choose from catalogs (where 'catalogs' include all kinds of prescribing paperwork), leaving remaining work to the obliging suppliers.

Employed mostly as a formal or informal manager, the author happened to be rather active, but did not miss playing the other roles, including the rubberstamping part, trying to be rational with the economics of the assignments, and always maintaining the 'good enough' principle.

Since managing technology was wrestled away by administrators in the 1980's in the Western world, the engineers' active category kept getting smaller, and the catalog user group kept growing, while the complexity, timelines and costs of implementing technology kept getting bigger, inflating the business results and GDP numbers (Jekielek, 2002; 2019).

The above status quo has been self-sustaining, keeping jobs, business, and governments at reasonably satisfactory levels. It has also been welcome by some large nations that, meanwhile, gained competitive edge and experienced unprecedented growth. They did not give up on the technocracy that they keep applying to this day.

2.1. Race of nations for dominance in Science and Engineering (S&E)

America has been the world leader in science and engineering (S&E), the key factor in the wealth of nations today. In gross domestic R&D expenditure U.S. (26%) leads China (21%), followed by the EU and Japan. The global S&E share of the U.S. is declining, and China's continues to rise. Since global R&D expenditure share is in dollars, this may inflate the results for the U.S. and EU since China, Japan and India are still technocracies, where projects are done with lower costs e.g., up to 30% less (and completed on time) in the construction of a nuclear plant.

United States leads in advanced S&E research work, awarding 40,000 PhD degrees in 2019, which is ahead of China (34,000) and Russia (19,000) (Khan, Robbins & Okrent, 2020).

2.2. Silent Free Markets for the Rescue of Innovation

'Venture capital' is a high-risk investment that is typically meant to commercialize emerging (i.e., as yet unknown) technology. The U.S. leads here it with more than 50% of the global share, with China lagging at 26% and others further behind (National Science Foundation, 2020).

The U.S./China R&D expenditure split (26/21%) doubles to 50/26% when speaking about Venture capital.

The gap between the above splits can be explained by using the example of the Polish and American economies, both clearly favoring large corporations over small business. In both cases, the small group of big companies' share of the GDP is about equal to the combined share of thousands of small businesses, with the latter employing more people than the former. The answer in both cases is partly the same: a silent under the radar of media celebration, spontaneous free markets struggling with the 'obstacles of fate.'

In Poland, the silent support of innovation comes from individuals who have mastered the art of skillful, mostly legal manipulation (which was well-developed before Poland's independence). The American silent support comes from the informal but well functioning infrastructure as follows.

While thousands of venture investors are looking for risky high-return gains, tens of thousands of inventors- and innovators-to-be need a lot of money to demonstrate, prototype, or commercialize their ideas amid the doubts and disbeliefs of their surroundings. These needs have created another need to connect; therefore, thousands of intermediaries or scouts have emerged to close the loop. Also, a new class of addicted inventors who learned how to sell their technologies to hungry to demonstrate innovation corporations. Once an inventor knows the inventive path, he is prepared to start anew on some other inventions or innovations.

3. Dealing With Challenges of the Precautionary Approach

Generally, challenges of a "precautionary approach" to innovation come mostly from fears. Even the very meaning of „precautionary approach" as related to innovation carries a contradictory note of anxiety vs. courage.

Governments tend to impose rigid regulations in fear of the hypothetical harms that may occur, and to control the development and adoption of new solutions, especially when those solutions may be applied to them.

Corporations fear losing sales of old products or services that are still attractive to some. Raised from a variety of sources that provide ideological support, social pressures often amplify these fears. Government challenges

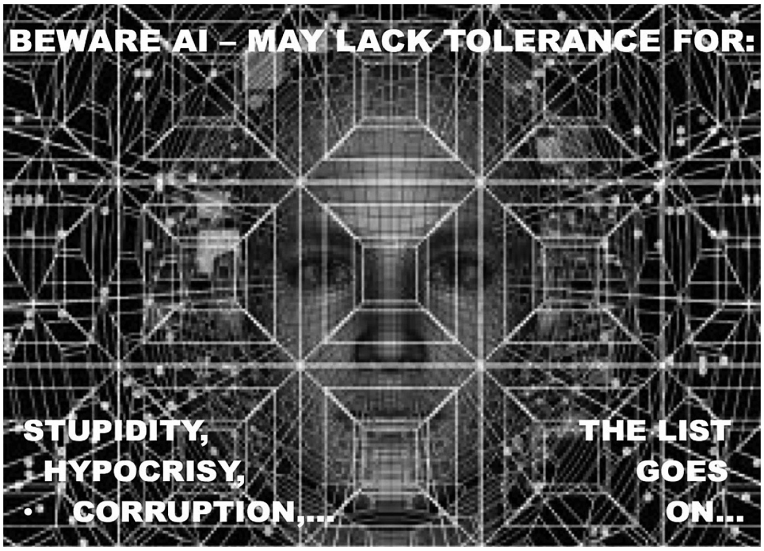
might be more powerful when combined with corporate efforts, especially while being spiced by ideological support that is often enforced by a variety of social pressures, often from both sides of the argued topics.

The effectiveness of social pressures shows up in the application of advertising for 5G networks in the U.S. and in the rest of the world, for example.

The rest of the world generally accepts 5G. Contrarily, the prospects of 5G application of a massive number of towers with multiple antennas in the densely populated cities raise protests and legal actions in the U.S., especially when installed in sensitive locations without permits (which is alleged to be quietly allowed by some local governments).

Following are briefs on three new global technologies with indications of the remaining challenges to be addressed.

3.1. AI Artificial Intelligence



Source: own study, background: Getty Images.

AI could be viewed as great "logical bulldozers" equipped with perfect memory of unlimited capacities, and insta nt learning capabilities. These sophisticated tools outperform humans in both learning and the fast processing of the unthinkingly massive amounts of data.

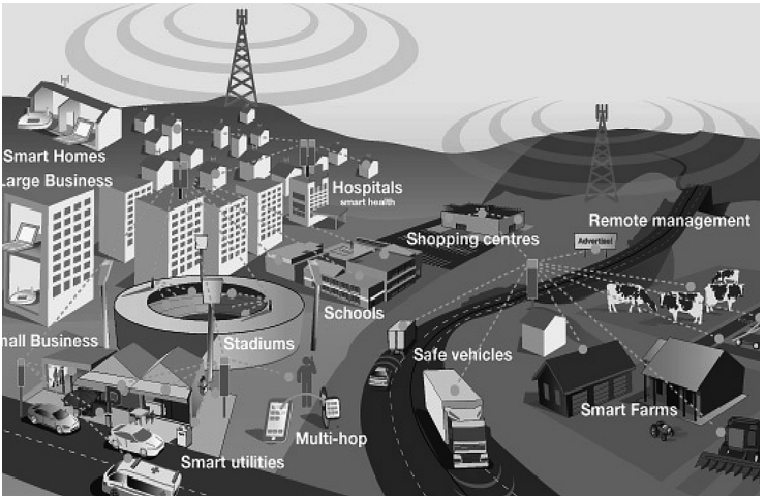
Like bulldozers, they posses neither identity nor self-awareness. They have been already used for years with great success in production technology and co-create (with human direction) the improvement of both themselves and technologies they serve.

Where true verification is forced (such as in the production of tangible assets) AI results are formidable. Production processes are forcing AI to be true after necessary corrections if any. Where AI is applied to intangible processes such as opinions, assessments, projections or computer simulations, the results are susceptible to serious errors and manipulations.

AI remaining challenge is simply the imperfection of their human handlers. These are "authors of the textbook" designers of the serviced processes, "teachers" labeling data for processing, and "assistant teachers" - statisticians setting statistics and designing presentation of the results.

AI could be taught to recognize random errors and distinguish them from repeatable manipulations, but who is to verify the verifiers?

3.2. 5G Wireless Networks



Source: (Getty Images); 5G for a community with towers: 5G central, management, and a few local

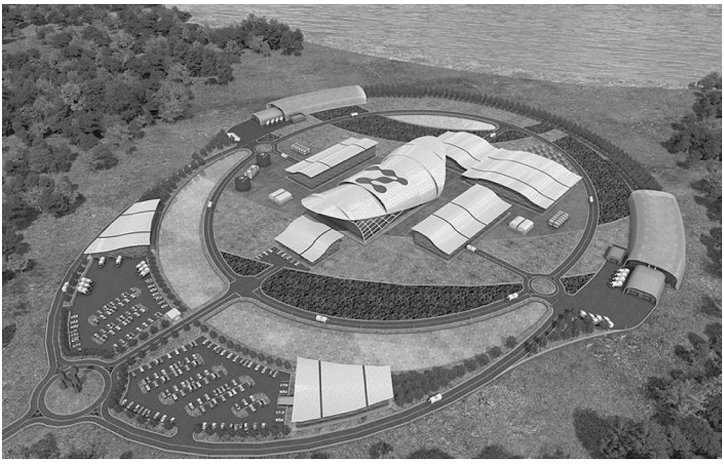
In telecommunication, 5G wireless networks are sets of the latest wireless technology superstructures also built on wireless technology layers that reach up to 40 years back. Presently, 5G's haphazard applications may be characterized as imaginary speeding trains with too many train managers.

The remaining challenges of the 5G implementations are as follows:

(a) Leveling the weaknesses of the 40-year old technology build-up: 5G extends the range of 4G (2000-2020), extends 3G coverage (2000-2010), extends 2G range (1990-2000), and extends range of 1G (1980-1990).
(b) Users' personal safety and security;
(c) User rights and liability of network owners;

(d) Limiting the chaos of mass ad-hock modifications and replacements of elements in all layers of network technology;
(e) Defining already announced G6 to settle challenges of the current chaos, and determination of scope, content and costs of further development.

3.3. Small Modular Reactors SMR



Source: NuScale Power; vision of an SMR plant of the future

SMR stands for small modular reactor, which promises a scaled down nuclear reactor to significantly limit or remove the risk of the nuclear accident, for example. They are to be of lesser complexity with huge benefit to encapsulate nuclear and generator parts in modules to be factory-built and transported to site for construction and servicing.

The modules would be stackable to expand or reduce capacity by adding or removing modules after construction.

SMR technology means the benefit of reducing the complexity, safety and cost of the nuclear plant to the level of an average chemical plant.

There is a growing need for a change of the aging centralized generation by the distributed power equivalent. New promised sources of electricity have not materialized for years. Distributing energy SMRs seems to currently be the best viable, long-awaited solution to provide electricity to remote places as well as to start the modernization and decommissioning of increasingly expensive and troublesome, centralized electricity generating stations as well as very-high voltage distribution networks.

Recently, a few suppliers started to work on prototypes of much smaller SMRs promising the further extension of the SMR range by the addition of micro-reactors.

Remaining challenges of SMR technology are as follows:

(a) Acceleration of development of partly accepted first SMR (NuScale Power) technology. Currently, several years are still needed to commercialize the first SMR (60 MW x 12 modules = 720-MW station);
(b) Accelerating development of a number of very promising micro-SMR prototypes with several new SMR technologies;
(c) Acceleration of SMR approval processes for the use as regular energy sources. SMRs are the most realistic proposals already en route in approval process.

3.4. Summary of remaining challenges

All of the challenges presented above feature either human inaction or reactive intervention as the key common issue that calls for improvement.

The AI case shows production-forced successes versus other applications that are still wide open and prone to errors and manipulation.

The 5G case demonstrates how combined business/government-funded rush may cause us to abandon the precautionary approach altogether to haphazardly create costly uncontrolled chaos and confusion that still exists with no end in sight.

The SMR case implies the possibility of a deliberate, combined government/ business slowdown applied to new breakthrough technologies that could benefit society and stimulate wellness and growth in new areas where this was unthinkable before.

3.5. Proposed Solution

The solution in the current environment (generally as well as for all three cases above) is just unassuming quiet advocacy that addresses all of the involved parties self-interests (i.e., interests of individuals, businesses, and government). This is based on an assumption that the impact of slow-noticing effects of positive actions is better then an outright rejection. In the author's experience, the impact on surrounding subordinates was noticeable in a matter of days, on the surrounding groups and departments in weeks, and on the company in months.

The proposed solution has been developed and repeatedly applied by the author with increasing success at the working group, project, and department level (both in Poland and Canada). This is based on the simple individual-centered idea of letting the individual willingly reach for his potential while functioning within a group of people. The current update is comprised of nine independent methods that have been successfully proven in private, government, and civic organizations.

The proposed methods of 'bottom-up improvement' described below were applied without any lecturing, training, nor outside interference.

4. Introduction to Bottom-up Improvement Methods

The elements of bottom-up methods have been used by the author as a natural way of managing his teams in the adverse organizational environments.

They automatically triggered spontaneous natural teamwork on projects and in organizations.

Their origin reaches to the old times of Western technocracy, when engineers were managing technology projects and enterprises, and the "engineering instinct" still ruled.

With help from the administrative personnel, managing engineers were used to operating in a freer, analog, and imperfect world with its ambiguity, mistakes and errors. This was an exciting, stimulating time with amazing solutions and quick fixes of errors.

In that world, project costs, execution time and content (including project quality) have been much better at meeting the established targets, with incomparably fewer delays and eventual major compromises that can be so often seen on digitized, over-controlled projects.

The administration of digitized projects has been focused on numbers and dates and form a driven perfect world. Yet, since the 1980s, project and construction costs, as well as cost overruns have been increasing, contributing to the inflation of GDP figures (that helped to show higher economic results) and to the acceleration of government debt.

The over-planned, over-budgeted, over-scheduled, over-controlled, and generally over-administered world had begun in the 1980's and still silently exists today, painfully demonstrated on nuclear mega-projects, for example.

Following are bottom-up improvements methods that are comprised of four 'mental' methods with some explanatory notes followed by a list of five 'agile' methods.

5. Bottom-up Improvement Methods

Mental

1. A value system-the most important starting point that allows us to view upcoming problems as challenges, and challenges as opportunities; self-determined, non-negotiable but updatable.
   It is the solid base to set limits and to allow for an instant, balanced reaction to the requirements of the changing outside world.
2. Operating principles or rules of engagement – self-determined, non-negotiable but updatable. Practical ways to act, helping us to reach decisions

that are needed to quickly resolve upcoming challenges, controversies and conflicts that always show up.

3. 'Taking control and ownership', developed and solidified in one's own mind. Accepting even poorly-formulated project as our own, allows for negotiating improvement and getting the better results.
4. Reprioritization, becomes instinctive when developed over time.
   This is the most active mental effort that must trigger action quickly, often demanding persuasive negotiation of contents and deadlines with the affected parties.

Agile

5. „Play" in action – creating a joyful work environment.
6. 'Nutshell models' (models of the essence of things) – simplified one page graphics; aids easy to use, require synthetizing ability to create.
7. Critical reflection – confronting all existing, and supplementing to prepare an all-current-aspects-covering solution.
8. Minimized compliance - to arrive at the ready for final verification a 'good enough' solution.
9. Self-organizing without infrastructure – An optional springboard from a structure of the workplace to the freedom of social activity limited only by the willingness to participate.

Those methods can be used selectively and independent of each other; they are meant to restructure and deformalize work to achieve a free atmosphere of the highest productivity, to minimize administrative tasks.

The dangers of administration were humorously demonstrated by Erich Fromm quoting his own perpetual transformations as a professor from friendly helper into ruthless machine for conducting exams (Fromm, 1979).

6. Conclusion

The application of precautionary approach to innovation leads to slowing progress as well as undermining growth, social progress, and competition. It slows down Western economies giving undue advantage to those nations that did not abandon faster and less expensive technocracy. Courage drives inventors to take the risks of challenging the positions of the majority that surrounds them (i.e., mediocrity).

The challenges of the precautionary approach to innovation come mostly from fears. The examples of artificial intelligence, 5G networks, and small modular reactors show the paramount importance of the human factor in removing negative effects of those challenges that mainly come from rigid government

regulations and actions as well as corporations slowing novelty, fearing a loss of sales of existing products or services.

Suggested solution is quiet advocacy directed to all involved parties self-interest, applying effective methods that are proven by the individual-centered, 'bottom-up improvement' successfully applied by the author, bringing benefits to individuals, groups and organizations.

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Chapter 16

Role of New Media in Shaping Relationships in E-Commerce on B2C Market[1]

Grażyna Plichta

1. Introduction

The development of modern technologies has brought about fundamental changes in the model of the functioning of commercial enterprises. It has contributed to an increase in interest in transactions concluded in virtual space, which has influenced the dynamic growth of e-commerce in Poland. The majority of entities functioning on the B2C market have started to widely use the modern communication channels that are available on the Internet, among other electronic applications, websites, etc. An increase in mobility and the possibility to commonly use new media (that is, any media having a digital form) has enabled wide and easy access to various bits of information and personalized communication of specific contents. The wide access to modern communication channels and mass use of their functionalities have opened up new opportunities for the shaping of relationships between entities on the B2C market. We can assume the thesis that a high level of activity in new media influences relationships between consumers and commercial enterprises. High activity in new media does not only concern individual consumers. In addition to single, more or less active entities, groupings of consumers also function in them, linked to each other by a network of mutual relationships and dependencies; these are called the Internet-based consumer crowds. They have the potential abilities to undertake collective actions, express opinions, suggest specific behaviors, etc., which affects e-commerce to some extent. In the context of the common use of new media, what becomes a significant problem is conceptualizing the Internet

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consumer crowd phenomenon and defining its impact on the behaviors of other market participants and the process of shaping relationships between partners to transactions in e-commerce.

The main purpose of this article is to analyze and evaluate the role of new media in shaping e-commerce relationships in the process of online transactions. This is complemented by specific objectives, which include defining consumer expectations of new media in terms of their functionality (influencing the building of relationships on the web), assessing the impact of online consumer crowds on consumer behavior and online relationship-building, indicating the values that are desired by companies and the threats resulting from the presence of crowds on the Internet in new media, and defining the role of trust in creating relationships between entities when concluding online transactions.

In order to present the issue thoroughly, the paper defines the role of new media and the consumer Internet crowds present in them in the shaping of relationships between firms and individual buyers. It also presents possibilities for using the skills and knowledge of the Internet-based crowds functioning in new media in the shaping as a source of benefits for enterprises. It also attempts to determine to role of trust in the process of shaping the network of relationships in e-commerce. The deliberations are based on theoretical assumptions and an analysis of available data.

2. Influence of new media on shaping of relationships on e-commerce

The growing mobility and related common access to new media as well as the elevated popularity of portable digital devices (smartphones, tablets, etc.) among users have contributed to the development of e-commerce. The percentage of Internet users buying online is rising dynamically – in 2019, this accounted for 62% of the totality of Internet users ("E-commerce w Polsce 2019, Gemius dla e-Commerce Polska"). According to the "Statista Digital Market Outlook" report, the Polish e-commerce market is one of the fastest growing markets in the world in terms of creativity and the use of new technologies. User penetration is currently 72.1% and is expected to reach 79.9% by 2024. In recent years, the volume of e-commerce sales has also been growing. In 2019, this accounted for PLN 50 billion, which was PLN 10 billion more than in 2018 (for comparison, this was PLN 35 billion in 2016). On the other hand, the value of the Polish market of online commerce in 2020 will amount to PLN 70 billion as estimated by experts ("E-commerce 2018" report, Interaktywnie.com).

The dynamic development of electronic commerce has arisen mainly from the fact that the number of online stores keeps going higher and higher, their offers are developing, and the number of buyers is rising. Moreover, contemporary

consumers who plan to conclude a transaction in their preferred place and time quite willingly take advantage of the functionality of digital devices. These enable them to access information about companies and their products, and they facilitate the access to offers and allow for a fast comparison. The most popular device that Poles use when buying online is still a laptop computer (74% of users), although this is a downward trend (in 2018, this was at 82%). More and more often, mobile channels are being chosen; e.g., smartphones (by means of which as many as 61% people buy) as well as tablets (27% of respondents). Also, desktop computers are still being used – 54% of respondents use them ("E-commerce w Polsce 2019, Gemius dla e-Commerce Polska" report)[2].

For e-customers, it is not only the product that is important but also the up-to-date information they receive about the consignment, the simplified procedure of a possible return of the product, and the flexibility as for the acceptance and free-of-charge return (e.g., by means of a courier or self-service terminal). Attaching importance to efficient order processing and a friendly return policy by e-customers is confirmed by the research findings presented in "Global e-commerce Logistics Market, 2018," among others. According to the "E-commerce dla Interaktywnie.com" report, Polish mobile e-consumers particularly appreciate speed (63%) and one-click payments (33%). What also counts to them is a professional-looking webpage, opinions from other customers, and the icons of the payment systems that confirm the safety of the shopping (Poradnik E-commerce IAB Polska, 2018). The findings of the "E-commerce w Polsce 2019" report show that, for a lot of consumers, it is the 24-hour-a-day availability that is important – as many as 75% of respondents indicated that this factor is the most crucial, as it guarantees independence while shopping. Digital consumers also appreciate convenient delivery methods, in the first place pointing to courier deliveries to the indicated addresses and then to self-service parcel lockers. They prefer modern payment methods (BLIK, among others), payment cards (whose details can be saved in an online store's database), fast transfers, or deferred payments.

Online shopping allows us to buy products at prices that are usually lower than can be found in traditional stores; in spite of this fact, the majority of online purchases are one-time transactions. Sellers try to deliver the desired shopping experiences to e-customers, but building relationships with them is not easy. Entities functioning on the supply side in e-commerce are aware of the fact that customers should be satisfied, as only then is it possible to build

[2] In the research process, the primary data was obtained with the use of the CAWI technique on a representative sample of more than 1,600 Internet users who were at least 15 years old. The data was gathered during the second half of April 2019.

a relationship with them and "retain them." What is very important in this aspect is the proper service at each stage of the contact with a customer (that is, before concluding a transaction, during it, and after the sale). Moreover, if it is only possible, additional value must be delivered; for example, it is necessary to enable a comparison of products in an application that is available on a seller's webpage, facilitate access to other users' ratings, etc. It is also crucial to ensure a high level of safety during the conclusion of a transaction via procedures and appropriate security systems (Kawa, 2017, pp. 286-288).

New media influences the relationships that are formed between individual entities on the B2C market. Their popularity among individuals has significantly impacted the specific empowerment of consumers; namely, a weaker party on the B2C market. Functionalities that are characteristic of new media have contributed to the growth of potential interactions between companies and consumers as well as between the consumers themselves. Individuals are present in the media practically all the time. Their activity is expressed to a great extent by the proverbial "clicking," which is not a complicated activity and does not require much effort. In a specific market situation, this means the approval of a product or its negative assessment, for example. The majority of so-called "activities" that are characteristic of e-commerce are "way less demanding" than the level of involvement necessary in a situation of concluding a transaction in the traditional manner. Moreover, each interaction between parties with the use of modern media is "marked"; that is, it leaves a trace and is visible to entities functioning within the infosphere.

Undoubtedly, the popularity of modern digital tools has contributed to the success of numerous companies that conduct commercial activity on the B2C market. Their development is also an effect of other activities – the proper recognition and addressing of the meta-needs of consumers, working on two-way communication at each stage of the contact, and cooperation focused on the conclusion of a transaction, among others. The activities undertaken assumedly aim at building relationships with customers (preferably in-depth ones). In management studies, relationships are understood as the "set of feelings, attitudes, and behaviors of two (or more) entities towards each other and the influences between them, which may be positive, negative, or indifferent" (Piwoni-Krzeszowska, 2014, p. 22). Building relationships with customers, maintaining these relationships, and enriching them are significant qualities of relationship marketing, which is an independent concept initiated by Leonard Berry (Berry 1983, p. 26; Otto, 2001, p. 46). Important elements of this concept include creating bonds with customers and fulfilling promises (Grönroos, 1997, p. 327). Moreover, it is important to gradually search for new values for individual customers, creating novelties, and common benefit-sharing according

to partnership principles (Gordon, 2000, p. 35). What is also important is what happens after concluding a transaction. According to A. Palmer and D. Bejou, it is crucial to skillfully maintain after-sales contacts (Pizło, 2008, pp. 89-98). Considering the philosophy of relationship marketing, it should be emphasized that it "pays off" much more to a company to do a lot to retain their present customers rather than incurring costs to win new ones. Building relationships is intended to lead to gaining loyalty. Achieving this is more likely when the parties (especially the stronger party) tend to be flexible in their behaviors (Synowiec, 2016, pp. 99-111).

Building a relationship with a customer in the situation of contact on a webpage is not easy. According to Doligalski, the shape of the relationship between companies and customers in the virtual world are supported by such activities as product virtualization, offer matching, the network effect, applying experience marketing, and the use of the customer lifecycle (Doligalski, 2006). Product virtualization is related to the digitalization or adding digital information to a product. This process has intensified due to the onslaught of mobile devices (e.g., smartphones). At present, customers use these more and more often (for example, to pay for purchases). Virtualization has affected the occurrence of various complementary products (e.g., search engines), whose presence in the whole customer service process has brought about the occurrence of a new arrangement of relationships between a company and a customer. Offer matching consists of its automatic adjustment to the customer's preferences without his participation (individualization) or customization; that is, the customer decides for himself about the shape of an offer (e.g., the customer chooses the delivery method and transfer of information). Without a doubt, such activities are an investment in the shape of a relationship. On the other hand, the network effect is a phenomenon that consists of the fact that consumers gain benefits (sometimes losses) arising from the possession of a given good when its popularity rises. Customer value increases (sometimes decreases) based on values provided by other consumers. This is also defined as the demand economies of scale or the external network effect. Network effects occur as a result of a presence in social media (e.g., Facebook, LinkedIn, etc.), auction sites (e.g., Allegro), or instant messengers (e.g., Skype). Joining the application by a new participant changes this participant's as well as other participants' values. An increase in the number of participants may cause an increment of value for all participants (as well as negative effects). Regardless of the character of the consequences, however, this influences the growth of the number of relationships as well as the network density. Experience marketing is based on a customer's emotions and the provision of desired experiences related to a product, owing to which it is possible to form a stronger bond between the customer and the firm. In the case

of the customer's lifecycle, it is important to skillfully use the knowledge about a customer's behaviors at individual stages of their contact with the company and conform to their needs. This enables them to attach to the customer and activate him to recommending products to others (Kawa, 2017, pp. 289-290).

Building a relationship in e-commerce is undoubtedly supported by the fact that contemporary online stores are standardized in terms of their functionality; their offers are personalized to a great extent, which influences customer experiences. In contemporary e-commerce, shopping experiences are particularly significant, as 40% of online customers choose a seller guided mostly by the positivity they gained during any previous shopping (KPMG, 2017). On the B2C market, each consumer has his own account, buys a product chosen by himself (which can be set up according to his needs), chooses a preferred method of payment, and waits for the delivery to the indicated address. In spite of the activities aimed at creating a positive experience related to a purchase, the problem is the aforementioned loyalty; there is continuous ongoing work on building this in e-commerce.

Today's e-commerce sites are trying to enter into relationships with customers, which is illustrated by activities that include offering virtual fitting rooms, scanning the interior of a flat, or recommending the appropriate cosmetics by means of an uploaded photo. E-commerce applies any novelties in the digital world, starting from tools in the form of chatbots and voice assistants and ending with fully integrated data-management platforms that manage the user's path and responds to his needs "here and now." In order to increase the level of customer loyalty, various facilities are used; among others, wish lists and shortened product lists. These lists include previously selected products or their varieties with the quantity given, which enables one to create orders based on previously processed ones (so-called order cloning). All activities potentially that are beneficial to customers (including those meant to shorten service time) impact their loyalty (Podhorecka, 2019). Gaining a customer's loyalty and, thus, making them repeat their purchases is possible when deepened relationships are built; this requires the presence of a specific trust level. The first contact of the seller and the buyer that leads to the conclusion of a transaction means that a relationship has been established that is based on rational trust and built on the basis of the information possessed (a sort of calculation and a considerable amount of risk). The realization of subsequent transactions by a customer (gaining his loyalty) means the confirmation of rational trust and the presence of factors such as soundness, reliability, and honesty that are necessary for building a seller-buyer relationship. Winning the loyalty of a customer means building trust based on affection, which releases the conviction that the seller (usually the stronger party) does not use its advantage, does not hide anything, shares information, and

cares about the mutual benefits (Miszczak, 2016, pp. 101-102). The relationship between a consumer and a firm is stronger when information transfer and communication (both formal and informal) frequently take place between them. Also, an emotional charge invested by a consumer in interactions with a company is important. A consumer who repeats shopping sends his suggestions concerning the purchased products to a company and participates in their design will be bound to the firm with a strong relationship. On the other hand, a consumer who rarely buys products or does not buy products at all but sometimes gets involved in interactions with a company (e.g., voices his opinions on the offers on its profile or on a social networking site) has weak ties with the company (Granovetter, 1973).

Building a specific shape of a relationship requires the presence of information. On the contemporary market, information is a crucial resource; therefore, along with a specific level of trust (without which, a relationship will not arise), it is important whether both parties of a relationship have access to information and whether they are inclined to share it. On all markets (also e-commerce), there is usually an asymmetry of information (that is, unequal access to it) that brings about uncertainty between the parties to a transaction and negative consequences for all market participants – also for those who have a stronger position on it (Akerlof, 1970, pp. 488-500). The limited access to information may mean that a consumer cannot check whether a given product has all the features it should have, among others – he can only trust that it does (Grudzewski et al., 2009, p. 129). In e-commerce, access to information is particularly important because e-consumers have no physical contact with a product before purchase.

Modern communication channels (which include new media) have provided the possibility of fast access to various bits of information, which has influenced an improvement in the situation of consumers (who are the weaker party on the B2C market). To obtain information, websites, electronic applications, etc. are used. They are often visually attractive, personalized, easy to use, interactive, and have advanced search possibilities. Owing to new media, we can easily search for offers, compare them, receive opinions from other participants on the market, etc. Without a doubt, this influences the decisions made by consumers and the shape of the relationships occurring between the entities (Jakubowska, 2017, p. 126). Owing to new media, an interesting method that is nowadays being used by online stores to create good relationships with customers is their presence on different platforms (blogs, Internet forums, etc.). Companies that use new media create an image of a modern firm, open to conducting a dialogue with consumers.

The available IT tools and their functionalities enable the fast exchange of information on every subject. In the case of transactions taking place in

e-commerce, this means a situation where consumers can obtain necessary information from other participants on the market and rationally make decisions about possible transactions without incurring high costs.

It should be emphasized that building relationships is a process that requires the involvement of each party, patience, and successive actions. Due to the fact that relationships are usually not permanent in the virtual world because they are often established for the needs of a single transaction, there is a necessity to undertake activities by aware managers that consist of introducing mechanisms that increase customer loyalty.

3. Consumer crowd in new media as threat and source of benefits for business – outline of problem

The common use of new media has influenced the significant growth of interactions between entities on the B2C market. The huge popularity of social media and its use to a mass scale is the reason for which groupings of consumers have started to occur within them, which as real separate entities have become able to implement collective goals. The individual consumers that make up such groupings are bound by a mutual network of different relationships and dependencies. When discussed as a network, the relationships within such groupings form with occurring interactions – this is from where their autonomy and non-intentionality come. Consumers functioning within the network of interactions intermediated by new media have a lot in common with participants of crowds. Such groupings are created by individuals who meet by accident in virtual space (e.g., on a social networking site), often do not know each other at all, and spontaneously act in the present time (the here and now). They can arise quickly and cease to exist quickly. The mentioned groupings of consumers functioning within new media are defined as the Internet-based consumer crowd (Wieczerzycki, 2015, pp. 75-76). A characteristic feature of the Internet-based consumer crowd is the fact that its participants are present in virtual space in the same electronic media and use the same or similar technical interfaces that enable mass multilateral communication. The Internet-based crowd is defined as a network of interactions, a kind of network of relationships with consumers that arises autonomously and non-intentionally to a great extent; this is understood in a similar way as researchers representing the Swedish school of the network approach defined a network (Brekke, 2004, pp. 4-5). An example of such a grouping can be programmers who did not know each other before but who managed to create an open-source operating system (Linux) by exchanging their possessed knowledge and skills.

In the literature of the subject, we can sometimes come across those who call such groupings "communities." However, the Internet-based consumer crowd should not be identified with a community because it is not a permanent entity and its participants are not bound to one another by a network of long-term relationships (among other reasons). Moreover, it is characterized by an incidental (at least partially) and short-term character. In contrast, links between entities in communities are strong and are subject to some kind of hierarchy to a great extent. If a crowd begins to focus on the future, planning, or formal structures, it turns into a community. Under some circumstances, a crowd can give rise to a community, a tribe, or publicity. On the other hand, this also can form a crowd. However, it should be emphasized that its occurrence is a response to a specific stimulus that arises outside the traditional structures and institutions of communities. The occurrence of the Internet-based crowd whose participants are members of a specific community does not mean the liquidation of their social identity but is rather a method of its manifestation.

In the classical approach, a crowd is a large but short-term assembly of individuals, usually united by common goals or ideas (Le Bon, 2010). Internet-based consumer crowds gather in every place where an exchange of opinions is possible. As a rule, these are social profiles of firms, brands, and products that function within any services available on the net (company websites, thematic discussion forums, etc.). According to C. Stage, it is publicity that is affectively united and synchronized within a specific website (Stage, 2013). As an example of a website, Stage refers to blogs and a group of an unspecified number of participants that are developed around them.

The mechanism of the formation of Internet-based crowds is related to the functioning of the market, on which the exchange of such goods as information and attention occurs. By means of a new medium, each sender of a message is the supply side of information and submits a demand for attention. On the demand side of this market, there are those who receive the message. However, due to the interactivity of new media, each party can be both the sender and the receiver, that is be on the market both on the demand and the supply side. This market is characterised by the fact that the supply of information on it is constantly growing and there is an easy access to it. Its specificity enables to derive benefits from information by any number of receivers. Moreover, if someone enters into the possession of information at the same he does not deprive the previous owner of this information (McQuail, 2007, p. 156). Potential e-consumers act in accordance with the mechanisms of the economics of attention and try to achieve the most pleasant experiences from the available information. If there is a potential to gain (e.g., attractive information will occur in a communication channel [a medium)] that is related to a company), an Internet-based crowd

may suddenly occur and will not have to consist of people who are interested in the offer, knowing the company, etc. It is important that there is a possibility of achieving positive experiences.

Firms know about the existence of Internet-based crowds and that, in some situations, can be unbeneficial to them. They are also aware of the fact that they cannot control its behaviors. In the situation when the reaction of the crowd is unfavorable to a company and it would like to "silence" or liquidate it, it is practically impossible. An attempt to liquidate the crowd (e.g., by the removal of the profile) will cause the negative emotions of the crowd to manifest in another virtual place, which can only make the situation worse. In some situations, the aggression of a crowd may be received positively; e.g., the defense of the values declared by the members of a given crowd (a so-called consumer boycott). A crowd has higher "bargaining power" than an individual consumer, which potentially gives it a greater chance of influencing a firm (e.g., in the case of a company's unethical behavior).

Internet-based crowds also have the ability to create values that are desired from the point of view of a company; therefore, firms consciously take advantage of "their wisdom." An example of a positive impact of Internet-based crowds on the activity of firms may be the phenomenon of crowdsourcing, consisting of outsourcing all types of company activities to an unspecified group of people present in the media space. Crowdsourcing is a process that uses the wisdom and potential of a crowd to solve problems or create innovative solutions. The phenomenon consists of outsourcing a task to a group (crowd) in the form of an open invitation. The role of the moderator in this process is played by new media functioning in virtual space, social media, and mobile applications, among others. Owing to these specific communication channels, it is possible to establish relationships and cooperation with a virtual community and use its wisdom to solve problems and create innovative solutions. In crowdsourcing, the significance of the crowd capital is emphasized, and it is assumed that a group can achieve and work out more benefits than a single expert (Lenart-Gansiniec, 2017, pp. 25-26). More and more often, firms consciously reach for knowledge, ideas, or opinions of groupings that function in virtual space. There are companies whose whole activity is based on such forms of cooperation (e.g., stores selling clothes designed by consumers). The Internet-based crowd decides which products will be put up for sale (e.g., by voting). There is a very similar situation when enterprises engage consumers in inventing a name for a product, choosing an optimum color, etc. Then, the crowd not only makes a choice but is also a specific intermediary between the firm and the creative individuals who submit their proposals. Crowdsourcing also gives firms huge opportunities to spread information. Owing to the fact that a crowd is actually a really huge

network of contacts, each piece of information can reach a really large number of receivers quickly and effectively. The activities within it support the firm when it wants to spread information about its product. Then, it asks representatives of the crowd to send it out among themselves. When it wants to boost the sales of its product, it turns to them to recommend it to their friends. And when it wants to promote a new product, it turns to representatives of the crowd to test it and post reviews in social media.

4. Role of trust in process of shaping relationships in e-commerce

Trust is particularly important with a market on which the unpredictable behaviors of consumers often take place; these are a result of the high pace of the development of innovations and the virtualization of transactions, among others. Trust is a necessary factor during the conclusion of transactions (Grudzewski, Hejduk, Sankowska, Wańtuchowicz, 2009, p. 15) because it reduces the time for preparing for the relationship (Rudzewicz, 2018, p. 56) and affects the quantity and quality of relationships where the customers play the role of trustees and sellers become the entities of trust (Grudzewski, Hejduk, Sankowska, Wańtuchowicz, 2007, p. 31). Trust is a multidisciplinary notion (Sztompka, 2004). A synthetic comparison of the definitions of trust can be found in papers by Sztompka (Sztompka, 2007, pp. 69-70), Grudzewski et al. (Grudzewski et al., 2009, p. 16), Wierzbiński (Wierzbiński, 2009, pp. 26-27), Sankowska (Sankowska, 2011, pp. 31-33), and Rudzewicz (Rudzewicz, 2018, pp. 58-59), among others. The substantial dimensions of trust that influence the establishment of permanent relationships between the parties of a transaction are honesty and reliability. The entity that strives for the trust of the other party must be reliable. Reliability is very important for building the good experiences of Polish customers in activities related to buying by means of electronic channels (KPMG, 2017). In addition to reliability, reputation is also crucial (Bugdol, 2010, pp. 23-30). Reputation is a kind of investment that enables us to win trust and all of the positive aspects connected with it (among other things). This is built for a long time, costs are incurred, and sacrifices are made, but it is a valuable asset that generates a "positive return" in the form of the growth of sales (Sztompka, 2007, pp. 172-173). Building reliability (and, therefore, relationships that are beneficial to both parties on the B2C market) is influenced by such activities as the reliable exchange of information between a commercial company and its buyers, the contact between a firm and a customer who is considering trust, the high quality of service, customer orientation, and the comprehensible and clear transfer of information. The presence of trust between a weaker party (the customer) and a firm means that the stronger party (the firm) should not conduct activities

that are inconsistent with the customer's interest (Plichta J., Plichta G., 2013). The presence of trust between the parties of a transaction (consumer/firm) is really desirable and particularly important in the case of online transactions. Objectively, it is difficult to build any relationships in e-commerce without the presence of trust in any contact between parties. Virtual trust often takes the form of so-called swift trust (namely, trust based on an immediate action). Its presence is necessary because it directly influences the making of a decision about an online purchase. Trust in online commerce consists mainly of building trust in a webpage, which in a way becomes the seller; therefore, it is important to win the trust of one's customers. The key aspect is the layout of the page, with effective navigation, content, quality of available information, customer data protection, and safety in the communication process (Paliszkiewicz, 2015, pp. 793-794). A problem arises when sellers themselves create store webpages that are too complicated to use, do not insert up-to-date information on the availability of goods, and have no contact details, as this creates a substantial trust barrier (Kozłowska, 2017). A low level of trust is the biggest obstacle in the development of Internet commerce, and Poles invariably have been distrustful for years. According to a CBOS study, only 34% of respondents believe that trust usually pays off, and 37% think that one should not place trust in another party. In particular, distrust is characteristic for people with low education levels and low incomes *per capita*. The higher the education and the higher the income, the more open one's attitude is towards others (CBOS, 2018).

Trust between the parties of a transaction can be built based on various activities by providing assistance free of charge in any situation and at any moment, keeping all made promises, being patient and understanding towards the customer, open to different information (including that which is unfavorable for the company), considering customer preferences, and only offering good and tried products, among others (Rudzewicz, 2018, p. 62). Building consumer trust is also fostered by the seller's professional attitude, the positive emotional relationship of the consumer with a representative of the party to the transaction, the legal and institutional protection of the consumer, the prospect of the repeatability of a transaction, and previous shopping experiences, among others (Sagan, Plichta, 2014, p. 224). At present, we can observe an increase in trust in e-commerce, which was proven by the findings of the "E-commerce w Polsce 2019" report. In the users' opinions, the image of online shopping is better and better, and shopping is getting easier and more comfortable. An important issue is the fact that trust has risen in the safety of digital payments. What also arose from the research is that comfort is absolutely crucial to present-day e-commerce users, and this is the comfort that makes them decide to shop in this form.

On the virtual market, the presence of trust between a consumer and a company is necessary. A serious challenge in e-commerce is winning the trust of consumers. To make this occur, it is the loyalty of the firm towards customers that is needed (and not the other way around). If building consumers' trust is successful, it usually leads to an increase in the frequency of transactions; in the long run, this influences the establishment of permanent relationships.

5. Conclusion

A common use of modern communication channels (namely, new media) has brought on new possibilities for building relationships between firms and e-customers. Their presence on different websites (on Internet forums, in social media, etc.) is an example of activities that are frequently undertaken today by Internet stores to build relationships with customers. Competition on the net enables prospective customers to find an optimum offer easily and fast; therefore, enterprises that conduct online activity have to do everything to build relationships and care about keeping permanent bonds with consumers. A unquestionable investment in the shape of relationships are the network effects that result from a presence on social media. Building a new shape of relationships between a company and a customer are enabled by different activities that are not available in traditional commerce, such as product virtualization, related complementary products (e.g., search engines), etc.. Their occurrence has enabled a permanent presence in the whole customer service process and, thus, has created a new arrangement of relationships on the B2C market. Moreover, offer matching (individualization or customization) as well as providing positive experiences are undoubtedly investments in the shape of the relationships. It should be emphasized that an important role in the process of building relationships in e-commerce is played by new media, as all activities supporting the shaping of relationships between a company and e-customers would not be possible to be implemented without their functionalities. It should be also stressed that the presence of trust is necessary in e-commerce, where transactions are concluded without physical contact between the parties. Its presence is crucial even in the situation of a one-time transaction, not to mention building deepened relationships and winning customer loyalty.

Based on an analysis of the literature on the subject and the available secondary data, the issues presented in the article clearly indicate the important role of new media in the process of shaping relationships in the situation of online transactions. This shows the multifaceted nature of the phenomenon that results from the dynamic development of new media. An important aspect of this problem is the need to successively obtain data on various factors that

shape relationships in the network; therefore, there is a need to conduct direct research covering each of the parties operating on the B2C market. It would undoubtedly be beneficial for companies to obtain information on customer expectations in terms of the possible and desired functionalities of new media. Therefore, further research is advisable in this respect, which will include not only an analysis of the available existing data but also primary research that enables the acquisition of quantitative data relating to research questions related to the subject matter.

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Chapter 17

Use of Social Media in Polish Film Industry Marketing

Milena Le Viet-Błaszczyk

1. Introduction

The dynamic development of technology makes it necessary for companies to adapt quickly and systematically to new ways of functioning (Grębosz, et al., 2016). Marketing specialists are, therefore, using the Internet more and more often as a powerful information and sales channel (Kotler & Keller, 2017). The effective use of technology is associated with the enormous impact of marketing on the environment and one of the phenomena associated with efficient activities is social media marketing (Mazurek, 2018). The growing importance of this discipline can be proven by the growing number of people using SM platforms; for example, 19 million active users in Poland (We Are Social & Hootsuite, 2020). In addition, SM is associated with many benefits, both for companies that conduct marketing activities there (Kos-Łabędowicz, 2013) and for the users themselves (Stelzner, 2019).

This article discusses the subject of social media in the context of the activities undertaken by Polish film productions. Polish cinematography is developing, as evidenced by the growing number of viewers in cinemas (GUS, 2019), and is being internationally recognized, as confirmed by numerous nominations for prestigious awards (imdb.com, 2020). Moreover, it is worth noting that, in reference to the research of 2018, target viewers are looking for information about films on the Internet (Kantar Millward Brown, 2018). Therefore, since the digital world is a source of information for the audience, it may also include social platforms.

Undertaking a discussion on the use of SM in the film industry is associated not only with the growing importance of these fields but also with a small number of publications concerning the topic. Articles indicate the numerous benefits that result from the implementation of SM marketing by companies (Constantinides, 2014; Erdogmus & Cicek, 2012; Lupa, 2016; Turner, 2018). The potential of social media should also be verified in relation to cinematography. However, this

topic is not yet very popular among researchers. Kerrigan points out that SM is an important element in film marketing (Kerrigan, 2017), Gębicka mentions numerous examples of the use of SM marketing in film promotion (Gębicka, 2019), as well as Oh and others, who analyze the impact of SM engagement on a film's box office (Oh et al., 2016). All of the above examples relate to American cinematography, which has a completely different character of marketing activities than Polish productions. Therefore, the results of this netnography research, which aim is to verify a relationship between the number of observers of an SM profile and the number of viewers of Polish film productions, will help fill the research gap.

2. Impact of social media marketing

2.1. Meaning and advantages of social media marketing

Social media is a form of communication that is based on websites or applications on the Internet, within a community, and created by the users of these websites (Polańska, 2011). Social media marketing, though, is a rapidly developing format of Internet marketing, which can be classified as one of the Web 2.0 trends based on a specific two-way form of communication using social media in which SM users are not only recipients but also creators of content and active participants of corporate marketing communication activities (Grębosz et al., 2016).

The main functions of social media include creating, processing, broadcasting, sharing, and receiving all visual and audio content (Lupa, 2016). For many companies, having an account on social platforms has already become a necessity (Kotler & Keller, 2017). This expanding area of marketing brings many advantages (Stelzner, 2019). Companies have the possibility to use a variety of tools to run a wide range of SM actions – publishing catchy content and photos, a broad spectrum of solutions in the Ads Manager, and finally controlling the statistics and information on fan groups. Furthermore, SM influences the following (Stelzner, 2019):

- increase in exposure;
- increase in traffic;
- generating transitions (e.g., to website);
- increase in sales.

2.2. Main Social Media Platforms

Currently, the most frequently used platforms both globally and in Poland (We Are Social and Hootsuite Report, 2020) are Facebook and Instagram.

Facebook (FB) provides the largest number of business tools (Lupa, 2016). Creating advertisements on the site is possible due to the tools available on the

site and additional Facebook applications such as Advertising Manager or Creator Studio. Due to the active communication efforts on this platform, companies can achieve various goals, including brand image, sales, employer branding, generating traffic, optimizing the customer service process, educational, and research (Iab Poland, 2020):

Using FB's features gives companies the opportunity to reach a wide audience – it has 1.95 billion active accounts worldwide, including about 16 million in Poland (which represents 89% of Polish accounts on social media platforms). Among Polish FB users, there are 53.4% women and 46.6% men. Moreover, 96.2% of users use Facebook with their smartphones.

Instagram (IG) is the second very popular social platform. Its character differs in many ways from the one discussed previously. Instagram is based on instant ephemeral content (especially on the visual side). Brands communicate here by using photos and videos, which should be both natural and of a very high quality. Businesses have the opportunity to use Instagram for awareness-raising, building customer relations, generating traffic, and sales (Iab Poland, 2019).

With Instagram, it is possible to reach 7.30 million people in Poland, including 58.3% of the women and 41.7% of the men (Hootsuite, We Are Social, 2020). The main assumption when creating content for this platform is to adjust the content for smartphone viewing (Iab Poland, 2019).

2.3. Performance measurement in social media

Monitoring, which is the observation of progress in achieving objectives, plays an important role in the whole field of management (Griffin, 2004) and, therefore, also in the marketing industry. Each product, operation, and activity should be tested and even considered as a proposal for new solutions (Drucker, 1963). The control process includes the following (Griffin, 2004):

- setting standards;
- measuring results;
- comparing results with standards;
- establishing need for corrective action.

The effectiveness analysis of marketing activities in social media can be performed in many different ways. The starting point for such an evaluation should be the very definition of effectiveness. Referring to Pudełkiewicz, this is the achievement of the desired effects on the market that are related to the objectives set by the management of the company and that express the efficiency of action in terms of approaching the intended goal (Pudełkiewicz, 2004). Thus, if a company's marketing activity in SM brings the company closer to its objectives, then it can be said to be effective (Lupa, 2016). Referring to

Bartholomew's model and its interpretation by Kozielski & Miotk, the following indicators may be measured in social media (Kozielski & Miotk, 2016):

- exposure – audience of marketing communication;
- engagement – fan reactions, comments, or other interactions;
- share of voice – brand mentions;
- impact among the category – brand mentions among product category;
- ROI – return on investment in SM activities;
- Net Promoter Score (NPS) – relationship between recommendations and criticisms;
- active followers – people who build positive brand image in SM.

Results in social media are often measured by using tools offered by social platforms as well as external solutions. One of the basic measured indicators is the number of people observing a profile, which refers to the exposure of the profile (Kozielski & Miotk, 2016). The number of observers determines the number of people who have expressed interest in a given profile by clicking the "Like" or "Follow" buttons. In practice, this is connected with the fact that people observing the profile automatically become organic potential organic recipients of all content published by the brand on the profile, for instance. The number of followers is also important in gaining a brand's competitive advantage. This is because rankings of leading companies in the field of social media marketing are made by taking the number of followers into consideration. This indicator is also connected with the further analysis of other SM results.

3. Polish cinematography characteristics

The system of audiovisual production is a very specific industry, combining business and artistic activities (Gębicka, 2019). Polish cinematography is popular and appreciated globally. This is evidenced by the presence of Polish cinematography among the nominations of the American Film Academy (Oscars), which is one of the most important events for the world's cinema (Hendrykowski, 1993). It is Hollywood where trends for cinematography around the world are set (Adamczak, 2010). Thus far, Poland has received 12 Oscar nominations in the category "Best Foreign Language Film." The popularity of the film industry in Poland is usually evidenced by the box office rankings, expressing the number of viewers and/or income of films (Wróblewska, 2016). As far as the Polish film market is concerned, the results of Kantar Millward Brown's report are significant; it indicates that every second viewer goes to the cinema at least once a month, 98% of cinema audiences use the Internet, and it is the most important medium when deciding which film to go to at the cinema. At the same time, however, only 3% of respondents declare that the place to look for information about

a film is Facebook (Kantar Millward Brown, 2018). The film market in Poland is growing (Polish National Film Institute, 2019). In 2019, there were 60.2 million viewers in cinemas (filmweb.pl) who bought tickets for PLN 1.13 billion in total. Among the ten most-watched films, there were four Polish productions, which received a total of 7.12 million tickets sold (cyfrowa.rp.pl, 2020).

Film marketing is rarely the subject of research nor the subject of social media marketing on the film market. In recent years, researchers and experts are beginning to see the potential benefits of using SM in the marketing of foreign films (Gębicka, 2019; Kerrigan, 2016; Oh et al., 2016). Meanwhile, the positive influence of social media on the marketing of enterprises is being noticed in Poland. Therefore, there is a high probability of the positive use of SM in the field of Polish cinematography. However, the previously presented data shows that, thus far, Facebook has been a source of information about productions to only a small extent (Kantar Millward Brown, 2016). This is probably caused by the fact that Polish productions have not made full use of SM marketing possibilities yet (some of the productions have not used them at all). This topic is developed further in the article.

4. Research methodology, objectives, and results

In reference to the conducted desk research and its key information presented in the previous part of the article, it has been assumed that one of the main indicators influencing the results of SM is the number of observers. As far as the success of a film is concerned, it can be expressed by the number of cinema viewers, for example. Therefore, this article assumes a hypothesis that there is a relationship between the number of observers of an SM profile and the number of viewers of Polish film productions.

The study was based on the netnography method (Kozinets, 2012). First of all, there was a verification of which Polish feature film productions from 2018 and 2019 had a profile on social media, specifically on the two most popular platforms (i.e., FB and IG). The research was focused on productions made during the last two years, which was caused by increasing the use of SM in 2018 and 2019. Thus, the sample included 115 films. Then, the data on the number of observers was compared to the number of film viewers. For research purposes, it was decided to take the number of viewers from the opening weekend of each production into account. All feature films that had had their premieres by February 2020 at the latest (sfp.org.pl, 2020) were included on the list. The details are specified in Table 1.

Table 1. Results of Polish films produced in 2018 and 2019

Film title*	Genre	FB followers	IG followers	Weekend audiences
(Nie) znajomi	drama, comedy	6,098	3,075	658,693
#Jestem M. Misfit	comedy	-	-	202,452
1800 gramów	drama	-	-	422,710
Bad Boy	action	-	-	155,627
Boże Ciało (Corpus Christi)	drama	9,868	-	1,363,031
Broad Peak	drama	909	1,170	-
Całe szczęście	romantic comedy	6,081	358	484,745
Ciemno, prawie noc (Dark, Almost Night)	crime, thriller	7,091	636	148,913
Czarny Mercedes (Black Mercedes)	crime, action	-	-	42,981
Dariusz	drama	-	-	-
Dolina Bogów (Valley of the Gods)	fantasy	1,101	174	-
Futro z misia	drama	1,881	1,352	144,130
Ikar. Legenda Mietka Kosza	drama	1,306	396	82,591
Eastern	drama	467	-	-
Fighter	sport	4,675	800	66,094
Interior	drama	-	-	-
Jak poślubić milionera	romantic comedy	10,314	-	200,997
Jak zostałem gangsterem	action	1,996	-	258,265
KobietyMafii 2 (Women of Mafia 2)	action	3,077	-	1,144,606
Kurier (The Messenger)	drama, action	3,427	341	501,466
Legiony	drama, war	8,017	-	471,287
Letnie popołudnie (One Summer Afternoon)	drama	551	446	244,970
Mayday	comedy	1,503	360	174,889
Miłość i miłosierdzie (Faustina: Love and Mercy)	drama	7,282	6,708	244,970
Misz masz czyli Kogel Mogel 3	comedy	30,280	15,088	2,389,082
Mowa ptaków (Bird Talk)	drama	2,328	-	23,032
Na bank sięuda	criminal comedy	635	-	285,296
Nic nieginie (Nothing is Lost)	drama	1,010	-	-
Obywatel Jones. (Mr. Jones)	biography, drama	2,116	70	117,636
Pan T. (Mister T.)	drama, comedy	2,179	-	28,513
Piłsudski (Pilsudski)	history	2,218	509	354,789
Planeta Singli 3	romantic comedy	90,068	8,664	1,436,947
Polityka	political	1,635	-	1,890,172
Proceder – producer SM profile	drama	24,486	10,066	516,269
Serce do walki	action	2,693	-	-

* If the producer provided the title in English, it is given in brackets

Film title*	Genre	FB followers	IG followers	Weekend audiences
Sługi wojny	action	-	-	26,426
Smak pho (The Taste of Pho)	drama	-	-	-
Solid gold	thriller	32	125	-
Supernova	drama	2,905	-	12,435
Swingersi	romantic comedy	6,972	840	141,201
Ukryta gra (The Coldest Game)	thriller	1,772	736	184,976
Underdog	sport	11,796	9,794	904,785
Władcyprzygód. Stąd do oblivio (Rock'n'Roll Eddie)	family	242	50	34,685
Wszystko dla mojej matki (All for My Mother)	drama	61	-	-
Żelazny most (The Iron Bridge)	drama	51	-	-
303. Bitwa o Anglię	war, drama	1,495	151	411,178
53 wojny (53 Wars)	drama, romance	971	-	34,614
7 uczuć	drama	-	-	866,676
Ajka (Ayka)	drama	1	-	-
Atak paniki	comedy	4,808	886	188,974
Autsajder	drama	-	-	-
Córka trenera	drama	1,993	364	35,172
Diabo. Wyścig o wszystko	action, romance	58,784	-	-
Dowłatow (Dovlatov)	biography, drama	413	-	-
Dywizjon 303. Historia prawdziwa.	drama, war	-	-	1,526,128
Dzień czekolady	family	872	10	52,243
Dziura w głowie	drama	405		-
Eter	drama	-	-	16,776
Exterminator. Gotowi na wszystko	comedy	2,700	-	376,864
Fuga	drama	-	-	72,831
High Life	drama, horror	5,403	2,695	-
I odpuść nam nasze długi (Rimetti a noi i nostri debiti)	drama	240	-	-
Jak pies z kotem	drama	-	-	54,412
Juliusz	comedy	2,101	765	395,847
Kamerdyner (The Butler)	drama, romance	7,079	-	434,131
Kantor. Nigdy tu już nie powrócę	biography	-	-	-
Katyń – ostatni świadek	history, thriller	-	-	26,393
Kawki na drodze (Winter Flies)	comedy, drama	1,072	-	-
Kler (Clergy)	drama, thriller	1,832	-	5,202,471
Kobieta sukcesu	romantic comedy	12,139	1,570	390,845
Kobiety mafii	action	6,690	-	2,037,411
Krew Boga (The Mute)	history	1,084	-	-
Litość (Pity)	drama	1,463	-	-
Miłość jest wszystkim	comedy	9,299	1,939	620,403

Film title*	Genre	FB followers	IG followers	Weekend audiences
Moja polska dziewczyna (My Friend the Polish Girl)	drama	320	-	-
Monument	drama	1,179	-	12,332
Narzeczony na niby	romance, comedy	-	-	1,127,269
Nina	drama	3,035	840	-
Odnajdę Cię	thriller, crime	358	-	46,089
Pech to nie grzech	Romantic comedy	-	-	407,916
Pitbull. Ostatni pies	action	55,513	-	1,014,213
Plan B	drama, comedy	1,483	-	311,327
Planeta singli 2	romantic comedy	87,799	8,663	1,696,653
Pomiędzy słowami	drama	-	-	23,556
Podatek od miłości	romantic comedy	2,529	-	1,044,687
Powrót	drama	736	-	1,100
Prawdziwa historia	thriller, drama	-	-	62,449
Serce nie sługa	romantic comedy	7,911	-	598,773
Słodki koniec dnia	drama	-	-	-
Sobibór	war, drama	5,967	2,013	13,776
Twarz	drama	-	-	194,944
Ułaskawienie	drama	919	-	15,124
Via Carpatia	drama	721	-	-
W cieniu drzewa	drama, comedy	-	-	21,034
Wieża. Jasny dzień (Tower. A Bright Day)	drama, mystery	2,034		23,200
Wilkołak	history	1,167	-	8,870
Zabawa zabawa	drama, comedy	16	-	448,602
Zimna wojna (Cold War)	drama	13,005	6,764	1,042,578
Żniwa (The Harvesters)	drama	4,142	-	-

Source: own elaboration based on data from PISF (pisf.pl, 2020), SFP (sfp.org.pl, 2020), imdb.com, & filmweb.pl (2020)

The table includes 115 films; of these, 80% (92 films) have an FB profile, and only 30% (34 films) have an Instagram profile. Productions that did not use SM are designated as "-" above. The information on the lack of data on the number of viewers was determined in the same way. Due to the low percentage of Instagram profiles, this platform was excluded from any further research conducted for the purpose of this article. Analyzing the Facebook profiles, it could be seen that some of them did not contain any posts (or just a very small number). To make sure that an FB profile was one of the elements of a planned marketing strategy, profiles with a small number of followers (fewer than 2,000) were excluded from the study. In order to verify the relationship between the number of film viewers and the number of observers, the selected data was collated and marked on a correlation chart (Figure 1).

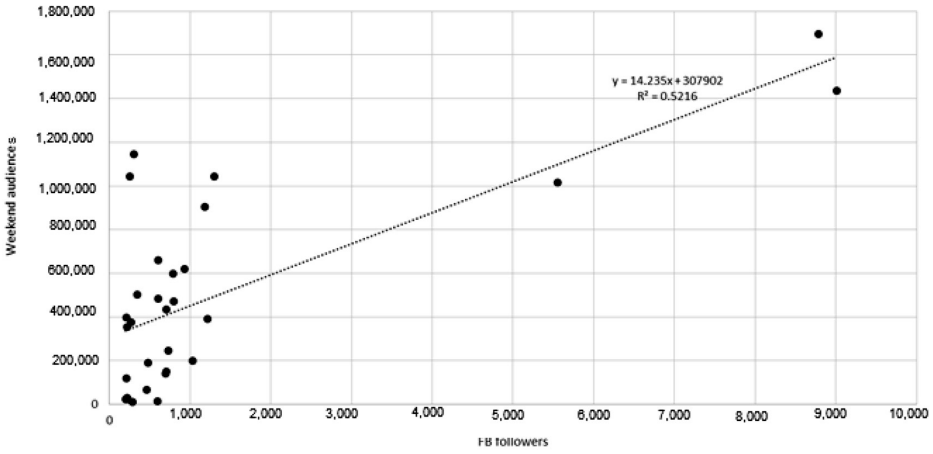

Figure 1. Weekend audiences vs FB followers of Polish films produced in 2018 and 2019
Source: own elaboration, 2020.

The data in the chart presents a growing trend line – the higher the number of people viewing the Facebook profile, the higher the number of cinema viewers. Additionally, the factor of determination was calculated for the presented data (Aczel, 2017).

In the case of the viewers' dependence on the number of followers, it was calculated that the value of the determination factor was 0.5216. Therefore, with reference to the interpretation used (Aczel, 2017), this value can be considered to be satisfactory – showing a match. At the same time, however, it is worth taking into account that errors may occur in the forecasting (a lower probability of error occurs with values above 0.8). Thus, the research hypothesis that there is a correlation between the number of people viewing SM and the number of viewers in Poland can be considered to be partially verified.

However, the conducted analysis was associated with some limitations. First of all, only those film productions about which information was included in the lists of credible portals were taken into account; that is, those from the Polish Film Institute (PISF) and the Polish Filmmakers Association (SFP) websites. Another limiting factor was the low number of Polish film productions in social media, which made it impossible to provide research with more data.

5. Conclusions and recommendations for future research

Social media is a technology that is more and more often used in the marketing of Polish and foreign companies. Film productions are also beginning

to see the potential of SM. The research conducted for the purposes of this article confirmed the correlation of film results on the use of social media. However, due to a number of limitations, it cannot be clearly predicted that the success of a film is dependent on the number of followers of Facebook profiles. Film marketing is a set of different activities, and its results can be measured in many different ways. The indication for future research is to extend it with other factors and indicators that are related to both film and social media results. For example, researchers can measure the correlation between SM engagement and film production income or between SM sentiment and the number of festival nominations of films. Moreover, due to the low use of SM by Polish films, the research should be extended by verifying the trend that concerns not only Polish productions but also foreign ones. Due to the unique characteristics of the film industry, the research may also include interviews with those professionals responsible for film marketing.

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Chapter 18

Critical Analysis of Blockchain as Basis for Implementing Business Information Systems

Daniel Wilusz

1. Introduction

The growing popularity of the Bitcoin – a blockchain database system and cryptocurrency – has led computer scientists and business people to focus on blockchain database systems as a basis for implementing business information systems. The proposed blockchain application area is very broad and includes supply-chain monitoring, distributed financial ledgers, file storage, instant messaging, car sharing, etc.

The purpose of this study is to identify the properties of blockchain database systems in order to assess their application in solving business problems. An evaluation of blockchain database systems reveals their inefficiencies and contradictions between the technical assumptions of blockchains and the business objectives of blockchain applications. A critical analysis of the Bitcoin system that was carried out using a formal model of a distributed blockchain database system revealed the shortcomings of blockchain database applications in such aspects as efficiency, security, and data consistency.

In Section 2, a formal model of a blockchain database system is proposed in order to enable an evaluation of blockchain database systems. Section 3 defines and discusses the mechanisms that solve the problem of distributed blockchain database inconsistency. A critical analysis of the Bitcoin database system is provided in Section 4. Section 5 concludes the study by pointing out the contradictions in the technical assumptions of blockchain database systems and highlighting alternative database systems that can meet business requirements better than blockchains.

2. Model of blockchain database system

This section explains and formally defines the main terms of a blockchain database system. Subsection 2.1 provides a formal definition and explains the

properties of blockchains. Subsection 2.2 defines and explains the characteristics of a blockchain database system.

2.1. Blockchain as data structure

The use of the term "blockchain" is quite ambiguous. A blockchain is defined in various ways in the literature. Some authors perceive a blockchain as a data structure (Antonopoulos, 2017, p. 195), and others view it as a database (Raval, 2016, p. 2), a ledger (Dhillon et al., 2017, p. 4), or even (more broadly) as a technology layer (Swan, 2015, p. 1). As different definitions of blockchains lead to different understandings of this concept, there is a need for a clear and universal definition of a blockchain. Before presenting the actual definition of a blockchain, a few computer science concepts must be introduced.

The first concept that is required to define a blockchain is a data structure called a linked list. A linked list is an ordered set of nodes where each node consists of two elements – data and a link. This link is used to order the nodes in a set by indicating the next node in the linked list for each node except the last one, where the link is empty (Bhasin, 2015, p. 82). The second concept required to introduce the blockchain definition is the hash function. The hash function is a one-way function that, from arbitrary-length input, efficiently computes the fixed-length output of the following properties (Paar & Pelzl, 2009, pp. 293-303, Preneel B., 2011):

1. Preimage resistance – knowing any output *out* of hash function *H*, it is computationally infeasible[1] to find input *in* such that $H(in) = out$;
2. Second preimage resistance – knowing the input in_1 and output of the hash function, it is computationally infeasible to find other input $in_2 \neq in_1$ such that $H(in_1) = H(in_2)$;
3. Collision resistance – it is computationally infeasible to find any pair of inputs in_1 and $in_2 \neq in_1$ such that $H(in_1) = H(in_2)$.

Plenty of hash functions exist (such as those advised for secure use in information systems such as SHA-1 or SHA3-512) and are specified by the National Institute of Standards and Technology (FIPS PUB 180-4, 2015, pp. 10-27; FIPS PUB 202, 2015, pp. 2-22).

The formal definition of a blockchain presented in this study generalizes the Bitcoin blockchain definition proposed by Antonopoulos (2017, p. 195). According to the author, a blockchain is a "back-linked list of blocks of transactions." In this study, blockchain *BC* is defined as ordered set of *n* blocks B_i where $i > 0$ and $i <= n$; formally, $BC:\{B_1,\ldots, B_n\}$. Each block B_i consists of two elements – reference rf_i and content ct_i; formally, $B_i=(rf_i, ct_i)$. Reference

[1] The problem is computationally infeasible if the best-known algorithm to solve this problem is so computationally intensive that it cannot be solved in any reasonable amount of time (Paar & Pelzl, 2009, p. 153)

rf_i is used to order the blocks in a blockchain by indicating the previous block B_{i-1} for each block in the blockchain except for the first B_1, where the reference is empty ($rf_1 = null$). The first block (B_1) is called the genesis block; formally, $B_1=(ct_1, null)$. The reference is calculated by executing the hash function over the content of the previous block. Let m denote the ordering number of B_i such that $m > 1$ and $m <= n$; then, the reference of the *m-th* block (rf_m) indicates the *(m-1)th* block and is calculated by taking the whole *(m-1)th* block (B_{m-1}) (both the reference rf_{m-1} and content ct_{m-1}) as an input of the hash function: $rf_m = H(B_{m-1})$. The content ct_i of block B_i is any data.

Since rf_m is calculated with the use of the hash function over B_{m-1}, then any change of B_{m-1} (both of rf_{m-1} and ct_{m-1}) results in a change of rf_m due to the second preimage resistance property of the hash function. Consequently, a change in rf_m will result in a change in rf_{m+1} and so on until rf_n. This regularity leads to the conclusion that a change in any block in the blockchain forces a reference update in all subsequent blocks. Since the output of the hash function is efficiently computed, the change of references can be performed in a reasonable time even for thousands of blocks (within a few hours)[2]. The construction of the references causes that the blockchain is self-verifying. This property is meant to verify the consistency of each block B_k (where $k > 0$ and $k < n$) by comparing the output of the hash function, taking B_k as the input with the reference of the next block $rf_{k+1} = H(B_k)$.

2.2. Blockchain database systems

Considerations on database systems require a definition of the database and database management system. Elmasri & Navathe (2011, p. 4) define database *DB* as a set of *n*-related data dt_i (formally, $DB:\{dt_1,\ldots,dt_n\}$) that (1) reflects some aspects of the real world, (2) includes logically coherent data, and (3) exists for a specific purpose. A database management system (*DBMS*) is a set of software that facilitates the management of a database; e.g., defining, constructing, manipulating, and sharing databases among users and applications (Elmasri & Navathe, 2011, p. 5; Foster & Godbole, 2016, p. 3). The database system consists of a database and a *DBMS* (Elmasri & Navathe, 2011, p. 6).

In this study, a blockchain database is defined as a database that stores data in a blockchain. The blockchain database inherits the properties of the blockchain:

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[2] The calculation of one hash output of a 4-MB large random data block with an SHA3-256 hash function takes 25 ms on average. Thus, the calculation of 100,000 references (40 GB of total size of the input data) would take about 42 min. The above estimation has been calculated on the basis of own Java implementation of software designed to test the performance of hash functions available in a standard Java library. The software has been executed in OpenJDK 13.0.2 on a personal computer equipped with an Intel Core i5-8250U CPU and 8 GB RAM operating under the control of Windows 10.

self-verification, and the need for reference updates after introducing changes to any block except the last one. A blockchain database management system is a set of software that facilitates the management of a blockchain database[3]. A blockchain database system consists of a blockchain database and a blockchain database management system.

The database systems can be centralized or distributed. According to the definition provided by Connolly & Begg (2005, p. 687), a centralized database system consists of a single logical database located at one site under the control of a single *DBMS*. Let fragment fr_i denote the subset of the database (formally, $fr_i \subseteq DB$); then, the distributed database (*DDB*) is a set of *n* fragments (formally, $DDB : \{fr_1, \ldots, fr_n\}$) that are distributed over a computer network and controlled by a separate *DBMS* such that $(fr_1 \cdots \cup fr_n) = DB$ (Connolly & Begg, 2005, p. 689). Let DBN_i denote a database node, which is a pair of fragment fr_i and $DBMS_i$; formally, $DBN_i = (fr_i, DBMS_i)$. Then, the distributed database system (*DDBS*) is a set of *n* database nodes (formally, $DDBS :\{DBN_1, \ldots, DBN_n\}$).

Distributed database systems can be homogeneous or heterogeneous. The database nodes of a homogeneous distributed database system use the same *DBMS* for managing each fragment (Connolly & Begg, 2005, p. 697); formally, for any database nodes DBN_1 and DBN_2 such that $DBN_1 \neq DBN_2$, the following property holds: $DBMS_1 = DBMS_2$. In a heterogeneous distributed database system, at least two database nodes exist ($DBN_1 \neq DBN_2$) that use different database management systems ($DBMS_1 \neq DBMS_2$) (Connolly & Begg, 2005, p. 697).

3. Consistency of distributed blockchain database system

The data in a distributed database may become inconsistent when discrepancies occur within the data stored by the database nodes (Fekete, 2018). A distributed blockchain database is consistent if the sum of the fragments from all database nodes produces a blockchain database where, for each block B_k ($k > 0$ and $k < n$), property $rf_{k+1} = H(B_k)$ is satisfied and, for each pair of distinct blocks B_a and B_b, their references rf_a and rf_b indicate different blocks (formally, $rf_a \neq rf_b$).

A lot of new data is sent to different blockchain database nodes. To maintain database consistency, the blockchain database nodes need to agree on the content of each new block appended to the blockchain (Singhal et al., 2018, p. 130); thus, a distributed consensus mechanism must be implemented in the *DBMS*. The different consensus mechanisms are presented and formally defined in the next subsection.

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[3] The Bitcore (Antonopoulos, 2017, pp. 343-345) is an example of a blockchain database management system managing Bitcoin databases.

3.1. Proof of work

A proof-of-work is a consensus mechanism that requires some amount of work before a new block can be attached to a blockchain (Singhal et al., 2018, pp. 131-133). A work verification mechanism in a distributed blockchain database system should also exist that allows for verification if the work had been done over a block before attaching it to the blockchain. Let PB_i denote the proven block that is a block that includes proof-of-work pow_i in its content; formally, $PB_i = (rf_i, ctp_i)$, where $ctp_i = (pow_i, data_i)$. Let W denote a work function such that, for any block Bi, it outputs proven block PB_i; formally, $W(Bi) = BP_i$. Let V denote a proven block verification function such that, for any proven block PB_i, it returns *true*, and for any other data, it returns *false*; formally, $V(PB_i) = true$. The work function aims to diminish the number of blocks proposed by blockchain database nodes for inclusion into the blockchain; thus, W should be characterized by high time complexity (e.g., exponential time). A proven block verification function aims to enable fast determination if the work over a block has been done; thus, V should be characterized by low time complexity (e.g., linear time).

The following properties of the proof-of-work mechanism cause that the modification of the data stored in the distributed blockchain database system is computationally complex: (1) the work function is characterized by high time complexity, (2) each proven block is required to include pow_i, (3) a change of any block in the blockchain forces a reference update in all subsequent blocks. The computational complexity of the data modification increases proportionally to the distance of the block from the last block. Let *dst* denote the distance between blocks, let m denote the ordering number of block B_i, and let n denote the number of blocks in the blockchain; then, the distance between B_m and B_n is $dst = (n-m)$. Depending on the specific implementation of the proof-of-work mechanism, such a distance *dstif* for which the modification of the *m-th* block is computationally infeasible may be distinguished. The larger the computational power of a blockchain database node, the bigger the *dstif*; thus, the number of blocks that may be modified by the blockchain database node depends on its computational power. Moreover, the greater the computational power of a blockchain database node, the shorter the execution time of the work function. This leads to the conclusion that the proof-of-work mechanism is not "democratic" but rather "oligarchic".

3.2. Proof of stake

A proof-of-stake is a consensus mechanism that requires a blockchain database node to risk some stake if the block committed by this node to other blockchain database nodes will lead to database inconsistency (Antonopoulos

& Wood, 2018, pp. 320-321; Dhillon et al., 2017, p. 14; Singhal et al., 2018, pp. 133-134). Let us define stake sta_i as something valuable to the blockchain database node that can be measured by some units (e.g., cryptocurrency). Let E denote an efficient election function that outputs one blockchain database node from set of blockchain database nodes $BDN:\{BDN_1, \ldots, BDN_n\}$ (formally, $E() = BDN_e$). Let sst denote the sum of all of the stakes possessed by blockchain database nodes $sst = \Sigma \{sta_1,\ldots, sta_n\}$; then, the probability P of choosing BDN_i by E is $P(BDN_i) = sta_i / sst$. The elected BDN_e includes the obligation in the submitted block B_s, which will enable any other BDN_i to deprive BDN_e of its stake if B_s transits the blockchain database to the inconsistent state; otherwise, BDN_e may be rewarded with an increase in the stake. As the election function is efficient (contrary to the work function), appending a new block to the blockchain is independent of the nodes' computing power. However, as the probability of being chosen by E differs among the blockchain's database nodes, the proof-of-stake mechanism is not "democratic." Depending on the implementation (e.g., using a blockchain intrinsic stake), gaining a stake advantage by a blockchain database node under the proof-of-stake may be more difficult than in the case of the proof-of-work.

4. Critical analysis of Bitcoin as distributed blockchain database

This section provides a formal analysis of the Bitcoin database system. Subsection 4.1 explains and analyzes Bitcoin's proof-of-work, Subsection 4.2 discusses the blockchain forks, Bitcoin's hard forks are explained in Subsection 4.3., and Bitcoin's security issues are covered in Subsection 4.4.

4.1. Bitcoin proof of work

In the description of Bitcoin's proof-of-work, Nakamoto (2008) proposed the use of the hash function for both the work- and block-verification function. Let ctb_i denote the content of Bitcoin block candidate BBC_i such that $ctb_i = (nonce_i, data_i)$, where $nonce_i$ is potential proof-of-work. Bitcoin block work function BW checks for each $nonce_i$ from the nonce set if the number of consecutive zero bits at the beginning of the hash function output (calculated by taking the Bitcoin block candidate as input) is higher than or equal to the target number of bits tb. Let LBC denote the leading zero bit count function that takes any data as input and returns the number of leading zero bits lzb as output. Then, if $LBC(H(BBC_i)) \geq tb$, then BW outputs proven Bitcoin block $PBBi$; otherwise, the Bitcoin work function takes another $nonce$ from the nonce set and repeats the check. Bitcoin verification function BV applies the hash function to the content of BBC_i and uses LBC to check the number of consecutive zero bits at the beginning of the

hash function output. If the number is higher than or equal to the target number of bits *tb* agreed by the Bitcoin database nodes, then the Bitcoin block is accepted by the Bitcoin database nodes and appended to the blockchain. The value of the target number of bits *tb* is set to force average Bitcoin work function execution time *abwt* to amount to about ten minutes. If *abwt* exceeds ten minutes, then *tb* is decreased; if *abwt* is less than ten minutes, then *tb* is increased by the Bitcoin database nodes (Antonopoulos, 2017, pp. 228-237).

Due to the above-described rule, any increase or decrease in the total computational power of Bitcoin database nodes will not affect the average time after which a new block is appended to the Bitcoin blockchain. This property of the Bitcoin database system prevents its scalability and makes it inefficient. A comparison between Bitcoin and Visa reveals how severe the Bitcoin scalability problem is and the reason why Bitcoin (or any other Bitcoin-like blockchain database system) cannot be the basis for a universal global payment system due to its computational complexity (not only in terms of time but also space). According to Poon & Dryja (2016), if Bitcoin achieves a volume of transactions that is similar to Visa's, one block would be 8 GB, and more than 400 TB of transaction data would be generated per day. In such a situation, only datacenters would be able to host blockchain database nodes that are handling such a huge amount of data. As a result of the severe Bitcoin scalability issues, a part of the Bitcoin database nodes changed the rules of their *DBMS* on August 1, 2017, in order to store more data in one block, thus creating a new blockchain database system called BitcoinCash (Frankenfield, 2018). The inefficiency of Bitcoin resulting from the proof-of-work algorithm causes that the total energy consumed by Bitcoin database nodes is similar to the energy consumption of Ireland (Robitzski, 2018).

4.2. Bitcoin blockchain forks

The Bitcoin database system (*BitDBS*) consists of thousands of Bitcoin database nodes; formally, $BitDBS: \{BitDBN_1, \ldots, BitDBN_n\}$ (North M., 2019). Thus, it is impossible for any $BitDBN_i$ to have open network connections with all other Bitcoin database nodes. Each Bitcoin database node has an upper bound limit of peer Bitcoin database nodes set in advance. Moreover, the information does not spread immediately across the Bitcoin network, so some delays may happen. The above-mentioned issues related to the computer network constitute the significant drawback of the Bitcoin peer-to-peer network. Due to the network delays, different proven Bitcoin blocks ($BitPB_a, \ldots, BitPB_z$, such that $BitPB_a \neq \ldots \neq BitPB_z$ and $a = \ldots = z$) may arrive at different Bitcoin database nodes within a narrow time frame. As a result, each $BitDBN_i$ appends the proven block that arrived first to its own Bitcoin database fragment. Such a situation leads to the

temporary inconsistency of the Bitcoin blockchain database, which is called blockchain fork (Antonopoulos, 2017, pp. 240-247).

Let *S* denote the function that returns the number of subsequent blocks for each $BitPB_i$; then, the temporary inconsistency of the Bitcoin blockchain database (caused by $BitPB_a$ and $BitPB_z$ pretending to be the *m-th* block) is resolved by the Bitcoin database nodes when $S(BitPB_a) > S(BitPB_z)$ or $S(BitPB_a) < S(BitPB_z)$. Then, either $BitPB_z$ or $BitPB_a$ is removed from the Bitcoin fragments in all Bitcoin database nodes, and either $BitPB_a$ or $BitPB_z$ is appended to the blockchain along with its subsequent blocks by all Bitcoin database nodes.

4.3. Bitcoin hard fork

On August 1, 2017, a minority of the Bitcoin database nodes permanently changed the rules of their *DBMS* to extend the capacity of a block from 1 up to 32 MB. As the majority of Bitcoin database nodes did not introduce the changes to their *DBMS*, a hard fork emerged at the 478,559th block, thus creating a new distributed blockchain database and cryptocurrency called BitcoinCash. The BitcoinCash hard fork is illustrated in Figure 1. The first 478,558 blocks of the BitcoinCash blockchain are the same as the first 478,558 blocks of the Bitcoin blockchain. Both the Bitcoin and BitcoinCash databases store payment data; thus, Bitcoin (BTC) owners automatically became BitcoinCash (BCH) owners after the hard fork. Figure 2 illustrates the transaction from the 478,558th block, which is common to both the Bitcoin and BitcoinCash databases (the main difference is the currency of the transaction).

On October 24, 2017, another Bitcoin hard fork took place, and another blockchain database system and cryptocurrency appeared – Bitcoin Gold. Bitcoin Gold was introduced not for technical purposes but to "make Bitcoin decentralized again" (Reiff, 2019). The hard forks prove that the blockchain database nodes do not have to strictly follow the rules that are specified by the authors of the specific database system. There may be a wide range of reasons (technical, economic, political, etc.) why a subset of blockchain database nodes leave the blockchain database system to create their own.

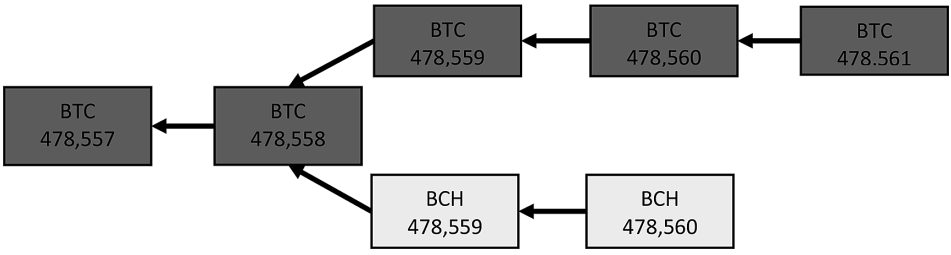

Figure 1. Bitcoin (BTC) hard fork creating blockchain for BitcoinCash (BCH)

Source: own elaboration based on Antonopoulos (2017, p. 257)

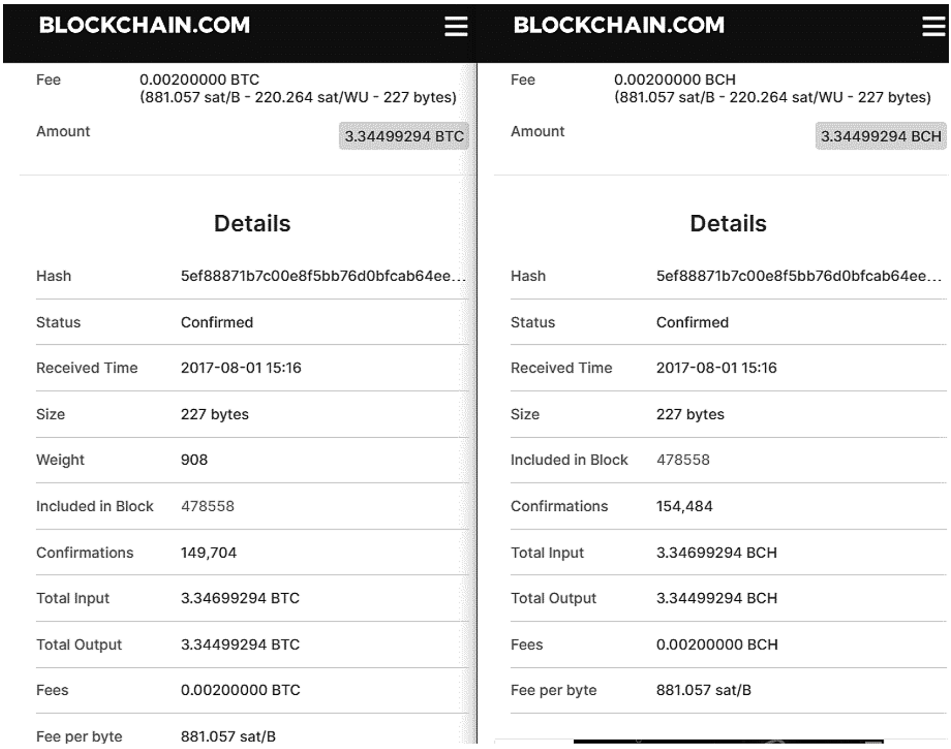

Figure 2. Common transaction for Bitcoin (left) and BitcoinCash (right) databases included in 478,558th block (before hard fork)

Source: blockchain.com

4.4. Bitcoin security

Let us define an honest node as a Bitcoin database node that strictly follows the Bitcoin protocol. To modify the already-appended block, an attacker must recalculate the proof of work and cause a Bitcoin fork. Nakamoto (2008) claims that, if the majority of the computing power is controlled by honest nodes, the attacker would not be able to catch up with the work of the honest nodes, which will finally resolve the fork in favor of the unmodified block. However, a computational attack may be successful in conjunction with a botnet attack on the honest nodes. If an attacker controls a lot of nodes, he may modify their *DBMS* to not follow the Bitcoin protocol, thus creating zombie nodes. Such zombie nodes can flood honest nodes with a lot of unproven blocks or incorrect transactions and deliberately fail to broadcast the proven blocks to the honest nodes, thus causing delays in disseminating the correct information and engaging the computing power of the honest nodes to unnecessarily work on incorrect data. The diminishing computing power and slowing down the propagation

of information on the proven blocks may cause the appearance of other blockchain forks, thus dividing the computing power of the honest nodes, giving an advantage to the attacker.

There have been plenty of attacks that have proven that the Nakamoto (2008) assumption that more than 50% of the computational power belongs to honest nodes is not always met. There have been a few successful 51% attacks on blockchain-based cryptocurrency; e.g., Vertcoin in November 2019 and December 2018 (Raza, 2019); Zencash in June 2018 (Hrones M., 2018); and Bitcoin Gold in May 2018 (Avan-Nomayo, 2018).

5. Conclusion

The growing popularity of Bitcoin and the increasing demand for cryptocurrencies have made blockchain database systems appear to be a technological revolution. The blockchain is perceived to be a trust-eliminating, self-sufficient, efficient, cost-saving, and democratic technology (Swan, 2015). However, a formal analysis of the blockchain and blockchain database systems do not confirm these properties. As shown in Subsection 2.1, a blockchain is nothing more than a self-verifying back-linked list that permits modifications of its blocks. To eliminate the need for trust among blockchain database nodes, the blockchain database system requires robust consensus mechanisms such as proof-of-work. However, proof-of-work is robust only if a series of a rather unrealistic assumptions are met. Due to the large number of nodes and total computational power, maintaining a robust proof-of-work mechanism would consume a lot of energy. The equal distribution of computing power among the blockchain database nodes is unrealistic, as there is no solution for preventing wealthy entities from investing in computing power. The distribution of computing power among blockchain database nodes is rather characterized by significant inequality, as the *DBMS* may be run on a two-core personal computer or thousands of Field Programmable Gate Array (FPGA) devices, so it is not a democratic solution. Due to the insufficient computing power of the blockchain database nodes, few examples of successful attacks were given in Subsection 4.4.

The choice of a database system and database design must be preceded by an analysis of an abstract and general description of the data and the requirements imposed by the data processing (Connolly & Begg, 2005, p. 33). The outcome of such an analysis would support the choice of the proper solution from a wide range of solutions, including blockchain, relational, object, document-oriented, SQL, NoSQL, centralized, or distributed database systems. Without a thorough formal analysis of a blockchain-based solution to the business problem, managers who are enchanted with the fairy tale of a trust-eliminating, self-managed,

efficient, cost-saving, and democratic information system can sink a lot of money into a blockchain database system that is insecure, unscalable, imposes significant fixed costs, is in an inconsistent state, and can ultimately destroy a company's reputation.

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Chapter 19

Bibliometric Study of Blockchain Technology between 2009 and 2019

Jan Zadrożny

1. Introduction

Blockchain technology is very often compared to the advent of the Internet in 1990. The Internet allows for the transfer of information, but a blockchain allows for the transfer of value and provides high level of security (Kisielnicki, 2018). Traditional database technology is based on a central database that is situated, stored, and maintained in one location, and access is limited by the owner of the network. A blockchain can be defined as a distributed database that is a storehouse for all of the transactions that have been carried out. All of the participants of the network can maintain the same copies of updated ledgers without any central administrator (Muzammal et al., 2018). The basic benefit of the technology is that every member of the network has confidence in their transactions without the need for a trusted third party, which is unique in the fact that it reduces the function of a middleman. The initial field of the blockchain application has been observed in the financial domain. Over the course of time, blockchains have disrupted traditional business processes and has been extended to a number of proposals to apply to other areas such as logistics (Francisco & Swanson, 2018), insurance, healthcare, or the Internet of Things (Khan & Salah, 2017). Thus, the growing number of publications in the discussed domain demand a more advanced literature analysis.

Nowadays, our society lives among the explosion of the information age where people are producing more data than they can handle (Khine & Shun, 2017). Therefore, the collection, storage, and analysis of the published literature to discover development paths, historical trends, citation analyses, or core authors in the studied domain provide an important source for the body of knowledge.

The term "bibliometric" was first introduced by Alan Prichard, who defined bibliometric as *the application of mathematics and statistical methods*

to books and other media of communication (Prichard, 1969) and can be used for the quantitative study of published literature (Lancaster, 1991). Hence, a bibliometric analysis can be successfully applied in the field of blockchain technology to be a helpful tool for scholars for formulating research questions and hypotheses and then enabling them for the interpretation of any obtained empirical research (Czakon, 2013). The analysis bring relevant information for understanding the publishing trends in growing disciplines to identifying research gaps in the existing literature (Lowry, 2013) as well as insights of potential areas for future work.

The main objective of this paper is to present a comprehensive assessment of a bibliometric analysis in blockchain research based on data gathered from the Scopus database between 2009 and 2019. To fulfill the aim of this work, several research questions have been articulated, which have been described in the methodology section. The presented research results are part of the ongoing studies on blockchain technology executed at the University of Warsaw and will be expanded in a future analysis.

2. Research methodology

The research methodology of this paper consists of four main steps: (I) the formulation of research questions; (II) data scraping; (III) data analysis; (IV) conclusions. Figure 1 presents the whole methodology process.

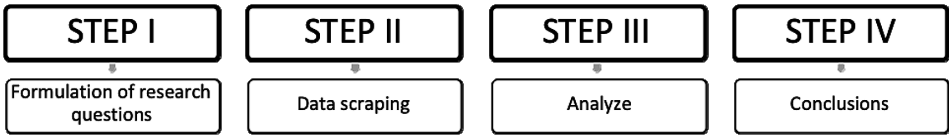

Figure 1. Methodology process
Source: Own work.

2.1. Research questions

The key goal of this paper is to conduct a comprehensive bibliometric analysis of the blockchain technology articles that were published during the period of 2009-2019 and present the evolution of the interest among academia in the discussed domain. The research questions have been articulated and divided into five main sections: (1) time analysis; (2) regional analysis; (3) subject analysis; (4) institutional analysis; (5) author analysis.

1. Time analysis
    1.1. How has the interest of blockchain technology changed over the years?

The answer of this question helps us understand the process of academia's interest in blockchain technology over the years. This could be helpful to predict the number of publications after 2019.

2. Regional analysis
   2.1. Which countries are most involved in the research of the blockchain domain? Which country has the highest h-index rating?
   The answer to these questions allows us to understand the distribution of publication outlets and identify the most valuable publications in the indexation by country. The h-index rating estimates the importance and impact of a country's scientific contribution (Hirsch, 2015), which helps us evaluate the published publications.
3. Subject analysis
   3.1. Which subjects are most dominant for blockchain technology publications?
   The extensive growth of blockchains over the last few years has opened up a number of research directions. The answer to this question will be helpful in understanding the most investigated domains of interest regarding blockchain technology and show the trend of publications over the last decade. It would be helpful for researchers to verify future research directions and select the main problems within the blockchain context.
   3.2. What are the most-cited articles about the blockchain domain?
   The answer for this question is relevant to determine which articles and related topics received the greatest attention among academia. The most influential papers serve as a guide to the knowledge about the main areas of the research interests.
4. Institutional analysis
   4.1. What are the most influential institutions for the authors?
   The answer to 2.1 helps researchers get to know the institutions that generate the most valuable content as well as with whom it would be helpful to start research collaboration.
5. Author analysis
   5.1. Which author has been the most productive in the domain of blockchain technology?
   The conclusion of this analysis will allow us to identify those authors who exert the greatest impact within the blockchain technology scientific community.

2.2. Data scraping

On the market exists search systems like Web of Science, ScienceDirect, or Google Scholar that are dedicated to the scientific community (Gusenbauer

& Haddaway, 2019); however, the Scopus database was ultimately selected for the following reasons: (a) the higher numbers of journals in the data engine (Mongeon & Paul-Hus, 2016); (b) it offers useful analytical features; and (c) it allows us to sort results by the needed parameters and filters. Thus, the Scopus database was used as a data source in this research, which reflects academia's attention towards blockchain technology. The inquiry on the Scopus database was proceed by using the keyword "blockchain" to extract the needed publications. To present the evaluation and development of the discussed domain, the time period was limited to between 2009 and 2019.

To clear the bibliometric information, non-English publications were excluded, the keyword was limited to only "blockchain," and the "final publication stage" filter has been used. After filtering out these records, we finally received 1,479 relevant articles. All of the data was limited to only high-quality published articles (excluding conferences papers or reviews).

3. Results

The third step of the paper presents the results of a bibliometric study that answers the research question formulated in Step 1.

3.1. How has interest in blockchain technology changed over the years?

This paper analyzes the sum of 1,479 articles published from 2009 until 2019 (so, more than ten years). Figure 2 shows the total productivity of the articles in the blockchain technology domain.

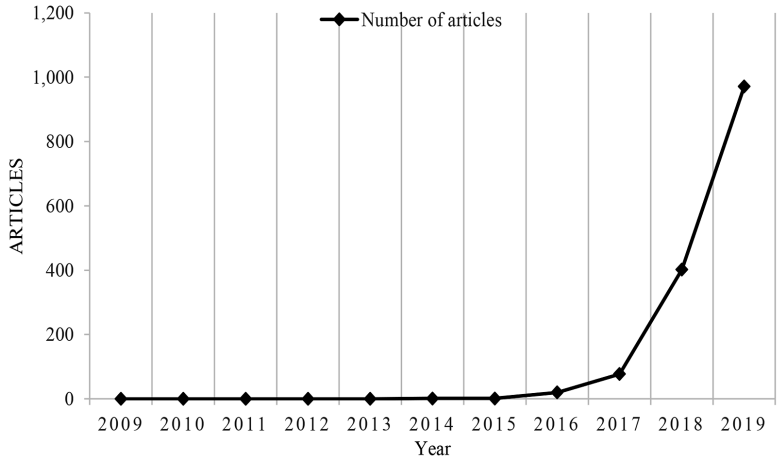

Figure 2. Number of publications indexed by Scopus between 2009 and 2019.
Source: Own work.

It is significant that the blockchain technology made its public debut in 2008, when S. Nakamoto released his whitepaper entitled *Bitcoin: A Peer-to-Peer Electronic Cash System* (Nakamoto, 2008). This first publication was proposed to support Bitcoin cryptocurrency. The implementation related to cryptocurrency in the literature is labelled "Blockchain 1.0" (Swan, 2015), but it took a few years for academia to become aware of the fact that its possible applications were not only limited to cryptocurrencies. It is also significant that the selected database represents high-quality articles published in scientific journals, not conference papers nor reviews. The number of publications with "blockchain" as a keyword has risen since 2014.

Table 1. Number of articles published by year and indexed by Scopus.

Year	No of publications	% of total 1,479	Yearly growth rate
2009-2013	0	0.0	-
2014	1	0.1	-
2015	1	0.1	1,900%
2016	20	1.4	285%
2017	77	5.2	422%
2018	402	27.2	144%
2019	978	66.0	

Source: Own work.

Table 1 displays the evolution of blockchain publications covering the time span of 2009 through 2019. The percentage distribution of the publications over the years and the yearly growth rate have been listed as well. From 2016, the number of publications grew dramatically, which demonstrates an increase in academia's interest in the blockchain technology domain.

3.1. Which countries are most involved in research of blockchain domain? Which country has highest h-index rating?

Figure 3 illustrates the geographical productivity of the top 20 countries indexed by the Scopus database. China achieved the highest number of publications (456), followed by the United States (287), India (140), the United Kingdom (124), and South Korea (112).

Table 2 presents the contribution of the numbers of articles, h-index ratings, total citation categories, and average total citations. China and the United States lead in the number of articles, h-index ratings, and total citations. The situation looks different in the average total citation category. In spite of the fact that China is the first country in terms of its number of published articles and highest number of citations, the number average total citations per article is 8.0. The average total citation per article is 10.5 for all of the studied countries, so China is below average in this regard. A more dramatic situation can be found

in India. Despite being in third place regarding the total number of articles (140), the average total citations is only 2.2, which is the lowest result among the studied countries. The leading average total citations belong to Germany (27.3), Singapore (19.8), and the United Arab Emirates (19.4), which can be interpreted as an approximation of the scientific relevance and the quality of the publications.

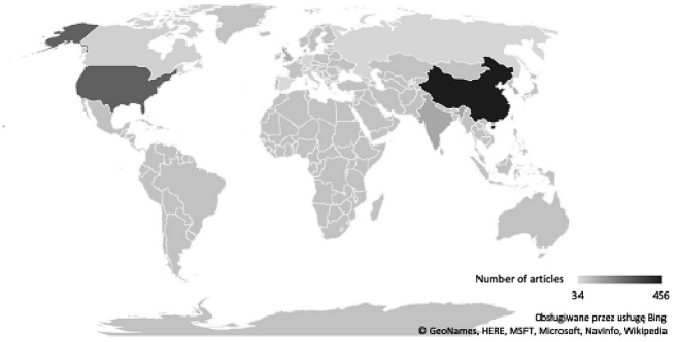

Figure 3. Map of most productive countries (2014-2019).
Source: Own work

Table 2. Numbers of articles indexed by country (top 20).

Country	Position	No. of articles	% of 1,479	h-index	Total citation	Average total citation
China	1	456	30.8	34	3,667	8.0
United States	2	287	19.4	33	3,352	11.7
India	3	140	9.5	9	304	2.2
United Kingdom	4	124	8.4	17	969	7.8
South Korea	5	112	7.6	15	805	7.2
Australia	6	83	5.6	16	632	7.6
Italy	7	59	4.0	13	614	10.4
Canada	8	56	3.8	14	602	10.8
Germany	9	45	3.0	15	1,227	27.3
Russian Federation	10	45	3.0	8	239	5.3
Spain	11	38	2.6	9	326	8.6
Singapore	12	34	2.3	14	674	19.8
Japan	13	33	2.2	8	248	7.5
Pakistan	14	33	2.2	7	420	12.7
Taiwan	15	33	2.2	9	421	12.8
Saudi Arabia	16	32	2.2	7	151	4.7
United Arab Emirates	17	29	2.0	10	563	19.4
Malaysia	18	28	1.9	7	120	4.3
Denmark	19	26	1.8	8	248	9.5
France	20	26	1.8	8	346	13.3

Source: Own work.

Against this backdrop, it is worth describing Poland's contribution to the numbers of publications. During analyzed period, Poland published 11 blockchain articles (with an h-index rating of 4). The outcome of total citations is 69, which means that the average total citation result is 6.3. Compared to the countries from the top 20, Poland is ahead of only three countries: the Russia Federation (5.3), Saudi Arabia (4.7), and Malaysia (4.3).

Figure 4 represent the top ten countries regarding the percentage distribution of productivity. It is worth highlighting that China and the United Stated accumulated more than 50% of all of the articles related to blockchain technology. There are no countries from South America nor Africa in the evidence. First place is awarded to China (which published 30.8% of the total number of publications) followed by the United States (19.4%) and India (9.5%).

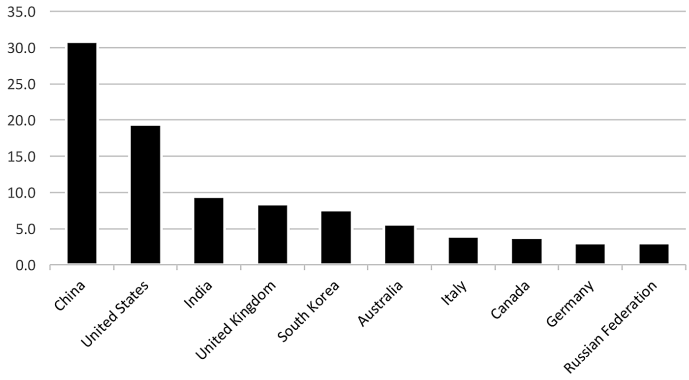

Figure 4. Percentage distribution of productivity by country (top ten).
Source: Own work.

Figure 5 presents the relationships between the h-index ratings and the average total citations of the top 20 countries. India (9/2.2), Malaysia (7/4.3), Saudi Arabia (7/4.7), and Russia (8/5.3) achieved the lowest results.

The significant worldwide result in each article belongs to Germany, Singapore, and the United Arab Emirates, so it is possible to conclude that these countries prefer to publish fewer articles yet offer a higher quality in the blockchain domain. On the other hand, the figure presents China and the United States with high h-index ratings but average ratings in average total citations.

Table 3 displays the number of articles, h-index ratings, and total citations indexed by region. It has been found that, out of these 20 countries, 10 countries are from Asia, 7 countries are from Europe, 2 are from North America, and 1 is from Australia. Asia achieved first position with the highest number of articles (930), h-index ratings (127), and total citations (7,373).

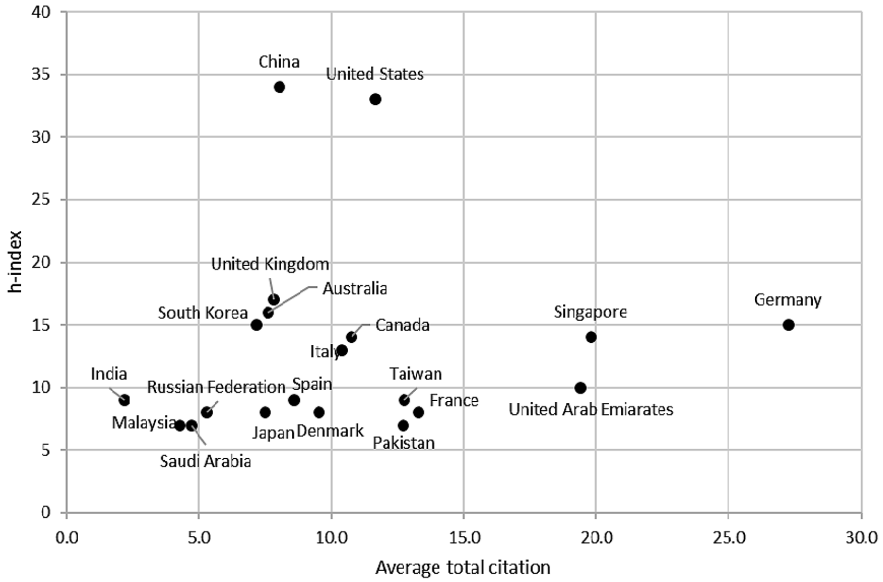

Figure 5. Relationship between h-index ratings and average total citations indexed by countries.
Source: Own work.

Table 3. Number of articles, h-index ratings, and citations indexed by region.

Region	Position	No. of articles	% of 1,476	h-index	Total citations	Average total citations
Asia	1	930	63.2	127	7,373	7.9
Europe	2	363	24.7	78	3,969	10.9
North America	3	343	23.3	47	3,954	11.5
Australia	4	83	5.6	16	632	7.6
South America	5	0	0.0	0	0	0
Africa	6	0	0.0	0	0	0

Source: Own work.

Asia, North America, and Australia are the leading regions in research activity. In Europe, the situation seems more complex. The United Kingdom is a country with the highest number of published articles (124) and h-index rating (17), but Germany leads in total citations and average total citations (1,227 and 27.3, respectively). None of the top 20 countries are from South America nor Africa, so these regions are not very developed in the research of blockchain technology. Regarding average total citations, the evidence depicts that the highest average total citation belongs to North America (11.5), followed by Europe (10.9), Asia (7.9), and Australia (7.6), which allows us to conclude that the most appreciated articles are published in North America.

3.1. Which subjects are most dominant for blockchain technology publication?

Figure 6 ilustrates the most engaged research areas in the blockchain domain. The majority of the published articles fall under the areas of Computer Science (959) and Engineering (694). Other investigated subject areas for blockchain research are Business, Management, and Accounting (228), Materials Science (224), and Social Science (208).

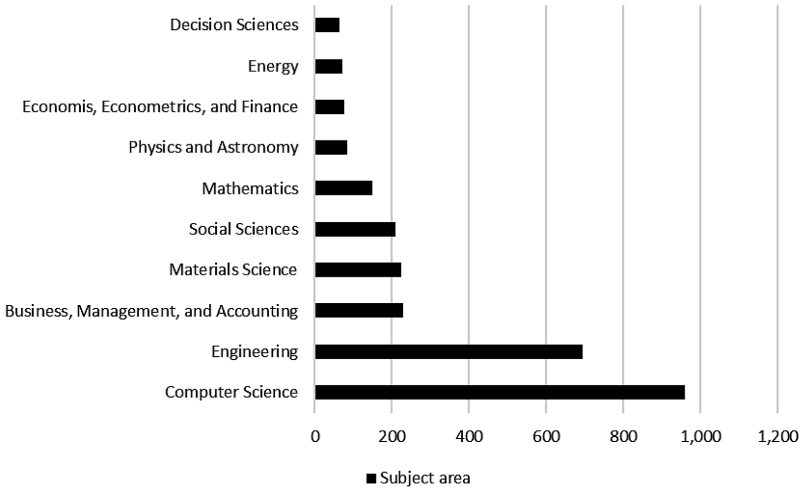

Figure 6. Top ten subject areas assigned of Blockchain articles between 2009-2019.
Source: Own work.

The blockchain domain is a recently growing topic in the scholar community. Omitting the initial paper by Nakamoto (Nakamoto, 2008) about Bitcoin, the first paper to consider blockchain technology was found in 2014.

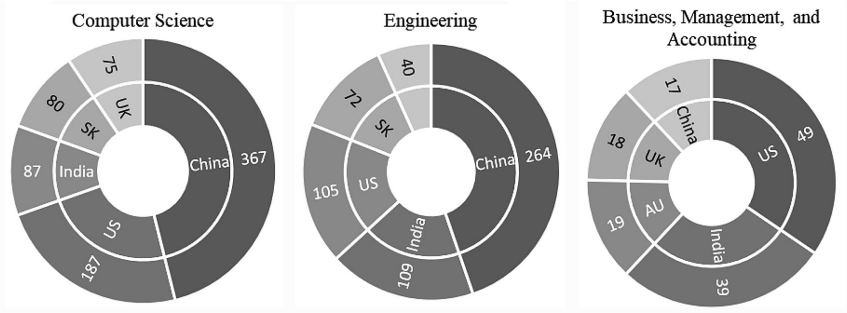

Figure 7. Number of country's articles by subject.
* AU – Australia; SK – South Korea; UK – United Kingdom; US – United States
Source: Own work.

Figure 7 depicts the number of published articles in two dimensions: subject and country. As mentioned above, most articles belong to Computer Science (31.2%), Engineering (22.6%), and Business, Management, and Accounting (7.4%). The distribution of the publication in each subject by country delivers interesting findings. In Computer Science, the leading country is China (367), followed by the United States (187), India (87), South Korea (80), and the United Kingdom (75). In Engineering, the most-contributed is China (264), followed by India (109), the United States (105), South Korea (72), and the United Kingdom (40). In Business, Management, and Accounting, the distribution looks a bit different; this subject received more attention from researchers from the United States (49), India (39), Australia (19), the United Kingdom (18), and China (17). This allows us to conclude that China is more involved in examining blockchain technology in a computer science or engineering context more than in business perspectives.

3.2. What are most-cited articles about blockchain domain?

The findings from this section could possibly be helpful for scholars when applying for publication in journals that are recognized as having a high level of reputation among academia.

Table 4 demonstrates the lists of top ten article outlets along with the number of most-cited publications during the period of 2014-2019 in the blockchain domain (excluded by self-citations). The total citation analysis shows that the most popular publication is F. Tschorsch and B. Scheuermann's 2016 work entitled *Bitcoin and beyond: A technical survey on decentralized digital currencies*, with 322 total citations published in IEEE Communications surveys and tutorials, which could be possibly related to the date of the publications and the first wave of interest in blockchain technology during this time (which regarded Bitcoin and the cryptocurrency market). The majority of the articles from the table connect blockchain technology with the Internet of Things (IoT) and considers a possible synergy between these technologies. Moreover, it is worth noting that the Applied Energy journal published two highly cited papers from the top ten of the most-cited publications, which could possibly be useful information for scholars with regard to applying for publication.

Remarkably, the most-cited article was published four years ago, which leads to the conclusion that the longer the publication is in the database, the greater the number of accumulated citations. Other listed articles were published in 2017 and 2018.

It is worth noting that, although 30.8% of the articles on the blockchain domain were published in China, none of them were in the top ten of the most-cited articles.

Table 4. Top ten most-cited articles in blockchain domain (2014-2019).

Title of article	Authors	P	TC	Y	Source	Institution	Country
Bitcoin and beyond: A technical survey on decentralized digital currencies	Tschorsch F., Scheuermann B.	1	322	2016	IEEE Communications Surveys and Tutorials	Humboldt University of Berlin	Germany
IoT security: Review, blockchain solutions, and open challenges	Khan M.A., Salah K.	2	241	2018	Future Generation Computer Systems	Bahauddin Zakariya University Multan	Pakistan
Designing microgrid energy markets: A case study: The Brooklyn Microgrid	Mengelkamp E., Gärttner J., Rock K., Kessler S., Orsini L., Weinhardt C.	3	199	2018	Applied Energy	Karlsruhe Institute of Technology	Germany
Industry 4.0: State of the art. and future trends	Xu L.D., Xu E.L., Li L.	4	179	2018	International Journal of Production Research	Old Dominion University	USA
Security and Privacy in Decentralized Energy Trading Through Multi-Signatures, Blockchain and Anonymous Messaging Streams	Aitzhan N.Z., Svetinovic D.	5	160	2018	IEEE Transactions on Dependable and Secure Computing	Masdar Institute of Science and Technology	United Arab Emirates
Can Blockchain Strengthen the Internet of Things?	Kshetri N.	6	170	2017	IT Professional	University of North Carolina	USA
Blockchain technology in the chemical industry: Machine-to-machine electricity market	Sikorski J.J., Haughton J., Kraft M.	7	157	2018	Applied Energy	University of Cambridge	United Kingdom
Blockchain Meets IoT: An Architecture for Scalable Access Management in IoT	Novo O.	8	144	2017	IEEE Internet of Things Journal	NomadicLab	Finland
On blockchain and its integration with IoT. Challenges and opportunities	Reyna A., Martín C., Chen J., Soler E., Díaz M.	9	134	2018	Future Generation Computer Systems	University of Málaga	Spain
A survey of blockchain security issues and challenges	Lin I., Liao T.	10	134	2017	International Journal of Network Security	Asia University	Taiwan

P – position; TC – total citations; Y – year

Source: Own work.

High-quality journals attract scholars to publish their articles as a way of gaining academia's attention to their work results. Table 5 present the top 15 most influential sources that publish articles regarding the blockchain domain. IEEE Access is a relevant multidisciplinary open-access journal that has collected 184 articles related to blockchain technology; it received the highest number of total citations (1,470) and h-index rating (22). Referring to average citation per article (ACPA), IT Professional (15.9), Future Generation Computer Systems (15.7), and IEEE Transactions On Industrial Informatics (11.6) were rated the highest. This means that articles published by these sources helped authors receive extensive attention from academia.

Table 5. Most influential sources for blockchain domain (top 15).

Source title	P	No. of articles	h-index	TC	ACPA
IEEE Access	1	184	22	1,470	8.0
IEEE Internet of Things Journal	2	43	10	422	9.8
Future Generation Computer Systems	3	38	11	595	15.7
Sensors Switzerland	4	34	7	135	4.0
International Journal Of Innovative Technology And Exploring Engineering	5	31	1	0	0.0
International Journal Of Recent Technology And Engineering	6	30	1	0	0.0
Energies	7	21	5	68	3.2
IEEE Transactions On Industrial Informatics	8	21	8	243	11.6
Applied Sciences Switzerland	9	19	3	15	0.8
IT Professional	10	18	6	287	15.9
International Journal of Engineering And Advanced Technology	11	18	0	0	0.0
IEEE Transactions On Computional Social Systems	12	17	4	50	2.9
International Journal Of Advanced Computer Science And Applications	13	17	2	10	0.6
Future Internet	14	16	5	153	9.6
Journal Of Medical Internet Research	15	15	2	19	1.3

*P – position; TC – total citation; ACPA – average citation per article

Source: Own work.

Moreover, by analyzing this table, it can be concluded that three high-ranking journals (International Journal Of Innovative Technology And Exploring Engineering [5], International Journal Of Recent Technology And Engineering [6], and International Journal of Engineering And Advanced Technology [11]) represent a high number of articles, but h-index ratings, and total citations is close to zero. closed to 0 at the same time. It is worth highlighting that all three of the discussed journals are from India.

3.3. What are most active institutions?

In order to answer the question of which institutions are most active related to the blockchain domain, the numbers of articles, total citations, and average

total citations per article were taken into consideration. According to the results demonstrated in Table 6, the vast majority of the institutions with the greatest numbers of publications are located in China (8); it is possible to conclude that this country is really involved in researching the discussed technology. The leading institution, Beijing University of Posts and Telecommunications, published 40 articles and received 434 citations. It is worth emphasizing that, in terms of h-index ratings, this institution was the highest with a value of 12. The second institution (the University of Electronic Science and Technology of China) collected 31 publications and 320 total citations.

Table 6. Most influential institutions in blockchain domain (top ten).

Name of institution	P	No. of articles	Country	h-index	Total Citation	ACPA
Beijing University of Posts and Telecommunications	1	40	China	12	434	10.9
University of Electronic Science and Technology of China	2	31	China	9	320	10.3
Chinese Academy of Sciences	3	29	China	10	194	6.7
Ministry of Education China	4	23	China	6	139	6
Xidian University	5	23	China	9	172	7.5
University of New South Wales UNSW Australia	6	20	Australia	8	78	3.9
Beijing Institute of Technology	7	17	China	10	259	15.2
Shanghai Jiao Tong University	8	17	China	7	112	6.6
Khalifa University of Science and Technology	9	17	United Arab Emirates	7	479	28.2
Sun Yat-Sen University	10	16	China	6	170	10.6

P – position; ACPA – Average citation per article (excl. self-citations)

Source: Own work.

In terms of average citation per article, Khalifa University of Science and Technology from the United Arab Emirates received the highest result (28.2), followed by Beijing Institute of Technology (15.2) and Beijing University of Posts and Telecommunications (10.9). Thus, it can be concluded that the number of articles are not related to the quality measured in the citation factor.

3.4. Which author has been most productive in domain of blockchain technology?

In an attempt to find out the most productive authors in relation to the blockchain domain, the classification of the most productive authors who have already published more than eight articles in the pertinent literature is presented in Table 7. The most productive author is J.H. Park (14), followed by M. Guizani (13) and K. Salah (13). Remarkably, only seven authors has ten or more

publications related to the blockchain domain. From the table, it is possible to conclude that the top 15 productive authors together contributed 10% of the total number of published articles between 2009 and 2019.

Table 7. Top 15 classification of article productivity by authors (2009-2019).

Author	Position	No. of articles	h-index	Country	Institute
Park, J.H.	1	14	25	South Korea	Seoul National University of Science and Technology (SNUST)
Guizani, M.	2	13	52	Qatar	Qatar University
Salah, K.	3	13	22	United Arab Emirates	Khalifa University of Science and Technology
Du, X.	4	10	6	USA	Temple University
Niyato, D.	5	10	66	Singapore	Nanyang Technological University
Wang, F.Y.	6	10	54	China	Institute of Automation Chinese Academy of Sciences
Yuan, Y.	7	10	16	China	Institute of Automation Chinese Academy of Sciences
Choo, K.K.R.	8	9	50	USA	University of Texas at San Antonio
Kshetri, N.	9	9	24	USA	The University of North Carolina at Greensboro
Yu, F.R.	10	9	54	Canada	Carleton University
Zheng, Z.	11	9	40	China	Sun Yat-Sen University
Xia, Q.	12	8	9	China	University of Electronic Science and Technology of China
Xu, X.	13	8	15	Australia	Commonwealth Scientific and Industrial Research Organization
Zhang, Y.	14	8	46	Norway	Universitetet i Oslo
Zhu, L.	15	8	19	China	Beijing Institute of Technology

Source: Own work.

Considering the h-index ratings, the highest position was achieved by D. Niyato (66) from Nanyang Technological University in Singapore. Interestingly, the distribution of the region indicates this majority, because 9 of the 15 authors are from Asia, 4 are from North America, and only 1 from each Europe and Australia.

4. Conclusion

In this research, a bibliometric study of the blockchain domain has been conducted based on the retrieved 1,479 articles indexed by the Scopus database between 2009 and 2019. The large amount of data enabled us to draw significant findings in several perspectives of the analysis: productivity over time, regions, authors, institutions, and subjects. The number of articles has grown rapidly since 2016, and it can be assumed that the upward trend will be continuing throughout the upcoming years.

The activity of academic institutions was measured by the numbers of publications published during the analyzed span time. It is worth highlighting that, of the top ten institutions, e ight are located in China.

The study delivers relevant information about the origin of the publications. In a country point of view, China, the United States, and India are the most productive countries in regards to the blockchain domain. It is worth noting that Germany, Singapore, and the United Arab Emirates received a high number of total citations despite having fewer publications, which suggests that these countries generate high-quality publications.

Moreover, the articles covers several disciplines; the majority of the published articles fall under the categories of Computer Science and Engineering.

Over the years, the most productive authors together contributed 10% of the total number of published articles between 2009 and 2019. The top author who published the most is Park J.H. with 14 articles, followed by Guizini M. with 13 and Salah K. (also with 13 publications). The main areas of interest for these authors aimed to combine blockchain technology in the Smart City concept and the Internet of Things (IoT).

The main identified limitation of the paper is based on the result of the Scopus search engine; therefore, some relevant articles may have been omitted. Thus, the bibliometric study opens up research perspectives for future work, especially to expand and evaluate the literature database to other well-known sources like Web of Science (Fetscherin M., Heinrich D., 2015) and Google Scholar to compare the results. As a new phenomenon derived from Information and Communication Technologies (ICT), blockchain technology requires a comparative analysis from different areas of this domain, such big data, cloud computing, or the Internet of Things (IoT).

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Chapter 20

Adversarial Machine Learning: Review from Business Perspective

Mariusz Rafało

1. Introduction

Many business processes are currently supported by machine-learning systems. Furthermore, some of these processes are fully dependent on autonomous artificial intelligence algorithms. Artificial intelligence (AI) is wide phenomena focused on computers that have the ability to work like a human brain. Although machine learning is formally an AI concept, both terms will be used interchangeably in this paper.

There are two main types of machine-learning algorithms: supervised and unsupervised. In supervised learning, the goal of the classification is known – a model tries to predict a target value. Unsupervised learning does not have any searched variable – it focuses on finding similar (and slightly different) groups of objects. A special variant of unsupervised learning is a group of algorithms based on reinforced learning. Reinforcement learning relies on a dynamic goal function where no specific target value is sought. The model tries to maximize the reward.

AI algorithms play a crucial and still-increasing role in a number of domains. AI supports autonomous vehicles, language translation, image and voice recognition, anomaly-detection credit scoring, customer churn analysis, etc. The use of AI systems can lead to cost reduction and business process optimization. Common use of these systems comes from the accessibility of software, competencies, and relatively low costs. Organizations generally trust machine-learning algorithms because they are based on well-known mathematical and statistical formulas. However, the complexity of AI algorithms is so large in many cases that they are perceived as "black boxes." An AI system implements specific functions, but it is not exactly clear how it works. Often inaccessible to human perception, this complexity has been found to be a source of weakness in AI systems.

This defect of AI is manifested in its vulnerability to so-called adversarial examples. An adversarial example is a synthetic (fake) data sample that, when put into a model, forces the model to perform a wrong classification. For example, a fraud transaction can be marked as a good transaction, a stop sign may be classified as a speed limit sign, etc. If this type of data is generated with the wrong intent, it can lead to serious consequences.

Adversarial machine learning is a technique that is implemented to fool machine-learning models through malicious (and fake) input. The attacker presents an adversarial example to the model, which results in a misclassification (Bengio, Goodfellow, & Kurakin, 2017). Prior research on adversarial machine learning focused mainly on image-recognition systems, leaving other potential threats undiscovered. Furthermore, the current research lacks the awareness of the business impact of malicious attacks (K. He, Zhang, S., & Sun, 2016; Wiyatno, Xu, Dia, & de Berker, 2019).

The goal of this paper is to review and classify the current state of knowledge about adversarial machine learning, including attacks on image- and speech-recognition systems, sentiment-analysis systems, recommendation systems, etc.

2. Adversarial machine learning

The existence of adversarial examples has been proven; however, there is no consensus on how they work (Xu et al., 2020). It has been pointed out that deep neural networks are especially vulnerable to adversarial examples because of their local linearity properties (Goodfellow, Shlens, & Szegedy, 2015). Some researchers have stated that the existence of adversarial examples is due to neural network complexity (Szegedy et al., 2014), while others have proven that linear models are also vulnerable to adversarial examples (Goodfellow et al., 2015). Another perspective is the decision boundary; i.e., the point where a classifier begins to perform a specific score. Adversarial examples are often located close to decision boundaries (Fawzi, Fawzi, & Frossard, 2015).

Adversarial samples can be exploited by accident when a specific anomaly occurs in the data, resulting in the model producing an incorrect classification. However, an attack can be intended and targeted at a model. In this case, the potential damage can be severe.

An interesting feature of adversarial data is transferability. This property refers to the fact that an adversarial example that is generated to fool a specific AI model can often be used to successfully fool other models (Papernot, Mcdaniel, & Goodfellow, 2016). It is estimated, that a single sample that fools one neural network has about a 60% chance of fooling a different neural network (Gao, Lanchantin, Soffa, & Qi, 2018; Moosavi-Dezfolli, Fawzi, & Frossard, 2016).

Despite the fact that machine-learning techniques perform a variety of complex tasks, security considerations in this area are not common in business nor in academia (Wiyatno et al., 2019). This lack of attention may be due to the low perceived risk of an attack (Amodei et al., 2016). However, the risk has two dimensions: the probability of the risk, and the impact of the risk (when materialized). Adversarial attacks have a relatively low probability of risk, but the potential damages caused by such attacks can be significant (especially when process continuity or business continuity rely on AI systems).

The first adversarial attacks where conducted in early 2000, when it was known that linear classifiers (commonly used in spam filters) could be defeated by inserting certain words into spam emails. Over the next years, this was practically the only example of an adversarial attack. Along with the significant development of neural networks in the 2010s, it was widely believed that non-linear classifiers (such as neural networks) had a natural robustness against adversarial data. In 2015, Ian Goodfellow, Christian Szegedy, and others published a series of papers that were dedicated to the logical gaps in neural networks. They introduced a simple method of preparing synthetic data that could mislead AI (Fawzi et al., 2015; Goodfellow et al., 2015; Szegedy et al., 2014). It was demonstrated that neural networks could easily be fooled by making tiny adjustments (called perturbations) in the input data (T. He & Glass, 2018; Moosavi-Dezfolli et al., 2016). Since then, this topic has gained more and more attention (Surma, 2018).

3. Types of attacks

Adversarial attacks can be classified by many features. Such attacks can be distinguished by the type of AI model that is the object of the attack: supervised, unsupervised, deep learning, or reinforced learning models. From the attackers' intention perspective, an attack can block a system or service entirely or force the system to classify synthetic data incorrectly. Also, there is a distinction between targeted and non-targeted attacks. In a targeted attack, the adversary forces the model to return a certain value. For example, a fraudster is likely to attack a bank's credit evaluation model to disguise himself as a highly credible client (he wants to receive a target value of 0, which describes a reliable client). If there is no specified target label, the attack is called non-targeted. The adversary only wants the classifier to predict something incorrectly (Xu et al., 2020). For example, the attacker wants to force the AI to misclassify a stop sign.

The subject of the attack can be a classifier – when an attacker wants to force a model to behave in the wrong way; however, the subject of the attack can also be a model as a whole. It this scenario, the attacker feeds adversarial data into the training data so that the model learns to behave in a wrong way.

One of the most common differentiations of adversarial machine learning is by information that is accessible to the adversary. These are as follows (Dai et al., 2018):

- White box attacks – the attacker has access to information on how the attacked classifier works. So, for each use (run) of the model, the attacker can determine the resulting prediction and which parameters were used. In practice, attacks of this type are rare because of their difficulty. In order to be successful, the attacker must penetrate the infrastructure of the system being attacked.
- Black box attacks – the attacker does not have access to the logic of a classifier operation nor the model parameters. It only has the model output (classification result).
- Limited black box attacks – similar to black box attacks, but the attacker has access to a limited number of samples that were used to train the model.

Using specified dimensions and features, all threats can be well-categorized. However, a significant limitation of contemporary research is the lack of evidence covering threats to AI systems from a business perspective. To fill this gap, examples have shown further cover attacks on AI targeted on many types of systems and business processes (including image-recognition systems, but not limited to them).

3.1. Image-recognition systems

As previously mentioned, examples of adversarial machine learning are mainly in the area of image classification. Truly, these exploits are most spectacular, especially when the increasing interest in autonomous vehicles can be observed. It has been proven that an adversary can take a correctly classified image and distort its pixels with a slight perturbation that is indistinguishable to the human eye and, yet, cause the model to label a different output (Szegedy et al., 2014).

Sometimes, an attack can be visible, as there are graphical patterns that look suspicious to the human eye. However, another type of adversarial image can be invisible to the human eye (Goodfellow et al., 2015). For example, a slight modification of a stop sign can force a classifier to recognize the sign as a different one (Fig. 1). Further tests were performed on a system based on the German road sign recognition standard (GTSRB). The results showed that 64% of the road signs were incorrectly classified (Papernot, Mcdaniel, & Goodfellow, 2017).

To perform this attack in a real environment, an attacker would have to change the road signs (which may not be an easy task, as replacing the signs require intense interference with the environment). However, further research of this topic (Gu & Dolan-Gavitt, 2019) proved that a physical change may not

always be needed to be significant. In this example, a sticker added to a stop sign "converted" the sign into a speed limit sign (Fig. 2).

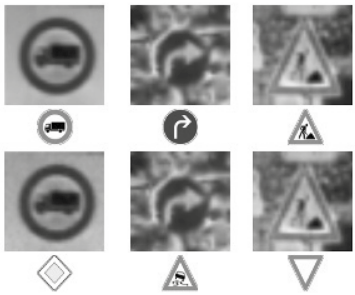

Figure 1. Adversarial examples of road signs. Top row presents "normal" input (along with model classification below), while bottom row presents adversarial examples (also with classification below)

Source: (Papernot et al., 2017)

Figure 2. Stop sign maliciously misclassified as speed limit sign (using small sticker)

Source: (Gu & Dolan-Gavitt, 2019)

Another potentially dangerous example of an adversarial attack applies to car recognition. It this case, an adversary camouflaged a car to make it invisible to AI systems. As shown in Fig. 3, the Toyota on the right side of the image fools the object detector after applying the camouflage. Neither a plain color (on the left) nor a random camouflage (in the middle) can prevent these cars from being detected (Zhang, H, David, & Gong, 2019).

These adversarial algorithms and patterns can be used in all sorts of ways to bypass AI systems, especially in self-driving cars, image recognition, security systems, factory robots, and many other areas where the functionality of object identification is crucial.

Figure 3. Car camouflage made car invisible to object detector
Source: (Zhang et al., 2019)

3.2. Text-related classifiers

The goal of a text classifier is to identify the meaning of a given sentence or categorize the sentence. First, the categorization can be thematic, determining what the text is about (Forman, 2003). Second, the goal of a classifier may be to determine the context or emotion that is in the text or sentence.

Text-analysis systems and sentiment-detection algorithms can also be the target of adversarial attacks. For example, even small changes in a text paragraph (changing one letter – Fig. 4) can force a classifier to change the score from one to another (Ebrahimi, Rao, Lowd, & Dou, 2014).

Chancellor Gordon Brown has sought to quell speculation over who should run the Labour Party and turned the attack on the opposition Conservatives. 75% **World**

Chancellor Gordon Brown has sought to quell speculation over who should run the Labour Party and turned the attack on the o**B**position Conservatives. 94% **Business**

Figure 4. Using single-character change alters classification of entire paragraph
Source: (Ebrahimi et al., 2014)

Another reported attack from this domain was performed with no malicious intent. The attack was conducted on the training data, not the classifier itself. The goal was not to fool the model but rather to force the model to learn unintended behavior. In 2016, Microsoft presented the results of a research project on AI by introducing Twitter bot Tay (Hunt, 2016). Tay was designed to communicate with the environment via the Twitter service. The goal of the research was to implement a self-learning algorithm that could communicate with many individuals in parallel. Truly, Tay acquired new knowledge; when people realized that they were dealing with AI, they started to feed Tay with fake or biased data.

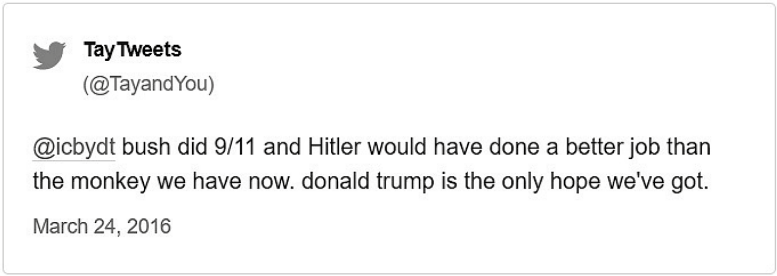

Figure 5. Tay AI bot tweet after learning from adversarial data
Source: (Hunt, 2016)

As a result, Tay started to publish racist comments and commend Adolf Hitler's policy (Fig. 5). Microsoft was forced to disconnect the bot after 16 hours of activity, as the tweets posted by Tay were too offensive.

Another Twitter-based attack targeted a classifier (not a training dataset) and was a black-box type (with no knowledge on how the model worked). The attack was based on hacking the Associated Press's Twitter account. After taking control of the account, the hackers published a tweet about a terrorist attack on the White House. This information was momentarily acquired by text-analysis systems that performed automatic decisions on financial markets. For seven minutes after the attack (the Associated Press quickly regained control and denied the message), the Dow Jones index dropped by 150 points (Fisher, 2013). It returned to its previous value (before the attack) five minutes later.

3.3. Recommender systems

The incident with the Dow Jones drop, made the research and business look more widely at the attacks on the system that makes autonomous decisions. Most of today's stock and financial markets are driven by autonomous systems (more or less). These system learn from historical data, but they can also be triggered by current transactions made by other market participants. Using this feature, an attacker can force a system to make automatic purchase decisions based on adversarial activities (e.g., by submitting or canceling purchase orders) (Goldblum et al., 2020).

A similar situation occurs in recommender systems – these algorithms (mostly collaborative filtering and association rules) classify customer preferences and match them with historical opinions about products. Based on this knowledge, the system presents a specific product to a specific customer (Sivapalan, Sadeghian, Rahnama, & Madni, 2014).

An attack on a recommender system may target training data: an adversary feeds the classifier with fake recommendations, and the system recommends the

wrong product based on the adversarial data (Bhaumik, Williams, Mobasher, & Burke, 2006). However, for the attack to be effective, adversarial samples need to be reliable for the system. Thus, the attacker focuses more attention on writing fake opinions about products. To do so, they use synthetic user profiles, which are indistinguishable by the recommender system. This includes behavior simulation as well as profile pictures or personal data. In 2016, researchers were able to fool a commercial facial-recognition system into thinking that they were someone else just by wearing a pair of glasses (Fig. 6) (Sharif, Bhagavatula, Bauer, & Reiter, 2016).

Figure 6. Using special glasses forces model to classify person in top row as person in second row
Source: (Sharif et al., 2016)

3.4. Speech recognition

Similar techniques can be used to create adversarial samples for speech-recognition systems. These attacks mainly target classifiers and are considered to white box attacks. In order to prepare an inaudible perturbation in an audio recording, there must be a deep understanding of how the algorithm works. Automatic speech-recognition (ASR) systems are composed of several components, (e.g., acoustic model, language model, pronunciation model, etc.) where each component is trained separately. Recently, research in this area focused on AI models. These types of models receive speech data as input and a transcript with no additional post-processing as output (Cisse, Adi, & Keshet, 2017).

Inaudible adversarial perturbations can be added to a voice sample, which is directly processed by an ASR system (Carlini, 2018). This leads to a misclassification of sentences and makes the system work in the wrong way. These threats may impact automatic customer services like voice bots or interactive voice response (IVR) systems. Another area that is targeted by adversarial noise is security and surveillance; a potential attacker may hide malicious activities by introducing inaudible perturbations.

4. Conclusions and research limitations

4.1. Conclusions and managerial implications

The main conclusion of this paper is that researchers disagree on how much of a threat that adversarial attacks can bring. Most of the attacks mentioned in this paper are relatively easy to conduct from an analytical perspective but relatively difficult from a physical perspective. However, with the growing use of AI, these restrictions will be reduced, as the number of possibilities will be much greater.

This study sheds light on wider aspects of adversarial machine learning. Many companies rely on AI, and many business processes are supported or even run by machine-learning algorithms. Processes like product recommendations, credit scoring, financial fraud detection, and trade decision automations are commonly used by companies (not to mention chat bots, voice bots, and other tools from the robotic process automation domain) (Sobczak, 2020). Yet, most organizations do not include activities that would counteract adversarial attacks. Despite the awareness of such threats, they have yet to be considered significant risks. Another issue is the lack of tools that could help companies at the stage of model building and model operationalization (Kumar et al., 2020).

The main concern arises of whether it is possible to protect modern AI systems from adversarial data. As for now, there are no solutions that would make AI systems more robust. There are, however, sets of good practices to prepare to deal with any potential vulnerabilities. They mainly state that training data should be enriched by synthetic adversarial data to teach the model to deal with these kinds of examples (Dai et al., 2018). However, this approach has natural limitations: the model cannot be fed with an infinite number of adversarial examples (especially when an attacker uses complex analytical strategies to create malicious data). Another strategy is to make surrogate input that is so close to real cases that it can be assumed that the adversary will proceed in a similar way (Uesato, Donoghue, Oord, & Kohli, 2018).

Among all of the most common programming languages and analytical platforms, only Tensorflow software offers functionality for managing an adversarial sample. It has built-in mechanisms to protect against attacks on AI algorithms by using appropriate tests (Kumar et al., 2020).

4.2. Contribution

Although this research area is relatively young, there are already well-defined categories and definitions. This study contributes to the AI literature by making a review of the threats and by a deep analysis of the adversarial machine-

learning categories. The paper also contributes to management science research, as it sheds light on the potential risk to many business processes that rely on AI.

4.3. Limitation and future research

Discussing the results of this study, two limitations should be considered. First, the study is a review of the literature and potential threats; thus, it lacks empirical evidence. Second, an inherent limitation is that most of the presented evidence has an academic background, as it is the result of experiments.

Future research should focus more on the managerial and social aspects of these new risks that are arising. There is a deep need in both business and academia for frameworks of dealing with adversarial risk, as it is a matter of time before this type of attack becomes more common.

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The turn of the 21st century has proven to be a period of major transformations in the mechanisms of the functioning of economies that have resulted from the impact of the transformation and globalization processes that have marked out a substantially different order in the entirety of our social, economic, political, and legal systems. Supported by their growing openness and resulting interrelations, the processes of deregulating and liberalizing economies have contributed to the intensification of capital flows in the global dimension and the unprecedented development of financial markets. The first decades of the present century have also depicted the power of a critical situation's influence on the functioning of economies and their entities. The global economic crisis that started with the collapse of Lehman Brothers in 2008 (which was the first crisis of the globalization era) reminded executives that crises are an inherent element of the functioning of an economy and a factor that implies the need for searching for new management solutions that can guarantee the survival of enterprises and their abilities to fulfill their goals. Totally different conditions are currently accompanying the critical situation evoked by the COVID-19 pandemic that started in China at the end of 2019; this has contributed to the economic, social, and political destabilization in the global dimension that will reverberate for decades. The transformations that we have witnessed in recent decades have also contributed to important transformations in corporate management. The consequences of these are changes in management paradigms and concepts (referring not only to the occurrences of new solutions within this scope but also primarily in the evolution of existing ones) and the creation of hybrid paradigms and concepts (adjusted to the undergoing changes with regard to the relationships of an enterprise with its stakeholders). This monograph discusses the aforementioned problems from the theoretical, methodological, and practical perspectives that are presented in the following chapters. It has been divided into the following three complementary parts:

- Macro- and Micro-Environment of Modern Business,
- Methodological and Practical Perspectives of Managing Modern Business,
- Innovation and Digital Technologies in Face of Challenges of 21st Century Economy.

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