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FROM PSEUDO-INTERDISCIPLINARY HOLISM TO HOLISTIC APPROACH BASED ON INTER-, TRANS-, CROSS-, AND MULTIDISCIPLINARY SCIENCES AND RESEARCH

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Abstract. A brief survey of the approach and procedures of human knowledge and research, from *Mythos* to *Theos*, and then to *Logos* and finally to *Holos*, represents the beginning of this paper. The central section describes the leap from pseudo-interdisciplinary holism to the modern integrative and holistic approach and to integrative science.

Keywords: *Mythos*, *Theos*, *Logos*, *Holos*, pseudo-interdisciplinary holism, holistic research, inter-, trans-, cross- and multidisciplinary sciences and research, integrative science.

1. INTRODUCTION

Historically, scientific research defines a civilization, generating a certain type of own culture and a unique conscience of its own in human evolution, transforming history and human evolution into a long series of mixes, as many inter-, trans-, cross- and multidisciplinaryities exploited in a significant manner and, more especially, in a completely different manner, oscillating between research of major existential impact and research with cultural allusions and resonances in the conscience of the era.

The evolution of initial knowledge and subsequent research overlaps an approach outlined in four steps, which has taken an approach that lasted millennia, from *Mythos*, rooted in ancient myth and mythical consciousness, from which humanity took a first step towards *Theos* or the theist mixture, manifested with the appearance and existence of the pyramid-layered state and its theistic conscience, then passing through the *Logos*, the Word, which became essential in medieval times (continuously diversified in meanings and types of significance, from a quantitative logos to the theist one, or from the idealistic logos to the natural logos, finally moving from the mechanistic to the rational logos, to the relativist logos, etc.) and finally stopping in a *Holos* [1] that was initially difficult to predict, redefined through today's systemic, integrating approach, much-needed for salvation through knowledge and full, thorough research of nature, of the environment, of the ecosphere and, especially, of our human nature (holism being unimaginable outside the essential Socratic investigation of *know thyself*).

This whole sequence of steps can also be redefined as a long oscillation between safeguarding and destroying, between conquering and being conquered, between colonizing and being colonized, between eating or consuming and being eaten or consumed, between surviving and disappearing, between researching others and letting others research or investigate you... [2]

Transformation from *Mythos* to *Theos* overlaps the change of primitive technologies, complemented by resource concentration through agriculture, animal raising, weaving and pottery, within the framework of human groups, and implicitly cultural development as an aggregation of varieties of zoological and botanical knowledge, and experiments related to agriculture and animal husbandry. Mythological nature was comprehensive in point of dimensions, and also animistic and spiritualistic in point of substance. Nature and people did not exist in separation, and all the less in opposition.

The transition from *Theos* to *Logos*, initiated by new discoveries in the field of metal smelting technologies, measuring land borders and development of calendars to keep track of time, in parallel with developing writing, in order to write and convey messages, with an immediate impact on population growth and complexity of social organization, this transition has generated a first pressure on science and research, diversifying them and consolidating the existing ones. The *gens* and the tribe surviving exclusively on a maternal support, through the fertility specific to *Mythos*, they were substituted by the layered pyramid of the state, redefined as official organization and characterized by a strict hierarchical structure and a strict discipline, shifting the major emphasis on male domination; father domination represented the key of thought in the new *Theos*. Order in relation to knowledge and research developed *on earthas it is in heaven*, through networks of information interconnections, which that stretched from the deepest areas of both the living nature and lifeless nature, to some of of the most sensitive areas of human conscience, through a social order rooted in the cosmic principles, the consciousness of heaven and earth protection rising high above human knowledge and understanding, while checking his wish for knowledge.

Transformation from *Theos* to *Logos* represented a leading to other values, generated by different technologies, and completely new resources. *Logos* gradually became a rational discourse, and even rationality, defining a central concept of both philosophy and other sciences, and of the first contacts rational of a number of scientific research processes.

Logos gave rise to the concept of quantitative measure, or *metron*, and gave human civilization an inexhaustible route to cover in achieving knowledge and research of nature, with a major impact in formulating new theories and in the emergence of new sciences, based on increasingly complex observations and reasoning.

Logos and *metron* delineated a new consciousness in their relationship with knowledge and scientific research. The last

three centuries were circumscribed to the departure from Newtonian mechanistic logos (a logos of the universality of the laws of motion, confirming that the environment is a divine clockwork moved by the primary power and functioning harmoniously and eternally in keeping with the strict laws of nature likely to allow the thinking mind to know the past, present and future) and allowed entering the Einsteinian relativistic logos, where humans, as entities endowed with a mind and consciousness, are free to investigate, for their own purposes, nature, environment, and even science and research themselves... In a way, even the notion of relativist Logos became invincible in research issues.

Albert Einstein was right when he noted that the problems created by the prevalent way of thinking cannot be solved by the same type of thinking, that a society having the conscience of relativistic logos cannot find relativistic solutions to the problem of science and research. This is the result of a crucial insight into the current existence of humanity. A new viable civilization must generate the development of a culture and conscience very different from the conception that characterized most of the past century, and the alternative is a human civilization centered on sustainable human development based on scientific knowledge and research, new technologies and new resources. The new development of scientific knowledge and research has combined extensive development (obviously unable to provide sustainability, finally conducive to chaos) and intensive development (propelling human society towards a new way of knowledge and research, of a systemic, aggregating, holistic type). [3]

The new transition can be detected in the rapid transition from relativistic Logos to Holos, and is a vital sign of hope in our so critical times. In Erwin Lászlo's model, introduced in 2006, in his book entitled *The Chaos Point: The World at the Crossroads*, this transition is based on a holistic approach, promptly transformed into a cultural and scientific force, related to major research (holism captures the deepest spiritual instincts: to fulfill you as a human being through knowledge; to generate, through research, communities that are independent, creative, healthy and comprehensive, both locally and globally; to include, in scientific and research activity, as many resources, items and dimensions of nature in general, and also human nature, in particular by being environmentally friendly; to know, to connect and to feel that you are part of the whole meaning and the whole mystery of the existence of human society, as the entire scientific research activity tries to preserve the essence of the existence of human society; to feel part of a civilization in which scientists and researchers think, publish and finally behave like responsible citizens of the planet, of the Earth's community which provides them a home and a vital mystery.

If in science holism seems limited and overlaps the principle that process raw materials or the unorganized energy units of the world, uses and organizes them, offers them a specific structure, character and individuality, and finally, personality, integrative holism does the same thing especially to create beauty, truth and specific values of knowledge and

scientific research for themselves [4].

Contemporary *Holos*, on which modern integrative holism is based, is not complete before it is able to solve the issues of priority of permanent knowledge of existential sources, in order to maintain a balance on planet Earth and not destroy life, correctly anticipating long-term structural and functional problems, while grounding them on success criteria for short periods of reference, and on the day to day evolution of scientific research and the development of multidimensional integrative knowledge.

2. FROM PSEUDO-INTERDISCIPLINARY HOLISM TO MODERN INTEGRATIVE HOLISM

The term holism was first used by Aristotle, in the superior sense of being the whole or the universal, the completeness or the continuum of the parts, in his *Metaphysics: The whole is more than the sum of its parts*. In terms of its specifically contemporary significance, holism and holistic have been introduced into sciences and research language by the South African statesman Jan Smuts, in 1926 [5].

Epistemological Holism or Confirmation Holism coexist, in connection with which new disciplines or sciences cannot be tested in isolation (unidisciplinarily), but rather at their contact and in their dependence on other scientific disciplines or sciences (appealing to inter-, trans-, cross- and multi-disciplinarity), as well as Semantic Holism, in accordance with which a certain terminology, methodology, type of modelling, theory or simply a certain part of language can be understood and valued in knowledge and scientific research only in relation to a broader segment of language, or in a pluri-methodological, multi-model and even multi-theoretical context, by a larger segment of language, possibly the entire scientific or research language.

There is also an inevitable compromise with linguistic origins, called *Moderate Holism* or *Semantic Molecularism*, which tries to place holism within very broad knowledge and scientific research fields (for example, social science), rather than the entire universe of knowledge and research, which actually brings together all these areas that have their own language, methods, theories, and especially a specific form of thinking (from e-grammar or e-syntax to e-languages, in the most spiritualized meaning, initially given by Noam Chomsky and completed by a growing virtuality exacerbated by the impact of contemporary Internet).

Holism is reflected by the Holos culture and consciousness of the 21st century; both holism and Holos are very different from the logos of the previous century, be it relativistic (see Table no. 1). The final transformation from Logos to holism based on Holos approach in scientific research covered almost entirely the last half of a century, since the 1970s, and is nearing the end in this decade, by its innovative approach to other values, which are generated by the new and original technologies, with other resources, and especially supported by a new mentality of the researcher and of scientific knowledge:

Table 1 Landmarks of Logos turning into Holism based on Holos approach, and the ethics of modern research

<p>Logos, or the word, became during the XX century a synthetic research rational type of discourse, and even a specific rationality, a central philosophic scientific and research concept especially. Logos, as the development of research in the last three centuries has finally yielded to intensive and emerging development, which was able to push society towards a new operating mode, of an aggregative, globalized, systemic and thus prepare the new holistic type of research, inspired by scientific inter-, trans-, cross-, and multi-disciplinary sciences and research... Transition from relativist logos to the current integrative holism based on Holos is the vital sign of hope in our times, plagued by uncertainties and risks.</p>	<p>Holism is based on Holos in science & scientific research and overlaps the principle that processes raw materials or the units of unorganized energy of the world, uses and organizes them, equipping them with specific structure, character and their own individuality, and even a distinct three thinking manners to know the past, present and future. Holism based on Holos consciousness must impose a new type of integrative research and ethics for all researchers in keeping with Confucius's principle of reciprocity: "Treat others as you yourself wish to be treated", turned by Gandhi, two and a half millennia later, in the formulation: "Be the change that you want to see in the world", implicitly in the research world ...</p>
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Source: Ghere , M., S voiu, G., (2010), *Economia mediului. Tratat, [Environmental Economy, Treaty]*, Ed. Universitar , Bucure ti, pp. 347 – 348.

Holism based on Holos approach focuses on inter-, trans-, cross-, and multi- disciplinary sciences and on the multidimensional and integrative research (physical, mathematical, economical, biological, educational, cultural, etc.) generating an harmonized adaptation of the human species as a whole [6], not only on the restricted kind of adaptation of the individual, an adaptation based on developing new technologies through a new vision on research and ethical approach on two levels, both globally as the ethics of research in a particular scientific field, and individually, as the ethics of a simple researcher in his/her own (experimental, publishing, and so on) activity.

Logos established the epicenter of the development of science and scientific research after subsequent measurements in a Eurocentric area, showing an unusually high proportion of leading scientists and researchers of particularly important impact in human evolution, around 80%, of the dominant figures, who were born in a hexagon bordered by Glasgow, Copenhagen, Krakow, Naples, Marseilles and Plymouth, and then extending the area by a radius of less than 100 miles of this area, the rest up to 98-99% could be easily included. [7]

Holism fully extended not only the area of world science and research development, but it also abandoned the classical investigation and observation limited by resources and time in favour of systematic experiment whose methodology is based on statistical physics and which has a maximized degree of coverage, using the survey theory, followed by statistical inference with an ever smaller error, and also in favour of scenario-directed forecast centered on the modern theory of

probability and the new types of fuzzy or neutrosophic logic.

The concept of pseudo-interdisciplinary holism is connected somehow with the individualism and systemism. Based on this, it becomes necessary to be provided for the science and the scientific research the need of a real systemic approach, based on *inter-, trans- cross- and multidisciplinary sciences and research* and against a pseudo holistic one.

But systemism and pseudo-holism are used interchangeably in most of the ecological sciences and research being equal to partial holism, due to methodological limitations, consisting especially in the limited resources available for inter-disciplinary research only.

An investigated reality is a totality transcending its components (entities, sub-systems, systems etc.) and has emergent and global properties, reducible to any properties of any part included in the reality). Reality acts on its entities more strongly than they act on reality and the interaction between two fields of reality is a whole-whole affair. The economic, political or social changes are supra-entities although all of them affect the individual structures of the analyzed reality.

The proper research of a reality in a holistic manner is the research of its global properties and changes.

The economic, political or social changes and facts are explainable in terms of supra-entities or units such as the state or supra-components forces such as the aggregate destiny of the reality. All the hypotheses and theories are either beyond empirical testing (antiscientific holism) or are tested against economic, political and sociological and historical data (science-oriented holism) [8]

The modern holism means that living matter or reality is made up of organic / unified wholes that are more and more important than the simple sum of their own parts, and holistic investigation could be considered a system of research or exhaustive scientific analysis [9].

Kafatos and Dr g nescu use the concept of integrative science as a result of the expansion of the contemporary holism. [10] Integrative science is reconsidered as a way of scientific and Luciferic knowing and research with a dominantly transverse or transdisciplinary sense, and not a paradise-like one (in the meaning Lucian Blaga gave that antinomy of knowledge in itself), and even simultaneously paradise-like and Luciferic, in the opinion of the authors of this paper, that is simultaneously horizontal or interdisciplinary and transdisciplinary by transversality, also articulating, through this integration, cross and multi-disciplinarity into scientific research (MihaiDr g nescu styled this type of science and scientific research by the name of orthophysics, and Amoroso [11], in 2001, Noethic theory).

Thus, the holistic performance of research gradually becomes its fundamental indicator in the contemporary context, and its character of an integrative science turns into the aspiration of superb sciences, in the meaning assigned to them by Penrose.

3. CONCLUSION

The holistic approach to contemporary reality is less and less of the one-sided type of interdisciplinary investigation, and, no doubt, the need is increasingly felt for continuous approaches of the inter-, trans-, cross- and multidisciplinary type, namely the need for modern research based on research team work and through research projects, along with the obvious obsolescence of unidirectional or exclusive observation, and the ultimate goal is also one of adequacy within today's globalized, political, economical and social context.

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A HOLISTIC APPROACH TO INNOVATION MANAGEMENT IN BANKING: A REVIEW

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Abstract. *This article analyses theoretical background of innovation and frameworks to guide managers in banking towards a holistic approach for successful innovation management in a highly dynamic and competitive business environment. We aim to provide a holistic viewpoint by eclecticism in review of multiple approaches. With regards to a holistic perspective on innovation management in banking, the paper provides strong foundation to better understanding the dynamics in banking and facilitates exploring of future business opportunities for sustainable competitive advantage in banking, which is particularly significant for this sector.*

Keywords: *innovation management, banking, holistic approach, open innovation, strategic innovation.*

1. INTRODUCTION

Banking industry is facing the numerous challenges in recent decades as a result of mainly external forces that are changing the market at high speed. Phenomena such as: volatile business environment, dynamic customer needs, regulatory pressures, rapid technological development, fierce competition and shorter product and service life cycles are trends that shaping banking sector in the 21st century. In order to sustain competitive, banks need to understand these trends and to redefine existing business strategies without any delay [1, 2].

Innovation is widely accepted as the core of a competitive economy [3], taking into account that has always represented a key role in sustainability and development of any organization, as an inseparable part of organizational ambidexterity. Innovation implies a set of knowledge and actions that leads to creation of new products, services, processes and markets, or expansion existing ones. As such, innovation is recognized as one of the competitive forces of an organization [4, 5].

Also, it has been argued that organizations may achieve a better business performance with the clear and unambiguous innovation strategies [6]. Depending on how well organizations set up and implement product and/or service development activities and thus accomplish continuous innovation success is influenced by their organizational innovativeness [7, 8].

In the last half-century, many researchers have produced an extensive scientific overview regarding the innovation. Some studies are based upon innovation typologies such as technological innovation [9, 10], product and process innovation [11], service innovation [12] and strategic innovation [13, 14], while some studies are focused on economics of research and development, innovation diffusion and innovation output [15 - 17]. Many theories such as institutional theory, cognitive theories, transaction cost

economics, socio-technical approaches, market orientation and resource-based view theory [19] have provided important theoretical findings to the innovation theory. Also, research findings on contributing factors to successful / failed innovations in financial services [21], approaches to new product development [22] or customers' involvement in the development process [23] have contributed to the innovation theory and practice in certain aspects of service innovation. However, none of these theories represent a comprehensive framework that guides managers toward successful innovation management considering a holistic perspective. Also, scholars that deal with the innovation management in service sector assert that major gaps in understanding development of service innovations in financial service sector still exist [20].

Despite the fact that prior studies have provided significant contribution to the innovation, most research is focused on particular aspects of innovation and accordingly does not provide a holistic framework to innovation management. Moreover, the previous literature suggests that managing innovation is a complex and risky process [18], hence requires systematic and more holistic approach to innovation management in order to be successful in innovation outcomes and organizational performances.

The aim of this paper is to extend and deepen the theoretical background of innovation and to provide an overview of conceptual frameworks for innovation management from holistic perspective to facilitate discovering future business opportunities for sustainable competitive advantage in banking industry.

2. LITERATURE REVIEW

Innovation implies an idea, object or fashion experienced as new by organization, units or individual [53]. Perceiving innovation at the organizational level, innovation can be defined as a new idea, product, service, process, technology and structure. Earlier studies adopt innovation as a process that encompasses generation, acceptance, adoption and implementation of novelty [54, 55]. In the context of organizational innovation, it includes research, development, and implementation of new ideas and behaviours [58].

Innovation management represents the implementation of inventiveness within organization, and in essence it illustrates a certain pattern of organizational change [24]. Also, innovation management is defined "as the invention and implementation of a management practice, process, structure, or technique that is new to the state of the art and is intended

to further organizational goals” [25]. To achieve successful innovation management, it has been argued that organizations have to achieve valuable performance and integration of the domains that imply innovation strategy, management of creativity and ideas, selection management, portfolio management, implementation management and human resource management [48].

Considering the on-going globalization of economics and markets that accelerate innovation processes and due to significant changes in financial service sector, holistic approach to innovation management is recognized as highly valuable to face the challenges in a dynamic and complex business environment. Some researchers argue that the holistic economic approach of innovation systems provides a fruitful basis for better understanding the dynamics of service innovation [26].

Some authors have developed a pilot holistic model for service industry, drawing innovation as interaction of internal and external stakeholders [27]. The holistic model consists of two parts. One part implies managing key business activities in a targeted manner, i.e. the involvement of customer contact employees by the top management. It has been argued that customers’ involvement have positive attitude to long-term relationships “to avoid the cost of starting a new relationship and thereby positively interact with contact employees” [43]. Also, the strategic focus on innovation management is supported by many scholars. Furthermore, it is considered that the successful innovation strongly depends on top management support as main activity in the innovation process [32]. The second part of the model is related to foundation of a positive climate for innovation [27]. Creating a positive innovation climate is closely associated with the organizational ability to bring together customers in the innovation process. Recently conducted empirical studies argue that customers’ involvement into development of product and service innovations are much more successful than without them [28], and customers now co-create value with the enterprise more and more, taking on an active role of “prosumers” [78]. Many authors have agreed that customers need to be an integral part of a holistic innovation strategy. Moreover, literature argues that, in financial services, customers need to be in the centre of business focus [29 - 31]. However, due to changes in the business environment, engaging customers into the development process require new methods and suitable information and communication technologies to facilitate external knowledge flows into the organization, especially in financial service sector as one of the knowledge-intensive industries. Designing interface between financial service organizations and its customers simultaneously facilitates interaction with the customers and creates possibilities to collect new ideas [30].

Taking into account increasing trend towards customers’ integration into the innovation processes, a new model of innovation has been recently occupied both, scientists and practitioners worldwide, i.e. open innovation model. The idea of open innovation hypothesizes that organizations cannot

innovate in isolation if they intend to be competitive. At the end of the 20th century, Chesbrough identified several factors that eroded the underpinnings of the closed innovation concept when closed innovation shifted to open innovation. Numerous examples of concept success, like Innocentive [79], illustrate theoretical framework. One factor was changed in industry and society which resulted in increased mobility of highly experienced and skilled people. The mobility of knowledge workers allowed ideas and knowledge to spill over from central R&Ds to companies of all sizes in many industries. Secondly, the development of financial structures such as private venture capital caused the innovation processes to exceed the boundaries of a company. Thirdly, shorter product life cycles, advanced technology and increasingly knowledgeable suppliers and consumers challenged the companies to profit from their internal source of knowledge. These factors affected all industries once they made a closed innovation approach no longer sustainable. As a result of these influencing factors, an open innovation approach has replaced the traditional closed innovation [33, 34].

Open innovation is defined as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively” [35]. According to the idea of open innovation, a shift from the previously closed boundaries of an organization to a semi-permeable membrane should enable an innovation to easily move between the internal R&D and external environment. Moreover, the central role of innovation is to research new ideas that have saleable potential at the open market [36].

Following pioneering definition and researches regarding open innovation, literature on open innovation concept has covered various topics. These topics include the different forms and the degrees of organization’s openness, knowledge flows, the involved parties into the innovation process, and the influence of openness on innovation performance [36, 39, 40, 41]. “Open innovation has come a long way in the past decade, in both the quantity and quality of research on the topic. The original conception of open innovation has been enhanced through inbound knowledge flows from other frameworks and theories innovation, strategy and economics. At the same time, outbound flows from open innovation have shaped and influenced innovation studies and other areas of social science research” [44]. Since its origination, the concept of open innovation has had powerful links to resource-based view of the organization, as well as the related dynamic capabilities perspective. Furthermore, there are strong links between open innovation and research on absorptive capacity [44].

Given that intellectual assets and knowledge flows became inseparable components of the new economy, open innovation is extended for the most recent definition which states that open innovation is distributed innovation process based on consciously managed knowledge flows outside an organization, using tangible and intangible mechanisms equivalent to the organization’s business model [42].

While some authors emphasize that open innovation

represents the most suitable way towards creating the superior value to the customers and organization [30, 37], another underline that open innovation concept is a holistic approach to innovation management [38].

3. INNOVATION IN BANKING INDUSTRY

The lines dividing competing banks are becoming progressively indefinite, exceptionally with regard to the products and services offering. Accordingly, it becomes extremely challenging for the banks to obtain differentiation advantage over competitors, taking into account competitors can easily imitate. Consequently, competitive edge is based on the ability to provide “strategic services that are tailored to the unique requirements of clients in a timely fashion” [49]. Many authors argue that innovation represents an additional means by which banks may straighten out market performance and achieve competitive advantages at the financial market [51, 52].

Innovation in banking industry is acknowledged as an influential factor that basically changes economics of banking and the financial system in general. Also, it has been argued that innovation has the power “to enhance the efficiency of the financial systems in the performance of its core functions” [45], and accordingly to significantly contribute to the economics [45]. Financial innovation is defined as something new that brings cost reduction, risk reduction, and provides advanced products, services and instruments that fitting the financial system stakeholders’ requirements [46].

Successful innovation in the banking industry is based on the set of integrated drivers that encompass excellence, satisfaction, simplicity, sociability, differentiation, separability, innovation speed, technology use, product fit and innovative culture [64, 65].

3.1. Types of innovations in banking

Previous literature on the type of innovation in banking differentiates areas of innovation on product innovation, process innovation, and risk-shifting innovation [45]. In addition to this, John White, America’s Banking Lead of the Institute for Business Value extends the innovation types in banking to the operations innovation, business and enterprise model innovation [50]. Some authors state that most oft-recurring types of innovation are product, process, administrative, technical, radical and incremental innovation [56].

Product innovation includes new products or services introduced by a bank to meet customers’ needs [58]. Banks that are active innovators of products use organizational systems substantially different and more suitable for developing new products in comparison to the less active product innovators banks. “Active product innovator banks have also progressed considerably in opening up traditionally tight operating structures in order to initiate product innovation” [57].

Process innovation implies new elements introduced into a bank’s operations [58]. Banking industry needs a revolutionary

approach to reduce time to market. Accordingly, business has to be viewed not in terms of functions or products, but rather as key processes. Process innovation incorporates the employment of a business process view with the utilization of innovation to key processes to achieve large-scale cost reduction and developments in flexibility and quality at service level [59]. Some empirical studies show that local banking development influences the probability of process innovation, but weak affects the product innovation [47].

Banks that aim at enhancing shareholder wealth have to concentrate on managing underlying risks and operations. Risk-shifting innovation refers to unbundling of the particular elements and risks of certain mechanisms that should be further integrated using diverse combinations [45], while operations innovation focuses on technologies and business practices that will allow banking operations to innovate in line with the predefined business strategy [60].

Administrative innovations include organizational structure and administrative process. This type of innovation represents the innovativeness that are indirectly related to the organization’s basic business operations, while significantly influences a management systems [54].

Since business environment has changed over the last 30 years, banking sector is undergoing a period of transformation that results in adoption of new business models, suitable to deal with the uncertainty and complexity. Business model innovation becomes extremely valuable for the banking industry, since its affecting long-term success of a bank. Moreover, it has been argued that innovation in business models becomes a more important than innovation in product and service as factors that foster sustainable competitive and growth of an organization [61].

3.2. Innovation culture in banking

Most organizational scholars perceive organizational culture as powerful weapon to achieve better business performance and enable long-term effectiveness of organizations [62]. “Creating a more innovative culture requires a change in the system, because people’s beliefs about innovation are related to beliefs about other aspects of the system” [66].

Leading organizations cherish an innovative culture and entrepreneurialism by having strong support from strategic management and structured internal processes which promote networking, collaboration and risk-taking among employees. Also, these organizations have a clear performance management structure measures and rewards for desirable behaviors which encourage innovation [63]. The innovative culture within an organization incorporates an innovative vision and leadership, style of management, development of idea creation, flexible organizational structure and advocates organizational support for innovativeness [65].

However, due to a risk-averse culture, short-term focus that is typical for banking industry, siloes approach to operations and lack of internal capability, banking sector is not recognized as the most innovative industry [63]. Past was characterized with a tight bureaucratic organizational structure with high levels of centralization and standardization, which

resulted in inflexible business models. Yet, today's banking industry confronts to a highly competitive business environment that requires quick and effective response to rapid external changes [1, 67]. Although organizational culture in the banking industry is changing, there are still barriers that discourage innovative culture within the banking sector. Organisation culture and organisation silos are viewed as very important barriers to innovation, particularly for large and medium size banks. In contrast, small banks tend to suffer less from cultural issues and organisation silos [68].

Development of innovation culture in banking sector, and particularly in large banks represents a challenge task to the strategic management, since banks have to have strong focus on risk management and to take into account regulations when innovating. Also, innovation culture development implies a set of activities with strong support of senior management and a lot of time to innovative culture flourishes [68].

Key to successful adoption of innovative culture is the inclusion of all employees in the innovation process. Also, recognition and rewarding contributors magnifies the awareness of the significance. "Innovation departments can play a role in developing the organisation culture but there is still a wide variance in the use and structure of innovation departments, even in the most innovative banks" [68] worldwide.

3.3. Technologies and innovations in banking

Information and communication technologies (hereafter: ICT) represent a strategic competence and significant driver of change at most companies since the end of the 20th century [69]. The role of ICT evolved over the last 20 years. Traditional "back office" function is shifting toward a more "strategic" role enabling both, supporting an existing business strategies and shaping new ones [70].

Following growing consumer requirements and strong competition, banks are investing a lot into PC banking technology. As a result, banks are introducing new technologies that facilitate consumers to do financial operations at more comfortable and accessible way [49]. Significant innovations related to technologies that marked the last decades are ATMs, internet banking, telephone banking, e-banking and e-money [49, 71]. Recently, m-banking has been recognized as an extraordinary opportunity for a new mode of e-commerce, and major factor that influences banking performance and business at a high speed [72]. Besides of innovations of banking distribution channels, innovations of internal banking systems exercised strong influence on performance and profitability of banks, too. Among all, customer relationship management and bank management technologies are recognized as the most featured technologies [49, 73].

According to the Efma and Infosys survey results of over 150 banks worldwide, IT systems present the most significant barrier for banks of all sizes when innovation is in question. It has been found that one of the major issue with IT systems is that they are silo based, which implies that integration is complex and difficult process. Banks argue that "silo based

systems had the most impact in terms of time to market, cost of innovations and functionality of innovations" [68].

Over last few years, there is a consistent trend showing that banks are more innovative in distribution channels than in other areas of business. Also, based on survey results, the highest priority of IT investments in the forthcoming period will be in channels (26%), followed by products innovation (21%), while process innovation is in the third place of priority with 18%. Customer service and experience innovation, sales and marketing innovation and other innovation have lower priority of planned IT investments [68]. Planned IT investment areas are presented in Figure 1.



Fig. 1 Planned IT investment areas in banking sector [68]

Overall, innovations in terms of technologies will represent investments with the capabilities for banks to launch products and services faster, with the features such as personalized products using multiple channels. "Enterprise-wide systems can support these capabilities, and a componentized approach to deployment of these systems can reduce risk and make the exercise more practical" [68].

4. TOWARDS A HOLISTIC APPROACH TO INNOVATION MANAGEMENT IN BANKING

Innovation management represents a vital process for banking industry. Taking into account that innovation process encompasses a number of business activities undertaken to carry out the innovation into market, it has been noticed that in the extremely volatile and uncertain business environment, innovation management requires new forms of managing the process. Accordingly, a holistic and systematic approach to management innovation along with the development and adoption of effective implementation mechanism and structures, are elements that should be the basis for managing innovation to create significant improvements in the value creation to all corresponding stakeholders. Moreover, effective external linkages focused on generating a portfolio of ideas should be in the focus of any organization, yet banking particularly [1, 74].

Long-term vision to holistic approach of innovation process lies in "an interactive model with feedback loops and interactions between different activities" [1], by shifting from linear to nonlinear process that requires corresponding innovation strategy [75]. Banks have recently shifted its focus

towards innovation strategy, which is recognized as the most significant strategic tool of innovation, by focusing on establishment of a clear set of objectives, processes and innovation performance metrics. Due to wide range and various types of innovation areas, innovation strategy allows banks to effectively prioritize its resources and it is confessed to be the essential for banking [68].

Fasnacht has developed a conceptual framework regarding managing innovation that is based on open innovation model for financial services. The model implies three basic principles: a transition strategy from a closed to an open innovation model, dynamic managerial practices, and appropriate corporate culture of open innovation [1]. The model emphasizes shifting from vertical organizational structure to structure that is founded on openness, flexibility and customer-centric principles. According to the authors, strengthening trust within an organization and intensifying partnerships with external stakeholders becomes increasingly important in an interconnected world. Also, employees and customers are recognized as two most valuable assets of the business in financial services. [1, 31].

Many organizations in banking industry rely on an ad hoc and unstructured innovation approaches that often results in incremental developments. To this end, a framework that provides outcomes driving a growth takes into account seven perspectives: a managed innovation process, strategic alignment, industry foresight, customer insight, core technologies and competencies, organizational readiness and disciplined implementation [76].

A holistic observation connects theme of this article with the trend observed by Hagel and Singer [77], where most large corporations comprise of three bundled, but essentially separate parts:

- Customer relations management
- Product innovation
- Infrastructure management.

In that context, it is possible for organizational structures in banking industry to increase distinction of these three parts, ranging from changes in departmentalization [80] to complete transformation to internal network [81]. That trend is observed at the example of Swiss private banking [82].

5. CONCLUSION

As the global marketplace is characterized by intensive political, economic, social, technological and demographic movements, change became a ubiquitous and decisive, creating equally possibilities and threats to the banking sector. Accordingly, a holistic approach to management innovation provides strong foundation to better understanding the dynamics in banking and represents a valuable instrument to face the challenges in volatile business environment.

Many authors argue that competing on innovation differentiation facilitates strengthening position at the highly competitive marketplace. To achieve better innovation performance in banking, integrated drivers such as excellence,

simplicity, sociability, satisfaction, differentiation, separability, innovation speed, technology use, product fit and innovative culture should be incorporated into an organization and all areas of banking business.

Literature on the type of innovation in banking differentiates areas of innovation on product innovation, process innovation, risk-shifting innovation, operations innovation, and business and enterprise model innovation. Among all, business model innovation is recognized as extremely valuable for the banking industry, since its addressing long-term sustainability and growth of a bank. Also, banks have recently shifted its focus towards innovation strategy by focusing on establishment of a clear set of objectives, processes and innovation performance metrics.

The literature review introduced in this paper provides frameworks that guide managers toward successful innovation management considering a holistic and systematic approach, with the aim to facilitate new business opportunities for sustainable competitive advantage in banking. Conceptual framework towards holistic innovation management that is based on open innovation model for financial services suggests three basic principles to be taken into account in the process of transformation: a passing strategy from a closed to an open innovation model, dynamic managerial practices, and corresponding innovation culture that fosters innovation blooming. Introducing an innovation department can play a significant role in shifting from traditional to a more innovative organization in banking.

On the other hand, a framework that takes into account seven perspectives: a managed innovation process, strategic alignment, industry foresight, customer insight, core technologies and competencies, organizational readiness, and disciplined implementation, leads to a systematic innovation management, which represents a foundation for creating radical innovations as a basis for business performances development.

There is no doubt that traditional approaches to innovation management in banking are no longer feasible. Consequently, new forms of managing innovation with a holistic view and systematic acting, along with the adoption of effective instruments and structures should be carried out in banking to create superior value to customers and stakeholders, respectively. Shifting from linear to nonlinear innovation processes, continually incorporating internal and external knowledge in the innovation process, consciously managing knowledge flows, intensifying partnerships with external stakeholders, creating a customer-centric organization and adopting the strategic innovation framework are leading principles of managing innovation, aiming at building sustainable competitive advantage and developing sustainable growth in banking.

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ECONOMIC GROWTH, DEVELOPMENT AND POVERTY DYNAMICS: AN INSIGHT FROM THE SOCIAL FIELD THEORY

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Abstract. *A review of the relationship between economic growth and incidences of poverty in the USA suggests that there are conflicting relationships over time between these two measures of the economy that can be attributed to the trickle-down effect. We revert to science and expanded the Social Field Theory in order to examine the relationship between economic growth and poverty by grouping the means of production into two categories: capital and capabilities. Balancing forces of capitalism by that of capabilities can be one way forward towards creating a stable upward economic and social mobility.*

Keywords: *social field theory, economic growth, development, poverty, economic entropy.*

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1. INTRODUCTION

Many researchers have analyzed pooled data in order to understand the casual relationship between economic growth and poverty. Analytical tools range from the measures of central tendency to that of dispersion; as well as, simple linear regression to non-linear models. The relationship seems to be dependent on what segment of data is elected, along with which analytical tools and methods are used. This is quite natural, however, conclusions drawn out of the same data set, even of the same studies, are found to be dependent on the researchers interpreting the results. It prompts a premise that economic growth may have differential impacts on incidences of poverty at different point in history, geography; the magnitude of economic growth must also be taken into consideration. In addition, there may be some endogenous or exogenous factors that have never been taken into account for such analysis.

President John F. Kennedy famously promoted the slogan ‘A rising tide lifts all boats’ which implies that economic growth should benefit all by wealth trickling down from the wealthiest to the rest of society, including its poorest. This popular notion seems to be supported by statistics: the percentage of US families with incomes of less than \$3,000 (in 1963 dollars) fell from 31.4 per cent in 1947 to 18.5 percent in 1963. While John Kenneth Galbraith and Michael Harrington have argued against the validity of the trickle-down effect, it is probably Anderson [1] who first dissected the census data (1947-60) in

order to demographically isolate groups of vulnerable individuals in the society who were ‘untouched’ by changes in the levels of income enhancement attributed to the economic growth. Using the log of median income distribution at various phases of economic growth Anderson [1] underscores the diminishing effects of growth on poverty in America. Thurow[2] used a linear regression based poverty model, attempting to identify the relative importance of different factors contributing to a sharp decline in incidences of poverty in the period. The TAL[3] bivariate model contributed to knowledge base of the diminishing effect principle, even though Hirsch [4] criticized the selection of dependent variables in the model to suggest that there is not any significant evidence that the beneficial relationship between economic growth and a reduction in poverty petered out in the post Kennedy period. Aghion and Bolton [5] proposed a model of growth through which they analyzed the trickle-down effect of capital accumulation. They suggested three phases of economic growth and inequalities resembling that of a Kuznets curve. Enders and Hoover [6] could not accept the outcomes of other studies [7,8] that argued that the aggregate of poverty was less responsive to the expansion of the 1980s than it was to the expansion of the 1960s. Hence they explored information that may have been missed by linear regression models. Using non-linear model backed by Fourier approximation, they came up with a different conclusion that ‘robust’ growth has a more than proportional rate effect in reducing poverty. Another study [9] analyzes the diminishing effects of economic growth on poverty during the 1990s. Above and beyond the diminishing effect, a research conducted by Greenwood and Holt [10] explains how the negative effect of the trickle down policy has lowered many people’s wellbeing. The president of the World Bank, Jim Yong Kim, has publicly admitted that economic growth is "not enough" to end global poverty [11]. In a half decade since President Lyndon Johnson launched a ‘War on Poverty’ the official poverty rate declined [12] from about 19% to 14.5% in 2013, a 50 basis point down from the previous year.

Evidently, we can conclude that the relationship between economic growth and poverty is still an open question that demands a careful review. Arguments against or in favor of economic growth as a singular way to alleviate poverty do not converge even with more detailed and accurate data that we may amass over time. A research question such as this one that has important public policy implications need to be resolved as

early possible in order not to waste academic resources on debates producing more heat than light. Along this line, we expand on a seminal work by Irving Fisher [13] at Yale University on a framework of the Social Field theory [14] developed at University of Massachusetts. This is an evidence-based scientific attempt to uncover the true relationship between economic growth and poverty.

2. SOCIAL FIELD THEORY

The social field theory hypothesizes that the patterns of the general interactions of an individual in a society can be modeled the same way as other field concepts - such as Newton's laws pertaining to the Gravitational Field.

There are diverse beliefs about poverty that can be classified broadly into two: a) Poverty is Individual; and b) Poverty is Structural. Whatever doctrine one may follow, it is imperative from each perspective that both society and the individual are important aspect pertaining to the dynamics of poverty. There are examples of some countries that belonged to one side of development spectrum that have managed to move to other side within a generation through the collective efforts of individuals along with effective decisions made by politicians in those countries. Hence it is imperative to recognize that cohesion among individuals of a society united for a common cause is another important factor in understanding the dynamics of poverty. Even in this era of globalization, individual behavior is increasingly becoming the key factor that governs the evolution of both the world and society as a whole [15]. Hence, a general interaction between a society and an individual must take into account the parameters of society and the individual, plus a measure to gauge harmony between these two entities.

An individual in a society Ω may value or have reason to value a set of qualities say $\{x_1, x_2, \dots, x_n\}$ with corresponding weight in order say $\{a_1, a_2, \dots, a_n\}$. However, the society as an institution may have aggregate weight $\{w_1, w_2, \dots, w_n\}$ different than the idiosyncratic view of the individual. For the sake of simplicity, we can assume that those qualities are common both to an individual and to a society that can be defined as the aggregate of people living together in a more or less ordered community. Hence,

$$\text{Societal Strength} < S > = f(w_i, x_i) \quad (1)$$

$$\text{Individual Strength} < I > = g(x_i, x_i) \quad (2)$$

It will be ideal if those sets of qualities x_i be linearly independent tuples of vector (S) or (I). However it may not be possible to identify such independent variables within an ecosystem where elements are connected and, complement one way or another. The choice and weight of the element of those vectors S or I may vary across society and geography. Moreover a society evolve and adapt over time. In respect to the sovereignty of a society identifying her strengths, we will leave this to be defined in open academic discussion, in part inspired by Sen [16]. The Human Development Index

(UNDP), Energy Development Index (IEA), OPHI Multidimensional Poverty Index [17] inspired by Sen's Poverty Index [18] are, in essence, attempts to identify strengths of societies in one way or another.

At a given instant (S) can be considered having a fixed magnitude $|S|$, and each individual will maintain a unique social distance, say r , in relation to its society. According to Wright [19], social distance is the relation of social entities to others measuring the degree of their contact or isolation. A reciprocal of social distance may be defined as trust vector (Γ), which can be a measure of degree of social cohesion or well-being. It can be measured utilizing Self-Anchoring Striving Scale [20], known as Cantril's Ladder popular in public opinion research.

Following the analogy of how this takes place in many other fields (such as gravitation, electrostatic, magnetic fields), the social field theory states that the binding force between a society of strength (S) and an individual of strength (I) is

- i. directly proportional to product of S and I ; and
- ii. inversely proportional to the square of the social distance r the individual maintain with society in equilibrium.

Mathematically, the social binding force (in natural units)

$$F = \frac{SI}{r^2} = SI^{-2} \quad (3)$$

In this document 'Social Field' and 'Poverty Field' are used interchangeably to mean the same field concept as described above. In the social field, Intensity = S/r^2 and Potential = $-S/r$. Potential Energy = $(-S/r)*I \rightarrow$ Capabilities à la Amartya Sen $\rightarrow 0$ as $r \rightarrow \infty$.

We postulate:

HP01: Social field is a quasi-conservative field, defined as a field for which rate of change of total energy is a monotonic function of time.

HP02: Poverty levels are quantized in similar notion as in established models of an atom, Bohr's theory of the hydrogen atom [21].

3. CONCORDANCE TABLE: THERMODYNAMICS AND ECONOMIC

Following a seminal work by Fisher [13] in his Yale University PhD dissertation, the concordance table of terminology is updated incorporating knowledge from the most profound discoveries of the 20th century – namely quantum mechanics, relativity theory and the capability approach. Table 1 attempts to account for the hiatus that results from the evolution of walls among academia disciplines, mainly towards interoperability of nomenclature between thermodynamics and economics

Table 1 Concordance table between thermodynamics and economics

Thermodynamics		Economics	
CV	control volume	Ω	a political region (society)
Q	heat	Q	aggregate value, in absolute sense
T	temperature	S/r	economic temperature
ds	entropy change	dSI/S	economic entropy change
W	work	W	input for an economic process
KE	kinetic energy	C_1	capital, SI/2r
PE	potential energy	C_2	capabilities (knowledge, skill etc.), $-SI/r$
E	energy (KE + PE)	A	asset (capital + capabilities), $A = C_1 + C_2$
m	mass	\Im	social inertia
v	speed/velocity	G	growth/development, dA/dt
a	acceleration	dG/dt	rate of change of growth, d^2A/dt^2

In the analogy term with classical mechanics, velocity corresponds to the rate of change of the social distance, dr/dt . In the Social Field $F = \frac{SI}{r^2}$, and the asset $A = -\frac{1}{2} \frac{SI}{r}$. Hence we can write: $F = -\frac{2Ar}{r^2} = -\frac{2A}{r}$. For a given time, say F is constant, the ratio of the asset and the social distance is constant.

This also implies that $dA/dt = -dr/dt$. Hence the growth rate, dA/dt , can function as a proxy of velocity in classical mechanics.

Paul Samuelson, the first American to win the Nobel Memorial Prize in Economic Sciences, credited Fisher's dissertation as being the best doctoral dissertation in economics [22]. Exact sciences have long been intertwined with the evolution of economic thought. Philip Mirowski [23] has summarized the neo-classical approach in economics considering analogies between economic and physical systems. A book by Weintraub [24] highlights important episodes in the mathematization of economics. A critical but thorough review of efforts so far in connecting thermodynamics and economics has been summarized by Glucina and Mayumi [25] in a language that is comprehensible to general readers. At the same time they also undermined another landmark effort made by a physicist Wayne Saslow [26] towards exploring economic analogues to thermodynamic variables. One of their conclusions was that there are a number of thermodynamic variables that do not have counterparts in economics. This does not seem to fully confer the cross-disciplinary wisdom the topic may demand. Evolution and the diffusion of mathematics and other sciences (exact and/or empirical) into other disciplines has, no doubt, benefited the disciplines by adding more quantitative framework and analytical knowledge. In the process they also bolster the qualitative approach required to make an analysis complete. Cross-disciplinary and Q-squared (quantitative and qualitative) approaches offer the possibility of combining the strengths of different disciplines [27] – such as the research question of

this paper.

In the words of Cédric Villani [28]: “As soon as you make connection between different fields, knowledge you accumulate here you can recycle there, and all of a sudden both fields are richer in terms of knowledge.”

4. ASSET AND POVERTY LEVELS

Under the hypothesis [HP02] of this research, it follows directly from Bohr's theory of the Hydrogen atom, energy of an individual in the society,

$$E_n = -\frac{P_0}{n^2} \quad (4)$$

The left hand side of Eq. 4 is the total energy, a sum of kinetic energy and potential energy. The lowest energy state is P_0 (that correspond to ground level, $n = 1$, energy = 13.6 eV, electron-Volts, of Bohr's theory). In economic analogy (see Table 1), it translates to the lowest level of asset, a sum of capital and capabilities of an individual. P_0 is a measure of extreme poverty in the absolute term and hence we call it Absolute Poverty on the same logic we define absolute temperature, the Kelvin scale in thermodynamics. The economic entropy of an individual shall be equal to zero at state corresponding to P_0 . A change in asset (ΔE_n) is an indicator of economic growth. In this formula economic growth and poverty are positively correlated. As our universe's expansion is accelerating, so is probably the poverty field. The postulate [HP01] also backs up Townsend's [29] main thesis that both poverty and subsistence are relative concepts because the poverty field is also expanding due to the quasi-conservative nature of the social field.

In a book [30] Jeffrey Sachs reflects on a goal to help less privileged people (from failed-states) reach the first rung on the "ladder of economic development". If there is a ladder in economic development, so must there be one for poverty which should substantiate [HP02]: the poverty levels are

quantized.

5. AN ECONOMIC PROCESS

5.1 Means of production: capital and capabilities

A study of the economic process would be incomplete without linking it to the means of production. Classical literature usually studies the means of production (land, labor and capital) in isolation, without emphasizing or often even including underlying interoperability. When analyzing modern production processes and financial products, we argue that these means of production can be grouped into two broad groups: Capital and Capabilities.

Hence, following Table 1, total energy in equivalent economics nomenclature can be written as:

Social Asset $A = \text{Capital } (C_1) + \text{Capabilities } (C_2)$

$$A = \sum \frac{1}{2} \frac{SI}{r} + \sum \left(-\frac{SI}{r}\right) = -\sum \frac{1}{2} \frac{SI}{r} \quad (5)$$

Eq. 5 indicates that capital and capabilities are interchangeable. This is what venture capital firms actually do – source investment in startup companies and small businesses with high capabilities for growth. We prefer to call the sum collectively an asset A of our society, or the drivers of growth/development. Only the realized capabilities, along with rotating capital, may have direct impacts on the growth/development processes. Non-rotating capital could be no more than not-realized capabilities, which may have negligible or even adverse impacts on development of our society. Production processes have become more advanced since the industrial revolution and hence more capital intensive. The process has been driven by a combination of secular and structural issues such as the changing nature of technological advancement, the rise of “capital – take – all” investment characteristics, and political systems favoring the wealthy [31].

Accordingly the forces of capitalism are becoming more dominant over the forces of capabilities in the production process.

5.2 Economic process as an energy conversion process

An economic process in a society may be analyzed by using the control volume analysis of thermodynamics. Following concordance Table 1, the equation of the First Law of Thermodynamics

$$dE = dQ - dW \quad (6)$$

translates to economics as

$$\Delta \text{Asset} = \Delta \text{Value} - \Delta \text{Work} \quad (7)$$

where symbol Δ represents a change of the variable.

Let Q_1 be the value of input and Q_2 be the output of an economic process that demands work input dW . This process may be compared to the refrigeration/heat-pump cycle in thermodynamics; a caveat being that those cycles do not retain internal energy while an economic cycle must retain some in order to perpetuate its motion. Fig. 1 attempts to interpret terms of Eq. 7 graphically.

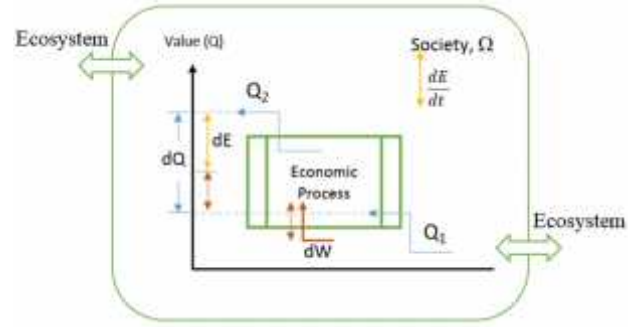


Fig. 1 Economic process and first law of thermodynamics

A coefficient of Production (COP) which is the ratio of desired output to input. Hence,

$$COP = \frac{Q_2}{Q_1 + dW} = \frac{\text{Value of output}}{\text{Value of input} + \text{Work Expended}} \quad (8)$$

It is critical for an economic process to have an operating margin to pay its fixed costs, hence $COP > 1$ in general. The numerator of Eq. 8 compares selling prices to the denominator of the cost prices of a product in layman’s terms. The gross value addition $dQ = Q_2 - Q_1$. The net value addition is $dE = dQ - dW = Q_2 - (Q_1 + dW)$, sometimes also known as gross margin. This value belongs to the drivers of production – capital and capabilities – that are assets of the society Ω in which the economic process (production or consumption) happens.

6. MODEL OF ECONOMIC GROWTH

6.1 Nomenclature: Harrod-Domar model

The Harrod model [32] of economic growth shed light on three types of growth: a) warranted growth, b) actual growth, and c) natural rate of growth. Warranted growth rate is the rate of growth at which the economy does not expand indefinitely or go into recession. Later expanded by many including Domar [33] and Solow [34], these terms of the Harrod model are equally relevant to modern macroeconomics (as it is previously thought to be relevant only to single sector under non-idealistic assumptions). Domar contributed an article the same year that the renowned British economist Keynes died, hence beginning a new era of economic thought sometimes referred to as the post-Keynesian model. These models are known to us as Harrod–Domar models, or sometimes as the Harrod–Domar–Solow models. A classification and brief account of these models is documented in part II: The Process of Growth, of a book [35] by Scarfe. In this section we adopt terms used by Harrod and redefine the terms in light of our new Social Field Theory.

New definition:

- Natural growth rate (r_n): The component of growth that corresponds to the rate at which the quasi-conservative social field, monotonic function of time and space, advances [HP01].
- Warranted growth rate (g^*): The rate of growth of an economy (in a broader sense – that includes both capital

and capabilities) in the long run.

- c) Actual growth rate (r_a): The growth rate of an economy as measured now in terms of gross domestic product (GDP), the aggregate monetary value of all goods and service produced in a year.

6.2 Model of economic growth

Economic growth can be broken down into components discussed in previous section as:

$$\text{GDP}(\Omega, t) = \overline{\text{GDP}}(\Omega) + \text{GDP}'(\Omega, t) \quad (9)$$

where $\overline{\text{GDP}}(\Omega)$ is a monotonic component that can be linked to the natural growth rate (r_n) of a region Ω . $\text{GDP}'(\Omega, t)$ is the fluctuating component whose value, positive or negative, depends on the relative magnitude of r_n , r_a and g^* along with the addition of the endogenous and exogenous shocks. In this separation of the variables, inspired by the Reynolds [36] decomposition, the mean of the fluctuating quantity $\text{GDP}'(\Omega, t)$, may not always be equal to zero. Even though we have used a variable GDP , it does not mean to the GDP as it is measured but the warranted growth rate g^* .

In the following paragraph, we utilize the law of conservation of energy (the first law of thermodynamics) to explain economic growth. The law dictates:

$$dQ = dE - dW$$

$$dQ = d(C_1 + C_2) - dW$$

$$1 = \frac{dc_1}{dQ} + \frac{dc_2}{dQ} - \frac{dW}{dQ} \quad (10)$$

After deducting proportion of effort, $\frac{dW}{dQ}$ in order to realize

an economic process, the value remaining is the share of capital and capabilities.

Analyzing capitalism with historical data amassed, Piketty [37] concludes that the capital has disproportionately claimed, time and again, the rate of return on capital $r \gg g$, the growth rate of economy.

Capital can only grow at a rate higher than the growth rate of an economy at the cost of capabilities. During $r \gg g$ period, Eq. 10 suggests a large portion of the dC_2/dQ that belongs to a society (or stakeholders) as public wealth is transferred to the capitalists. This conversion mechanism of capabilities to capital and vice versa results into cyclic 'boom and bust' periods of an economy as presented in Fig. 2 for the USA from 1854 to 2009 plotted from data furnished by National Bureau of Economic Research (NBER). This ebb and flow, however, continues in conjunction with the inherent natural growth rate, $\overline{\text{GDP}}(\Omega)$, due to the quasi-conservative nature of the social field.



Fig. 2 Economic cycle expansion and recession, USA (1854 - 2009)

A Harvard University study [38] has analyzed global subjective well-being data. The study reveals that individuals are more sensitive to losses than gains. To be more specific, losses having more than twice as much impact on well-being as compared to equivalent gains. The asymmetrical results highlight the cost of welfare, along with the relationship between GDP and subjective well-being in terms of the economic growth cycle. Hence, in the long run a society may be better off by balancing capabilities and capital instead of focusing merely on economic growth as measured by GDP.

Let us zoom into a specific example of the economy in the USA, using our model of economic growth represented by Eq. 10 as our lens. Fig.3 presents the US business cycle expansions and contractions around the most recent recession in 2008.

Early recession in the USA began in December 2007 at the point B where dC_1/dQ is equal to zero. Between the segments BCD, this ratio is negative which translate to that the GDP contracted until the end of the late recession in June 2009. The last early expansion began in June 2009, the GDP equalize to the natural growth rate value, $\overline{\text{GDP}}(\Omega)$, at E.

The GDP contraction B through D gives C_2 an opportunity to accumulate. A conservation law of asset A implied by the Eq. 10 suggests D is the point at which the capabilities C_2 should be at a maximum. Beyond D, C_1 expands (if r_a is still greater than g^*) at the cost of C_2 . This transformation, at least in theory, can be prolonged to a point when the minimum threshold of capabilities C_2 is reached again. This results in inherent oscillations between economic expansion and contraction commonly known as periods of economic 'boom and bust'. The NBER has recorded periods of contraction and expansion in the business cycle since as early as June 1857 to as recent as June 2009.

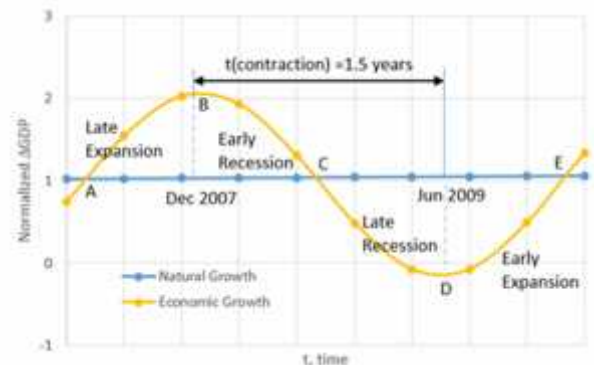


Fig. 3 Economic cycle USA recession (2008)

In the long run, the economic growth tends to stabilize, say to g^* . This growth rate will not be enough to balance the tendency of the rate of return on capital [37]. Increasingly capital uses its power to claim shares of social capital and eventually dC_2/dQ could be negative when here is an unbridled desire to make capital grow. Such a situation may lead an economy into recession (recently in 2008) that can be detrimental to secure financial stability and growth let alone to the well-being of the society.

Hence in a deregulated economy, $r_a \gg g^*$ may eventually lead an economy to a boom and bust that then spreads across borders due to the globalization of economies, among many other reasons. An economic growth not accompanied by investment in capabilities development is simply unsustainable.

6.3 GDP: an ideal measure of growth?

In terms of the Newton second law of motion, the analogy to economic growth is that the net force in an open society could be the sum of the endogenous (F_{en}) and exogenous (F_{ex}) forces that compares the body forces and the surface forces in mechanics. Hence,

$$F_{NET} = \text{Social Inertia} \times \text{rate of change of growth } G,$$

$$F_{en} + F_{ex} = \mathfrak{I} \times d^2A/dt^2. \quad (11)$$

Where A is a social asset, the sum of capital and capabilities. Social inertia is a term that applies the concept of inertia to other fields, in particular social science fields that describes resistance to change or the endurance of stable relationships in societies or social groups. Social inertia can be thought of as the opposite of social change.

The equation, Power = Force \times velocity, in mechanics translates to the economic science as

$$\frac{dE}{dt} = \frac{SI}{r^2} \times \frac{dA}{dt} = \frac{SI}{r^2} \times G \quad (12)$$

We consider only the endogenous force, and assume that the force and velocity are in the same phase/direction, and there is no retardation potential.

From Eq. 5:

$$\frac{dE}{dt} = \frac{d\left(-\frac{SI}{2r}\right)}{dt} = -\frac{1}{2} \frac{r \frac{d(SI)}{dt} - SI \frac{dr}{dt}}{r^2} \quad (13)$$

Combining Eq. 12 and Eq. 13, growth rate

$$G = -\frac{1}{2} \left[\left(\frac{r}{SI} \right) \frac{d(SI)}{dt} - \frac{dr}{dt} \right] = \left(\frac{1}{2c_2} \right) \frac{d(SI)}{dt} + \frac{dr}{dt} \quad (14)$$

$$G = -\frac{1}{4} \left(\frac{2r}{SI} \right) \frac{d(SI)}{dt} + \frac{dr}{dt} = \left(\frac{-1}{4c_1} \right) \frac{d(SI)}{dt} + \frac{dr}{dt} \quad (15)$$

Our current practice of measuring the economic growth in terms of GDP, as $\left(\frac{1}{c_1} \right) \frac{d(c_1)}{dt}$ for a fiscal year, seems to be missing some dimensions that are important to a society. GDP does not take into account changes in the social asset (entropy-strength), $\frac{d(SI)}{dt}$ and the social distance, $\frac{dr}{dt}$, as suggested by Eq. 15. Therefore, GDP be termed as incomplete even though it is still a practical measurement. Though there needs to be a consensus on a more comprehensive method to measure social assets in relation to the overall GDP.

7. ECONOMIC GROWTH AND DEVELOPMENT

In economic literature we come across many phrases such as Economic Development, Human Development, Inclusive Development, and Sustainable Development. Development, according to the Cambridge Dictionary, is “the process in which someone or something grows or changes and becomes more advanced”. According to the Human Development Report [39] “human development is the end—economic growth a means.” For a society or a political region, development refers to the advancement of all concerned – an inclusive development - definitely not to the lopsided development where one economic strata advances at the cost of the other. An overriding preoccupation with economic growth makes no sense without recognizing that human development depends on how that wealth is used and distributed [40]. In the following paragraph, we examine nuances between economic growth and development in light of the Social Field theory.

Fig. 4 presents a diachronic analysis of a political regime Ω . At a reference point in time t_0 , let the absolute poverty be Po. A_1B_1 represents line of the social hierarchy; the inclination θ_1 with horizontal time-axis represents inequality prevalent in the society at time t_1 .

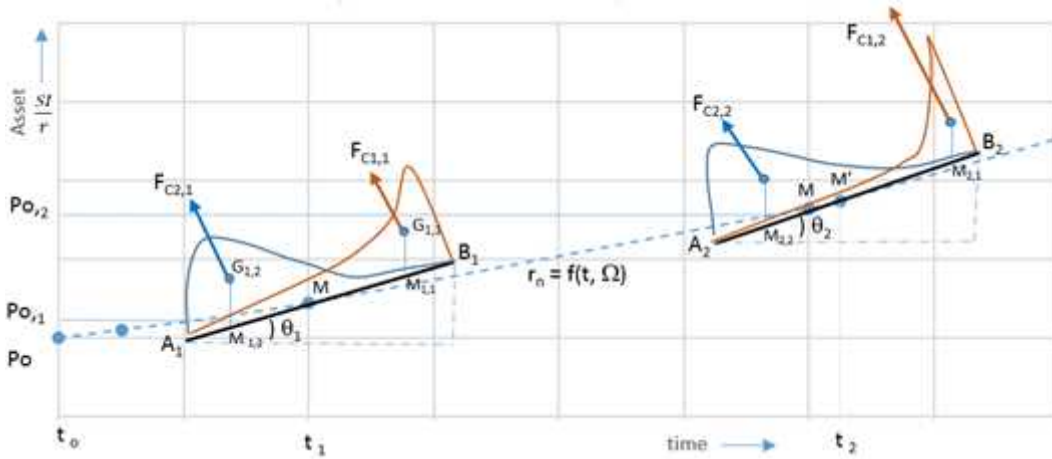


Fig. 4 Dynamics of growth – capital and capabilities

F_{C1} is the forces of capitalism which acts at centroid $G_{1,1}$ of the capital distribution curve, whereas F_{C2} is the forces of capabilities that acts at the same way but at the centroid $G_{1,2}$ of the capabilities distribution curve. In presence of these duo forces, society yields to another state of equilibrium, *ceteris paribus*. F_{C1} tends to rotate line AB counterclockwise towards greater inequality. At t_1 , the rotation hinges at M, the social fulcrum at which the social inertia, \mathfrak{I} , of the society may be assumed to be concentrated. In contrast, the force F_{C2} tends to rotate the same line in clockwise direction towards a more homogeneous or egalitarian society. Thomas Piketty [37] indicates to these two forces by the terms Forces of Convergence/ Divergence.

At time t_2 , $F_{C1,2} \gg F_{C2,2}$ results in the more unequal society and hence more pronounced social classes. To maintain an equilibrium, the fulcrum must move up making more people vulnerable to the poverty line $P_{0,2}$. Only those social classes above the new fulcrum M' gain from spurred economic growth. Many public policies are known to create financial winner and losers in society, as is the case shown here. Such economic growth will inherently cost people below M' . Hence, economic growth will always have a toll on the bottom strata of the social hierarchy, not to mention poverty in general. The analytical reasoning presented above strengthens the argument that poverty is inherently entrenched below economic growth. Balancing the forces of capitalism by those of capabilities in order to improve a society demands an inclusive development. A balance can expand the trust vector (social cohesion), rule of law, and unlock economic potential. Not to mention that balanced economic development has many possibilities though it must also overcome the social inertia as evidenced from many examples demonstrated by Newton's second law of motion.

Hence it is the development that matters for the well-being of the society at large while economic growth must be seen in this light as only a part of the equation, undoubtedly an important one. A rise in inequality has been a signal global feature of economic growth as if there are no recourses. Economic growth and development are not the same terms but are correlated. For example in the case of inclusive development, it takes place in a way that may not be as

explicit to the naked eye.

8. SUSTAINABLE DEVELOPMENT

The unlimited possibilities for balanced economic development ought to conform to the sustainability of our ecosystem. This implies an inclusive development that takes into account the ecosystem as being part of an optimal sustainable development, or a sustainable development goal. According to the 1987 report by the United Nations World Commission on Environment and Development, development is sustainable if it “meets the needs of the present without compromising the ability of future generations to meet their own needs.” The famous Rio Earth Summit Declaration, adopted by the United Nations Conference on Environment and Development in 1992, puts it this way: “Human beings are at the center of concern for sustainable development. They are entitled to a healthy and productive life in harmony with nature.”

A growth of one demographic group does not require to be at the cost of the other human beings, especially those at the lower social hierarchy. Capital and capabilities together can go a long way toward mitigating economic ‘boom and bust’ (or winner and losers) cycles and preserving the social wellbeing of current and future generations.

9. CONCLUDING REMARKS

The Social Field Theory along with the law of conservation of energy (First Law of Thermodynamics) has the potential to explain and redefine economic expansion and recession. In conjunction with the natural growth rate, the economic growth cycle oscillates due to relative changes in two means of production: capital and capabilities. As consensus parameters that can measure social asset and trust vector (social cohesion or wellbeing) are accomplished, a better measurement of growth can be initiated to complement gross domestic product (GDP) and result in a more complete measure of economic growth. Economic growth and absolute poverty are positively correlated. The trickle-down effects of economic growth are not an ‘absolute’ truth. Economic growth always produces

winner and loser. The demographic group at the lowest strata of the social hierarchy loses from economic growth while the groups at the higher strata (above social fulcrum) gain from the trickle-down effect. An inclusive development policy that can strike a balance between the force/energy of capitalism to that of capabilities can benefit all in society, and it is realizable. An inclusive development that includes our human society and physical environmental ecosystems is an optimal sustainable development path.

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ECONOMY, ORGANIZATION AND CULTURE OF SCHOOLS THROUGH HISTORY: THE HOLISTIC APPROACH TO EDUCATION'S BUSINESS MODEL

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Abstract. *The aim of this article was to provide a comprehensive view of education through the connection of this discipline with other sciences. We analyzed how the economy, culture and spirit of a time can shape the organization and how, later on, organizations affect the faculties and schools. Using The Business Model Canvas, strategic management tool invented by Alexander Osterwalder, we compared elements of traditional approach to education and modern one, in order to find best practices for the education of young people in the 21st century.*

Keywords: *education, business model, holistic approach, organization, culture, economy.*

1. INTRODUCTION

Talking about philosophy of education in schools, Albert Einstein once wrote:

"Sometimes one sees in the school simply the instrument for transferring a certain maximum quantity of knowledge to the growing generation. But that is not right. Knowledge is dead; the school however, serves the living. It should develop in the young individuals those qualities and capabilities which are of value for the welfare of the commonwealth." [1]

Indeed, schools serve the living, born in certain time and place - in a specific historical context. Providing the knowledge collected by that era is not their only task. They are ought to help young individuals to adapt to society in which they live in, by developing capabilities useful in given culture and economy. But how can our schools do so? If we notice that they are failing to successfully complete this mission, what do we do? Other important components of societies have high expectations from education -they are waiting valuable staff to help them to evolve. Still, business, culture and education have little mutual contact, and from there stems a myriad of problems they are sharing, as described in Robinson (2011). [2]

In the area of business, when a system does not perform as expected - despite minor adjustments and aids, methods and techniques of transformational change are often applied. There are numerous methods, techniques and approaches applied in such situations, like restructuring [3] [4], reengineering[5], organizational transformation [6]. Their common denominator is drastic change of strategy, structure and processes – that are dubbed as hard elements of organization by Waterman, Peters and Phillips (1980) [7]. The aim of questioning and changing those elements is to make huge improvements in novel measurements of efficiency and effectiveness. Our article will synthesize description of multi-dimensional changes in

organization (strategy, process, structure) using Osterwalder's and Pigneur's business model canvas [8].

2. BUSINESS MODELS IN GENERAL; OSTERWALDER - PIGNEUR CANVAS

What is business model and what do we need it for? The business model is a simplified view of how the company functions and earns money by creating value. It is a representation of all relevant elements of the organization and their interconnections [9]. The core of business model is **value** that company creates and explanation of methods used in order to develop and preserve that value and distribute it to desired segments. There is whole network of partnerships that should be made, resources that should be provided, activities that need to be done in order to achieve this. Company should consider what revenue streams and cost structure are the most suitable for organization and conditions they work in.

Minimal changes to each of these elements separately, or in the manner in which they influence each other, can lead to major changes in the results that the company achieves. The business model can also be understood as a guide in translating business strategy into operational processes. Owning fine, completed business model is not in itself a guarantee of success, but mostly is a prerequisite for it. Model is just a proof that the company is aware of its objectives, courses of action, that the leadership agreed about the distinctive advantages that wants to offer and the manner in which to do business. [10]. Whether it will lead to profitability depends on many factors and it remains to be verified in practice.

The business model canvas was introduced in Ph.D. dissertation of Alexandar Osterwalder with the help of his professor, Yves Pigneur. It is applicable and practical management tool for defining business, based on 9 blocks. [11]

Those blocks are:

1. Customer segments – defines for whom the organization creates value. Here we decide if some group of customers is a segment, which type of segment and if it is in our interest to serve them.
2. Value proposition – this is not only a product or a service that we offer to the customer, although they are closely related. The value is the solution of a problem that our customer has, or satisfaction of some of his needs, which is provided by our producer service. [12]

3. Channels – defines the best ways of communicating with our customers and reaching them. We also look attentively at costs of different channels and their integration with other elements.
4. Customer relationship – describes expectations of our customers considering our relationships with each and one of them. We think of costs of different channels and their integration with other elements.
5. Revenue streams – examines the dynamics and various methods of payment. For what value are customers willing to pay and in which way and how does that contributes revenue in total.
6. Key resources – fundamental assets we need to have in order to provide our value proposition.
7. Key activities – fundamental activities we need to conduct in order to provide our value proposition.
8. Key partnerships – discovers which are our most important partners, suppliers and distributors, and how are they connected to our key resources and activities.
9. Cost structure – lists all relevant costs company has and considers how they occur.

Left part of canvas is responsible for doing things efficiently, right part is for doing the right things – creating the exact value your customer needs. [13]

3. THE BUSINESS MODEL OF TRADITIONAL APPROACH TO EDUCATION

The business model to illustrate traditional approach to education is developed using example of Faculty of Organizational Sciences, University of Belgrade (Serbia) ranked between 300th and 400th position of The Academic Ranking of World Universities (ARWU) published and conducted by Shanghai Ranking Consultancy for the year of 2014th. Generalization of our findings can be supported by neoinstitutionalism theory [14], which states that organizations in the same industry and performing similar tasks are very similar. To illustrate that, Harvard or Stanford University (which came 1st and 2nd on that list) have similar blocks in business model to analyze. Most universities today act as “click and mortar” [15] type of organization, with e-curriculum, distant learning programs supplementing their classic “brick and mortar” foundation.

Although technology is taking more and more important role in everyday education, it is often used as one of the other tools in the teaching or the organization of educational process. The process, in its core, remained same for decades, even centuries.

1. Customer segments – It may seem that students are the most significant customers of faculty. They are the ones directly paying for the service, segmented according to their department and level of studies. However, in addition to their role of a customer, graduated students are, in a way, product of educational institutions. Crucial customer of

education is **economy** and organizations that require people with knowledge and skills of a particular profession.

2. Value proposition – For the economy, value is certain number of trained young professionals ready to work and contribute to reaching goals of organizations on market. For students, value is bundle of knowledge and set of skills given to them through undergraduate, master and PhD studies, increasing their chance of employment, advancement and average expected salary. Besides, staff of faculty is publishing research work and giving consulting services that can be used in academic and business sector.
3. Channels – Except for raising awareness about the work of the faculty, which takes place through the media and social networks, scientific journals and conferences - all the other channels that are used by scientific institutions are direct and their own. The process of teaching takes place at the university at predetermined times. University “brick and mortar” building is a place where students get value, where they can complain to some conditions through surveys, inquire about employment after studies and similar actions, however this kind of information can be also obtained on the website of the faculty. There are also online programs for lectures and exams, but they are usually combined with the traditional ones. Actual meeting between students and interested organizations –are often facilitated at the school and partly through the website.
4. Customer relationship – Most of the time, relationship type between faculty and students or companies is personal assistance. That means there is a direct, human interaction between student and professor, face to face or by e- mails. Some part of administrative work is regulated by automated services – such as online profiles of students or companies on internal networks of faculty, which are used for different purposes: applying for exams, notes about vacancies, diverse evaluations...
5. Revenue streams - Revenue streams depend on whether it is private or public college. Income that comes from students is in each case realized in the form of tuition fees-they pay continuous access to the full service during, in most cases an academic year. In some systems, if it is a state university –revenue partly comes from the state budget. If it is private one, revenue is coming from the personal assets of the founder and other companies through various grants and sponsorship programs. Also, significant part of income can come from monetizing knowledge in the practical problems of the industry – various consulting and expert projects, where university, faculty or department engages its teaching and research staff, and keeps percentage of the earning for the institution.

6. Key resources – The most important resources are certainly human - teaching staff of the faculty. Social aspect of that capital is sometimes much more important – general reputation and prestige of certain university is often determining factor for positioning among the best institutions, as well as social networks of professionals employed by the university. Intellectual resources, such as special teaching methods, patents and works of professors and students, should be treated with special care. From physical resources it is important to mention faculty building and the necessary technical equipment for teaching.
7. Key activities – Key activities are determined by the teaching process. Dissemination of knowledge by lectures, checking attainment of knowledge by exams, acquiring the knowledge by research or application distinguish as most common activities. They are however tangled in their implementation and goals – knowledge attainment can be checked by research of students at MSc and PhD level of studies, and knowledge can be disseminated by practice in the industry.
8. Key partnerships – Students, professors, industry, and external researchers-all have different types of partnership with the university. The main motive for their conclusion is proper allocation of human and intellectual resources-future employees and their knowledge. Another key thing to remember is reduced risk of mismatch between demand and offer in the labor market by joint planning.
9. Cost structure – Faculties are mostly value – driven organizations (as opposed to cost – driven ones). That doesn't mean that minimizing cost is not their objective, just which their focus is on quality of service. They are relying on economy of scale – once they develop well-structured and useful program, they try to enroll as many students as they can, in order to obtain cost advantages.

According to Osterwalder, the canvas of traditional approach would look like this (figure 1):

Students, professors, organizations, and external researchers	Knowledge acquisition Knowledge dissemination Knowledge examination	Bundle of knowledge and set of skills Trained young professionals Research work and consulting services	Direct interaction between student and professor (face to face, e- mails) Online profiles of students or companies on internal network	Students segmented by field of interest and level study Economy searching for educated workforce
	Teaching staff University building University image and prestige Technical equipment for teaching processes Teaching methods, patents and intellectual property of professors and students		Media and social networks, scientific journals and conferences University building Website of the faculty Online courses	
Value – driven organizations Economy of scope		Income from students - tuition fees State university – the state budget Sponsorship programs Research grants Fees for consulting and expert projects		

Fig 1. The business model of the traditional approach to education

4. THE BUSINESS MODEL OF MOOCS

Education today resembles transportation industry in the times of steam engine introduction. The advent of MOOCs and other forms of distant and blended learning introduce paradigm change in the technology for the core processes – acquisition, dissemination and examination of knowledge. We can't deny there is a trend nowadays towards specific form of education that differs from traditional. Excellent examples of it are courses on Coursera, video lessons on Khan Academy or your favourite TED talks: any type of Massive Open Online Course – MOOC.

Without holistic observation, it seems it is just a "modern version" of old principles, but when we break down the MOOC approach into smaller blocks of a business model, it is evident that it is completely different business philosophy. The concepts of literacy, access to knowledge of any kind and costs of it are redefining faster than ever. These facts are raising the issues of intellectual property, privacy and security on the internet, as well as learning ethics in online world.

1. Customer segments – First significant distinction in business models of these approaches is customer segment. Education is now brought to anyone with internet connection, regardless of age, origin, educational background, or financial assets. That revolution is similar to the revolution of mass education in the XIX century, when state offered free education. Mass market of students act as prosumers [16] – they simultaneously produce and consume value. MOOC business models are mostly functioning as multi – sided platforms, which means that they need to have universities or professors on one side of platform, and students on another in order to work. If you do not have mass of interested students, it is hard to attract world-class professors, and if you do not have world-class professors it is hard to attract large number of students – often tens of thousands per course. Economy is again main and final consumer of created value, since people who learn can contribute to organizations they work in. Finally, existing universities and other educational institutions are customer, which is not the case in traditional approach. They can learn from other institutions or use platforms to promote themselves.

2. Value proposition – MOOCs are offering more specific knowledge to potential users – they can choose exactly which courses they will listen and neglect others. That may mean they won't make the bigger picture of a field they study, but they are free to make their own curriculum and to decide upon their tempo of learning. Values such as interactivity in learning, freedom and customized lessons are changing the needs and motivation of learners. Organizations that will employ those learners and faculties can get promotion through offering courses, same kind of knowledge as students, if their staff takes the same courses and professionals that are extremely self – driven and interested in particular matter.
3. Channels – Platform is the main channel between user and educator/institution, and all of the process - delivering the value, evaluation of it and contact with other learners of professor is made through it. Promotion of MOOC or platform itself can be done through social networks or media. Also, students often take proactive stance and communicate on the MOOC issues, delivering part of the MOOC value via separate social media channels. Channel is direct and own from perspective of platform founders, but universities or persons that offer videos consider it indirect, partner channel (unless they develop their own platform).
4. Customer relationship – Given the circumstances, customer relationship can be a bit complex in this approach. It is combination of all types of relationship we have known so far. Student is using personal online profile that provides him customized service. Then again, he can find online personal tutor or ask for a help on a specific question and get some sort of (dedicated) personal assistance. If that is not an option - platform is based on self service. Maybe the best thing of all, considering customer relationship is crowdsourcing. All students of one MOOC form online community, through platform and forums on it. They can discuss the program and co-create rules or unites, bringing a whole new value to the process of learning.
5. Revenue streams – Revenues are obtained from various kinds of sponsorships and partnerships with universities and companies. For instance, Khan Academy is getting funding from Bill & Melinda Gates Foundation and Google. Mostly, platforms are not charging listening to tutorials and courses, not even participating in them (tests, forums). Some of them charge the final certificate the send you. That is called Freemium business model. Usually, platform owners sign a contract with faculty that is providing course and agree upon a percentage of gross revenue that will go to them.

6. Key resources – Platform. Wide network of partners and sponsors that are providing intellectual and financial capital for platform. Ownership of all knowledge, methods and patents explained through MOOCs. Another important resource are databases of customers and their learning habits. Valuable human resource is ICT personnel servicing the platform.
7. Key activities – Considering what the key resource is, it is understandable that key activities are development of platform – both technically and by managing requests of all partners and users. Promoting the brand of platform is equally important. Compensation for the party developing and implementing courses is often partly monetary, and partly in propagating image of the course, professor teaching the course, or the institution endorsing that course.
8. Key partnerships – Universities that are preparing courses, organizations, foundations and institutions that are helping financially and most active customers that are contributing with their suggestions.
9. Cost structure – Platforms that offer MOOCs are value – driven. They are relying both on economy of scope and economy of scale. At the same time, they tend to increase the number of users and range of services that they offer. This is done in order to pay off high fixed costs of maintaining platform. Comparable to costs of delivering the course per student in classical approach, MOOCs are often incomparably more economic due to economy of scale.

The Osterwalder’s and Pigneur’s business model canvas of MOOC approach is presented in the following figure, with specific segments and corresponding values highlighted by the same colors behind text (figure 2):

Academic staff and institutions developing and implementing courses Organizations, foundations and institutions that are helping financially Most active customers contributing with their suggestions	Development of platform – both technically and by managing requests of all partners and users Promoting the brand of platform	Specific knowledge Interactivity in learning and freedom to make customized curriculum and tempo of learning Promotion and income through offering courses Professionals that are extremely self – driven and interested in particular matter	Personal online profile that provides customized service Online personal tutor personal assistance or self service Crowdsourcing - students of one MOOC form online community, through platform and forums on it	Mass market of students - anyone with internet connection Economy - corporations, small and medium enterprises of private and public sector Academic staff and institutions
	Platform Network of partners and sponsors Ownership of intellectual property on MOOCs Databases of customers and their learning habits IT support staff		Platform Media and social networks	
Value – driven organizations Economy of scope and economy of scale High fixed costs of maintaining platform		Sponsorships and partnerships with universities and companies Freemium business model (e.g. - charging only final certificate)		

Fig. 2 The business model of MOOCs

5. THE CUSTOMER IS ALWAYS RIGHT: THE ECONOMY DICTATES THE BUSINESS MODEL OF EDUCATION

To begin with, **can era shape the organization?** To put it another way – do economy, culture and spirit of time effect all organizations established in it?

Many experts in management, economics, sociology and education dealt with this hypothesis. American sociologist Arthur Stinchcombe wrote his book *"Social Structure and Organizations"* fifty years ago. He defined term 'Social structure' as 'groups, institutions, laws, population characteristics, set of social relations that form environment of organizations; any stable characteristics of society outside the organization'. [17]

He then claimed that this structure has impact on the rate of foundation of organizations, especially if they have new kind of organizational structure. According to him, time in which certain industry is created has effect on social structure of all organizations that are created in that period. Likewise, organizations have effect on social structure, people that work and live in time during which their business is developing. He compared older industries, such as a textile company or a farm, with industries of twentieth century, such as automotive industry. For instance, majority of organizations that are working in new industries have staff that is educated on colleges or universities. Family companies with informal structure became rare. These qualities are completely opposite to the ones valued in 'old' organizations.

Henry Mintzberg followed up on the work of Arthur Stinchcombe. In his book *"Structure in Fives: Designing Effective Organizations"* he continued to question the connections between organizational structure and an era that organization is founded in. What is more, he wanted to discover does that hypothesis applies to modern sciences (like discovering laws in aerospace). There are five structural configurations that considered, from simple structure to adhocracy. Their differences were portrayed through dimensions of organization structure. The evidence noted in his book suggests that every type of organization had traces of a specific era in it. He remarked:

"Change in the Professional Bureaucracy does not sweep in from new administrators taking office to announce major reforms, nor does it from government techno-structures intent on bringing the professionals under their control. Rather, change seeps in by the slow process of changing the professionals—changing who can enter the profession, what they learn in its professional schools (norms as well as skills and knowledge), and thereafter how willing they are to upgrade their skills." [18]

Changing structure of a company or a society actually comes from changing the individual, during the process in which education plays the most important role.

Another respected author in this field, Alfred Chandler, wrote the book *"Strategy and Structure: Chapters in the History of the Industrial Enterprise"*. He studied way of doing

business in large American companies (Du Pont, General Motors) in order to support the claim that structure follows strategy. Book indicates that appearance of new technology or transformation on the market requires from the company to adjust its direction and mode of operation. In other words – company should redefine its strategy if external circumstances change significantly. To make this strategy work, organization is ought to modify their structure, too. The mismatch between the growth and development of the internal structure can only lead to economic inefficiency – says Chandler. [19]

With this in mind... can era shape a school? How do we build our educational system?

6. CONCLUSION

We are witnessing tremendous shifts in philosophy of education. Yet, they are somehow familiar to us. In light of time that we live in, we could almost predict virtual classrooms and globalization of knowledge. Similar tendencies can easily be observed in the economy. It is not mere coincidence that Osterwalder's business model starts with analyzing the customer segment. We need to get to know our customers well, if we want to satisfy their needs and solve their problems in the best way possible. Traditional and MOOC approach have many differences, but one thing remained the same – main customer of education, whatever its form is – is economy. No wonder educational institutions try to mimic the laws recognized on the market or structure of companies in which students should work afterwards. If we draw an analogy between types of school and types of organizations through time, we can see that faculties that exist today, even the best ones - reminds us of Henry Ford's factory – the flamboyant vanguard of the industrial era. On the other hand, we have platforms that provide MOOCs and other sorts of inspirational and creative ways of studying – those platforms are mirroring our economy of today. They are following dot.com companies, they are preparing students for modern labor market and give them the real picture of what is ahead. Why are we, then, so reluctant to change the way formal education system work?

One of the most vocal experts on the subject of education, that is asking this question, is Sir Ken Robinson. His speech, entitled *"Changing education paradigms"* is addressing this problem and explains the significance of it. To illustrate this issue, he is describing students as if they were just getting off the production line – classified by 'date of manufacture', with standardized set of skills and knowledge, got used to ringing bells and strict rules that are preventing them to express any unique talent they have. [20] The consequences of this system are immeasurable: beside obvious lack of motivation and decreasing divergent thinking, new generations are left to cope alone with challenges of new economy that is waiting for them.

There is no one correct solution to this situation. What should we do today, if we want to have better schools tomorrow? Maybe the first step forward is admitting that

philosophy of schools needs to be changed and that must be done through holistic approach to education. Then, we could learn something from this brand-new kind teaching - from MOOCs. Some useful lessons could be:

*“The fact is that given the challenges we face, education doesn't need to be reformed - it needs to be transformed. The key to this transformation is **not to standardize** education, **but to personalize** it, to build achievement on discovering the individual talents of each child, to put students in an environment where they want to learn and where they can naturally discover their true passions.”* -Ken Robinson, *The Element: How Finding Your Passion Changes Everything*. [21]

“The same products, services or technologies can fail or succeed depending on the business model you choose. Exploring the possibilities is critical to finding a successful business model. Settling on first ideas risks the possibility of missing potential that can only be discovered by prototyping and testing different alternatives.”-Alexander Osterwalder

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POSSIBLY QUANTUMLY EXPLAINED NEGATIVE INTEREST RATES

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Abstract. *Negative interest rates have similarities with quantum mechanics. Feynman diagrams can be employed to explain intertemporal liquidity exchange, due to speed of money reaching the maximum: c .*

Keywords: *Feynman diagram, quantum mechanics, intertemporal liquidity.*

1. INTRODUCTION

Presently, negative interest rates started to become more and more present in the international landscape. The negative interest rates have shown on for the first time in Japan, as inverse forward curves. Negative interest rates are not being forward (virtual) any more, but they became real and show off not only in the Swiss deposit rates, but also in the Swiss bonds market, both of the Swiss National Bank (SNB) and also for corporations highly rated on the Swiss Exchange market.

2. POSSIBLY QUANTUMLY EXPLAINED NEGATIVE INTEREST RATES

In Switzerland, where the real negative interest rates headed on among the firsts in the world, in 2011. the Swiss Franc, the Euro, the American Dollar and almost the Great Britain Pound are practically at parity, at least on the exchange tables. But the interest rates plunge differently. Equally to SNB, the Danish Nordea Kredit [1] started paying mortgage holders to borrow money by charging a negative interest rate. When doing short-selling of shares in the stock market, you promise to sell somebody shares for a price lower than they are selling for, because when the time comes to deliver the shares you are expecting to pick them up cheap. From financial point of view, the negative interest rates mortgages could be represented as a short sale of currency, in the context of a deflationary economy.

But what about the negative yield corporate bonds, which start to emerge? Technically again, the risk free interest rate is considered to be the rate offered by the central bank. If this rate is negative, investors lose less by investing into a negative yield bond. And why would somebody want to lose money, by exchanging more money now for less money in the future? It looks like the premium you willingly pay for your own future liquidity or, otherwise, against your own probability of default (debt valuation adjustment).

Example [2]: When a house builder takes/validates a credit from a bank, a hole is created, representing the money he owns to the bank. The builder's hole versus the bank is filled in by

the money he/she receives from a new house owner, who has built his house by borrowing money from the same bank. The bank, via the money, transfers the hole from the house builder to the house owner. Further assuming that everybody has debts, money operates as the visualisation mechanism of the hole, which travels in the opposite direction (when money enters, the hole leaves). When money does not fill in any hole (the money owner had no debt), it is only useful as it represents the fill in for future holes or future debts that the owner will encounter. In Feynman's terms, [3] who gives a second interpretation to negative energies, money represents a hole/debt in the future that travelled back in time, to the present, and future liquidity can be seen as a reflection on own credit risk, like when paying for pension/retirement.

What could be the difference between all these deposited money, in whatever form (in the bank, directly in corporate borrowings showing on as bonds) and their returned interest rates? The speed of money, instantly transported with the most performant electrical systems, that the classical approach to finance might not work anymore. The exponential limit with which interest rates used to be approximated, $\exp(rt)$ has been reached. In such a fast environment, a new, quantified approach might be necessary.

In the classical impulse conservation law, where p =impulse, one has $p=mv$ conserves. The same holds for its square: $p^2 = m^2 v^2$ is constant. The measure unit for impulse is $[p]=[m][v]=kg \cdot m/s$. In the quantum limit, when the mass of the particle is very light (photon), in its mass limit to zero, the mass unit (kg) is useless and we can write it directly in units of speed, which is the speed of light $[c]$:

$$[p]=1*[v]=[c] \quad (1)$$

As, on the relativistic limit of the photon $E^2 = p^2 c^2 = m^2 v^2 c^2 = m^2 c^2 c^2$. Dividing by the size of c , we will obtain:

$$E^2 = m^2 c^4 \quad (2)$$

Leading to

$$E = \pm \sqrt{m^2 c^4} = \pm mc^2 \quad (3)$$

Mathematically, the credit risk spread can be mapped, through averaging, to the probability of default. A negative spread would then translate to negative probabilities. For the very moment, the thing that jumps to my mind is what Paul Dirac used to write more than 70 years ago: « Negative energies and probabilities should not be considered as nonsense. They are well-defined concepts mathematically, like a negative of money. » Negative energies do get employed in particle physics. Dirac associated them to antiparticles/holes, which do conceptually resemble to short selling. Anyway,

there is a more terre-à-terre immediate explanation. For the negative interest mortgages, technically the negativity is covered by the negative yield of the mortgage-backed bonds that then the bank emits. In the very end, it is supported by the final investor, as a plus profit is taken by the bank from the spread between the two.

If we consider v to be the velocity of money, which now reaches c due to liquidities transmission via optical fiberglass cables, and m to be the transmitted monetary mass, which has no inertia and represents a number, the negative and positive energies E above could be mapped to a model to base on both positive and negative interest rates. To note above the use of c some times as speed of light and sometimes as measure of unit.

3. CONCLUSION

There is a lot of debate in particle physics on what antiparticles do represent and how negative energies can be made concordant with positive mass. And this is why maybe one could at least use the available mathematical recipes to

deal with current financial events. As in order to produce an item one needs to start from primary ingredients, standardly valuated in money, a functioning, producing economy can be naturally assimilated to a Dirac sea of holes. And one can also seem to be naturally happier to pay for being able to invest the money and eventually be taxed on the gain (which is none under negative investments), than for keeping the cash at zero rates and being taxed on the whole fortune. This does make the mathematics really less difficult understanding.

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INTERDISCIPLINARY APPROACH TO IT OUTSOURCING: PARALLELS WITH SYMBIOSIS

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Abstract. *This paper observes and describes similarity between IT outsourcing and some types of symbiotic relationships (mutualism). Some species practically outsource their IT function (collecting and processing information, mainly from the environment) to other organisms. Research has found that there are 6 main parallels between symbiosis and IT outsourcing: outsourcing of IT function to other party, beneficial relationship, parties are focused on what they do best, risk related to reliability, synergistic effect, and survival as the ultimate objective. Aims of this article are to direct the researchers at transdisciplinary effort, in order to make better knowledge of system mechanisms which have developed for millions of years in ecological systems, and apply superb and refined relation pattern knowledge existing in those systems into business environment.*

Keywords: *symbiosis, mutualism, IT outsourcing, parallels, interdisciplinary approach, transdisciplinary approach.*

1. INTRODUCTION

Outsourcing is one of the leading business strategies and economic issues nowadays. IT outsourcing can be defined as buying IT-related functions as a service from a third-party instead of performing the functions in-house [1].

As a result of strategy of focusing on core competences, IT has come under scrutiny [2]. There are many motives for IT outsourcing. The entire IT function is frequently viewed as a noncore activity, and also IT service vendors have the economies of scale and technical expertise to provide services more efficiently than do internal IT departments [3]. In the following chapters we are writing about the concept of outsourcing, IT outsourcing and IT outsourcing business models.

Essentially, IT function boils down to collecting, processing and disseminating data, information and knowledge from organizational entity and external environment. Some of these patterns can be also seen in the nature. There is the type of symbiotic relationship between organisms where one species transfer the function of collecting information from the environment (lookout for danger) to another species. In the end of this paper, we examine parallels between IT outsourcing and this kind of symbiotic relationship.

2. THE CONCEPT OF OUTSOURCING

During the most of the 20th century large and integrated companies that owned and directly controlled all its assets and

processes were deemed a business success. Being founded in the post-war period, when managers were encouraged to make conglomerates, these corporations tended to achieve economies of scale within their own organizations, to show greater market power, to ensure stability by widening product range and gain more control either over the sources of raw materials or distribution channels through vertical integrations forward and backward. As in the 1970s and 1980s competition was growing more and more global, these rigid, bureaucratic companies started underperforming. The reason was their inability to adapt to the changes. With the beginning of the global recession in the 1980s such failures became even more evident which was why consensus was reached that corporate strategies should take another direction - companies should be focused on less core activities. In order to achieve this target companies were looking for solutions outside their traditional borders, through establishing partnerships with other organizations.

Outsourcing is „procuring products and services that the company previously used to produce internally, from external provider“[4]. The word outsourcing was derived from the phrase „Outside Resource Using“[5]. Essentially, outsourcing involves contracting out business processes to other parties that can provide them with more efficiency and effectiveness. Although its roots can be traced back in the distant past, externalization as a business strategy had not been identified until the 1980s.

One of the most common divisions of outsourcing is into:

- a) *onshore outsourcing* - outsourcing within the same country of the company outsourcer (company that outsource),
- b) *nearshore outsourcing* - outsourcing to a country in the neighborhood (in a broad sense - on the same continent) that has lower costs and
- c) *offshore outsourcing* - outsourcing to a low-cost distant country.

The main reason for outsourcing was cost-cutting, but as time went by motives became more and more strategic such as introducing innovations, reducing risk, increasing flexibility etc. At the beginning organizations used to outsource only non-core activities. However, as the concept was developing they began outsourcing even some core business activities. Until then it had been axiomatic that no organization would outsource core functions because of their huge strategic

importance.

Outsourcing can provide numerous benefits.

a) Focusing on core competences.

When competition is fierce organizations are under pressure to achieve supremacy in all business activities which is almost infeasible in practice. In order to provide long-term competitive advantage companies have to focus on their core competences, i.e. key activities. Companies should outsource all the non-core (support) activities [6] and thus free their resources and managerial time that can be afterwards reallocated into core activities.

A company can achieve supremacy in the area of its core activities, still other activities should not be neglected because of greater focus on the core activities [7]. In order to achieve competitive advantage non-core activities must be also competitive. These activities are core for outsourcing providers, hence they can add to the value [8].

b) Reducing costs.

Companies often have to cut costs to remain competitive. Business activities are outsourced to those vendors that can conduct them either at lower costs or better, and often both. Outsourcing vendors achieve cost advantage as the result of economies of scale, experience or their location (due to lower labor costs, infrastructure, lower taxes etc.) [9]. By conducting similar jobs for a large number of clients the provider becomes specialized for those jobs. That experience enables the provider to improve constantly its business processes and thus to reduce costs considerably.

A very important advantage of outsourcing is transforming fixed costs into variable costs [7]. Namely, performing activities in-house brings about not only variable but also quite high fixed costs (capital set-up costs), while outsourcing implies only variable costs – the costs of outsourced services. Thus outsourcing provides efficient capital management since it frees capital for other purposes.

c) Access to a huge pool of experts.

During the previous years we have witnessed swift shift from industrial economy to knowledge economy where sustainable competitive advantage of a company arises from its highly qualified workforce and know-how [10]. Companies often face shortage of experts, when the most practical solution is to find an experienced outsourcing partner. Outsourcing to countries with cheap labour force (offshore outsourcing) provides companies from developed countries with opportunities to access a huge and insufficiently exploited pool of expert at considerably lower costs [7].

d) Enhancing processes.

Non-core activities that companies outsource are core activities for a vendor, which is why the vendor pays more attention to them unlike the company outsourcer. The vendor tends to manage the outsourced activity efficiently, to introduce improvements and achieve superior quality standard [7]. The experience that the provider has acquired by conducting similar processes for a big number of clients enables the provider to perform the jobs more efficiently and faster.

e) Introducing innovations.

Introducing innovations in the processes that are not core is not a priority for a company. On the other hand, there are outsourcing providers that tend to introduce innovations which provide long-term improvement of operating efficiency and strategic performance of their clients [7] - not only to retain clients, but to increase their competitiveness on market [11]. Vendors have much more experience in performing outsourced jobs, which enables them to make use of best practices and introduce innovations all the time [7].

f) Adjusting time zones.

By outsourcing activities to providers that are in other parts of the world a company can take advantage of time zones. For example, if a company in the USA outsources its business processes to India time differences enable it to conduct a part of the processes in a daytime in the USA, and at night to transfer the processes to India where a working day has just begun [7]. Hiring an outsourcing partner in other time zones is used to assemble a global team which successively performs the common activity 24/7 - non-stop [12]. This is of great importance for jobs such as software development which is to a big extent based on sequential activities such as development, testing, verification [12]. In this way a product or service development cycle is reduced and utilization of resources is improved [7].

On the other hand, hiring an outsourcing vendor in the same time zone provides conducting outsourced activities and the activities in the outsourcer company simultaneously. The working hours of the teams in the outsourcer company and the outsourcing provider match which makes communication and control easier.

g) Increasing flexibility.

Today's business environment demands quick responses to very frequent changes. In such conditions of doing business flexibility is the component that enables a company to survive. By outsourcing a company frees its resources for other purposes. Free resources can be easily reallocated so that companies can quite faster and at lower costs adopt their scales and production framework to meet market demands. By hiring an outsourcing provider the company can meet changes with the required capacity far faster than in the case it conducted the processes internally. This is especially important for the companies that have significant season or cyclic fluctuations in sales.

By focusing on core competences the company can sustain entrepreneurial agility and avoid premature transition from informal entrepreneurial stage into bureaucratic. If there is outsourcing infrastructure, in case of unfavorable market conditions, companies can be reorganized faster and easier, even change the business area completely.

h) Sharing risk with an outsourcing provider.

Outsourcing provides delegating responsibility for business activities to a provider even up to 100%, by which a part of the total business risk is delegated to the provider [7]. If a company performs a certain activity in-house, the company has to take all the risk of investing in that process. On the

other hand, finding an outsourcing partner who will accept costs of investing and process development reduces risk for the client's company.

i) *Reducing time-to-market.*

In business it is of key importance to enter a market first when an opportunity arises. In order to reduce time-to-market as much as possible companies find outsourcing partners so that they can operate much more time-effectively than in case they did all the activities in-house. Outsourcing providers already have all the necessary infrastructure, experts and know-how, thus they radically reduce time-to-market.

Some of the main obstacles and risks of outsourcing are related to [7]:

- a) service quality,
- b) information security,
- c) redundancy issue in the company outsourcer,
- d) geopolitical risks and
- e) cultural differences.

Some of the common disadvantages are overdependence on suppliers and the loss of competencies.

To take advantage of outsourcing and reduce risk companies have to take every step in the outsourcing process consistently and thoughtfully. Outsourcing process consists of the following eleven phases [13, 14]:

1. *Defining targets of outsourcing.*
2. *Making outsourcing decision.*
3. *Determination of outsourcing method.*
4. *Choosing location.*
5. *Choosing providers.*
6. *Decision authority.*
7. *Contract negotiating.*
8. *Service level agreement.*
9. *Organizational adaptation.*
10. *Managing partnership.*
11. *Exit strategy.*

3. IT OUTSOURCING AND BUSINESS MODELS OF IT OUTSOURCING

Information technology (IT) outsourcing is defined as a decision taken by an organisation to contract-out or sell organisation's IT assets, people and/or activities to a third party supplier who in exchange provides and manages assets and services for monetary returns over an agreed time period [15].

Companies usually decide to outsource IT function in order to focus on their core competencies. They outsource a part or the entire IT function to the provider with required know-how and resources [16]. IT outsourcing can reduce the time and money spent on infrastructure and operations and dedicate more resources to the core competencies [1]. The purpose of IT outsourcing is to get the best possible technology and service at the lowest possible cost [1].

In recent years the focus of IT outsourcing has been shifted to processes, which include application development, maintenance, testing, supporting services, new products'

implementation and engineering services [13]. Usually the processes such as IT strategy and management are too strategic to be outsourced, thus it is far more appropriate to outsource processes such as support and application development.

In relation to provider's location we can draw a distinction between the following IT outsourcing models:

1. *Onshore IT outsourcing.* In this setup an outsourcing provider is located in the domestic country. The main reason is engaging the best-in-class vendor, while costs can often be higher.
2. *Nearshore IT outsourcing.* In this setup IT function is outsourced to a nearby country. For example, many companies from Western Europe outsource their activities to the countries of Central and Eastern Europe, where costs are lower, workforce is qualified, and cultures are very similar. It implies lower risk but also less savings in comparison with offshore outsourcing.
3. *Offshore IT outsourcing.* In this setup IT function is outsourced to a distant low-cost destination, Such as Asian countries (India, China, the Philippines etc.).

In addition to the afore-mentioned models there is a model of offshore insourcing where companies perform activities abroad drawing on their own resources in order to gain the advantage of lower costs [17].

According to the organization ITSqc, LLC (formerly the Information Technology Qualification Services Center at Carnegie Mellon University) there are 6 IT outsourcing models [18]:

1. *Traditional model* - single service provider delivers service to a single client.
2. *Co-sourcing model* - two service providers work together to deliver service to a single client.
3. *Multi-sourcing* - multiple service providers provide services to a single client (client takes responsibility for managing and integrating the services of the various service providers).
4. *Alliance* - Multiple service providers collaborate to serve one or more clients (often, one service provider has a primary role in interfacing with the client on behalf of the alliance).
5. *Joint Venture* -Multiple service providers form a collaborative business venture to serve one or more clients (often, the first client may be a part of the joint venture).
6. *In-sourcing* - A group within the client organization is selected as a service provider, but it largely managed as an external entity. Often this group must compete with external suppliers or service providers for work.

The model of multi-sourcing is more and more often used nowadays [1]. Hiring several outsourcing providers can eliminate overdependence on just one provider.

Five different IT outsourcing models can be identified [19]:

1. *Staff augmentation.* This IT outsourcing model has the lowest risk and it is mostly used when there is a short-

term increase in demand the company outsourcer contracts out a vendor instead of hiring new personal.

2. *Out-tasking*. By adopting this model a company outsources only some tasks to the vendor and not the whole IT functions.
3. *Project-based outsourcing*. In this setup a company outsources the whole project to a vendor, with a focus on results and desired outcomes.
4. *Managed services*. In this setup a vendor is engaged as a long-term consultant.
5. *Build-operate-transfer (BOT)*. This model is adopted by companies that want to have a subsidiary in a low cost destination. Offshore partner can initiate operations and reach stability a lot faster than company itself with its in-house effort. Offshore partner operates business for a definite period of time, after which the company can buy the entire operation.

According to Robinson and Kalakota there are five business models of new generation (Fig. 1) for processes of outsourcing [13]:

1. *Global Delivery Model or Mix-Outsourcing*. This model is adopted by companies that outsource to multinational service providers that offer a mix of offshore, onshore, onsite and offsite capacities. Global Delivery Model is particularly used by huge global suppliers.
2. *Hybrid Outsourcing Model*. This model is also known as a dual-shore model. It combines advantages of providing onsite and offshore services to deliver results to clients at lower costs. This delivery model is usually adopted by medium-size service providers with offshore headquarters.
3. *Captive centers, offshore insourcing*. These models combine onshore common services and offshore captive centers. They consolidate activities of organizations' internal services into mega-service centers.
4. *Build, operate, transfer – BOT Model*. In this setup an organization contracts with an offshore partner to build a shared services or offshore development center, operates it for a fixed time period (usually 3-5 years) and transfers it at the end. Organizations adopt BOT model with an expectation that an offshore partner can initiate operations and reach operating stability much faster than it can with an in-house effort.
5. *Offshore multisourcing-a model (hub-and-spoke)*. This model combines several offshore business models and providers to reduce the power that only one provider, a monopolist, could have. Organizations adopt this outsourcing model in order to take advantage of the best-of-breed strategy, which, in addition, provides flexibility.

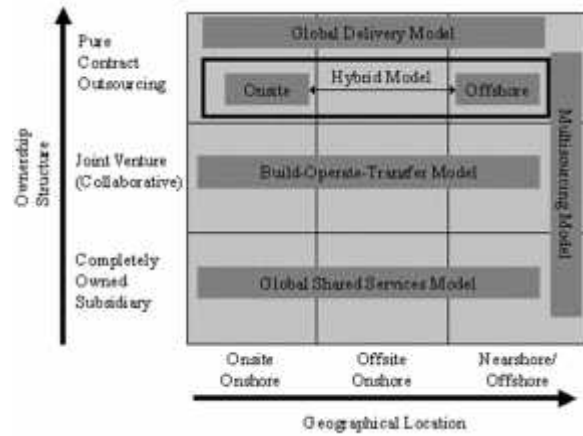


Fig. 1 Outsourcing business models [13]

4. PARALLELS AND A BUSINESS IT OUTSOURCING MODEL IN WILDLIFE

Mutualism is the type of symbiotic relationship that means association between organisms of two different species in which each benefits. [20] Although there are many examples of mutualism, the focus of this paper is on the species which practically outsource their IT function (i.e. collecting information from the environment) to other organisms, which in return get food, habitat, protection or other benefits.

For the start we are giving the example of baboons and impalas that live in the African savannah [21]. Impalas are one of the most common prey species for all predators and need to be constantly wary of predators. On the other hand baboons are highly intelligent animals and by their very nature hyper vigilant.

When impalas graze and browse leaves on branches they stir up insects in grass and leaves that are food for baboons. The insects jump from the grass and leaves running away from the impalas, which makes them an easy prey for the baboons. Following impalas in their pasture, baboons use the opportunity to catch insects far easier.

On the other hand, baboons are in charge of lookout. They climb trees and high termite mounds to check the situation in the environment. Baboons bark an alarm when danger is sensed to alert impalas. When alerted, impalas can easier escape from predator.

The second example of mutualism is one between one kind of birds (Oxpecker) and rhinos (or zebras) [22]. These birds alight on rhinos (or zebras) and eat bugs and other parasites that live on the latter's skin. In this way the birds get food and the rhinos and zebras get rid of bugs and parasites. In addition, if the birds sense danger for rhinos and zebras, they fly above them and scream in token of warning.

Mutualism is found in the underwater wildlife too. A good example is the relationship between Goby fish and shrimps [23]. A shrimp digs a hole in sand where it lives together with Goby fish. In return, the Goby fish touches the shrimp as a sign of warning if a predator is near, as the shrimp is almost completely blind.

The example of symbiotic relationship between fork-tailed drongo birds and meerkats which live in the Kalahari proves

that sometimes frauds can occur in this kind of mutualism [24]. Drongos and meerkats live in a symbiotic relationship where they warn each other in case of danger. However, these birds are not reliable partners. It happens that drongos scream false alarms just to steal meerkats' food, which run away when they hear the alarm leaving everything behind them. When meerkats are deceived several times they learn not to trust drongos' warnings. Research have shown that then these

clever birds are able to imitate alarm call of other animals so that in the end meerkats get deceived anyway.

In order to draw a parallel between these kinds of mutualism (where some species practically outsource their IT function to another species) and IT outsourcing we will illustrate them with the business model pattern introduced by Osterwalder and Pigneur (Fig. 2 and Fig. 3). The symbiotic relationship between baboons and impalas is taken as a symbiotic example.

Key Partners - Termites - Predators	Key Activities - Lookout - Alarm	Value Propositions - Security	Customer Relationships - Warning of danger - Eating together	Customer Segments - Impalas
	Key Resources - Time - Trees - Termite mounds		Channels - Direct contact	
Costs Structure - Time		Revenue Streams - Food		

Fig. 2 A business model pattern for IT outsourcing in wildlife (example of mutualism between baboons and impalas)

Key Partners - Outsourcers (clients)	Key Activities - Software development - IT consulting - etc.	Value Propositions - High quality - Lower costs - Know-how - Flexibility - Innovations - Focus on core competencies - etc.	Customer Relationships - Service levels - Process improvement - etc.	Customer Segments - Client's customers
	Key Resources - IT Experts - Up to date hardware and software etc.		Channels - Internet - Email - Live Chat - Phone - etc.	
Costs Structure - Salaries - Equipment - Advertising etc.		Revenue Streams - Fee - Incentives		

Fig. 3 A business model pattern for IT outsourcing

Table 1 Parallels between mutualism and IT outsourcing

Parallels	Mutualism	IT outsourcing
Outsourcing of IT function	Collecting information from the environment (lookout for danger)	Managing informational system
Beneficial relationship	Both sides benefits (protection, food, place to live etc.)	Outsourcing provider gets fee in exchange for providing service
Focus on specific activities	Species contribute with activity that they are doing better	Focus on core competencies
Risks	Possible false alarm	Information security risk
Synergistic effect	Associations helps animals to defend from predators easier	Gaining advantage that independent parties wouldn't be capable to achieve
Ultimate objective	Survival	To survive on the competitive market

Given all the afore mentioned it can be concluded that there are several significant parallels, i.e. analogies between mutualism as a kind of symbiotic relationship and IT outsourcing (Table 1).

1. *Outsourcing of IT function.* As impalas let baboons collect information from the environment for them, companies should outsource their IT function to those companies that can conduct it more efficiently and effectively.
2. *Beneficial relationship.* Mutualism is a kind of symbiotic relationship in which all the parties have benefits. Organisms that live in mutualism can receive protection, food, cleaning from parasites and insects, place to live etc. IT outsourcing also provides advantages for both the outsourcer and outsource provider. Outsourcing provider earns a fee in exchange for providing a service to the outsourcer.
3. *Focus on specific activities.* Mirroring an outsourcing model where both an outsourcer and vendor are focused on their core competences organisms in a symbiotic relationship are focused on what they do best. In the example of baboons and impalas we can conclude that impalas from the ground cannot observe the situation as well as baboons from trees.
4. *Risks.* As IT outsourcing implies certain risks, in mutualism sometimes can occur frauds. The example of symbiotic relationship between drongo birds and meerkats is the proof. In order to reduce the risk of IT outsourcing, it is necessary to find adequate outsourcing partner. In an outsourcing process that is a critical phase. Here it is very important to check experiences of the previous clients of the considered outsourcing provider.

The qualifications most frequently requested from the provider are [25]:

- a) *quality,*
 - b) *performance history,*
 - c) *guarantee and receivables policy,*
 - d) *objects and capacities,*
 - e) *geographical position,*
and
 - f) *technical qualifications.*
5. *Synergistic effect.* Living in associations helps animals to defend from predators due to synergistic effect that they achieve. On the other hand partnership between outsourcing vendors and clients is usually strategic. Through common efforts both parties are supposed to gain advantage that otherwise they wouldn't be capable to achieve if they worked independently.
 6. *Ultimate objective.* In the same way as the information about the environment impalas gain from baboons is of key importance for their survival, it is necessary that companies as open systems follow changes in the environment and adapt to them. If animals are associated they are more likely to survive. A similar thing is noticed with companies in the face of fierce competition on market.

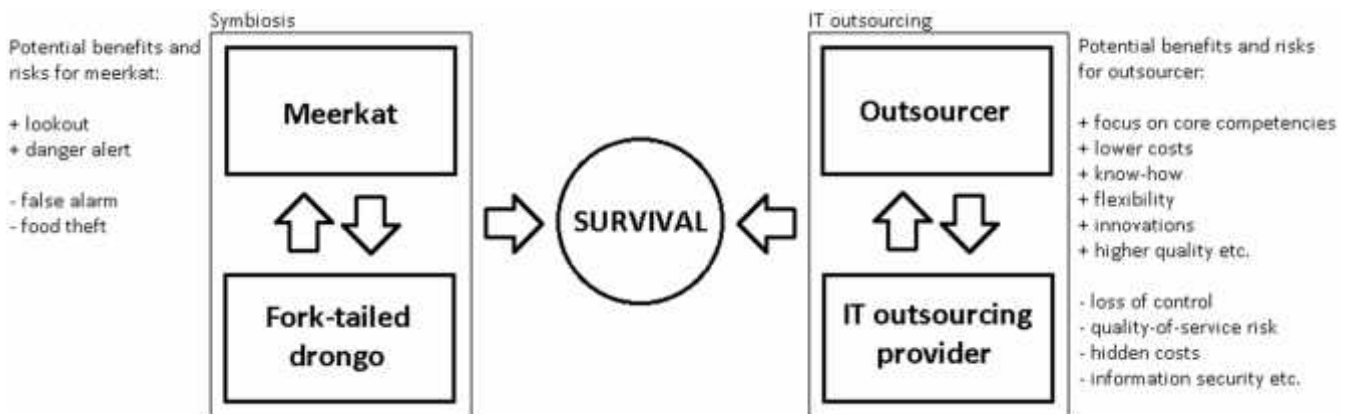


Fig. 4 Parallels between symbiosis and IT outsourcing with potential benefits and risks

5. CONCLUSION

Outsourcing became a key strategic management tool in competitive environment nowadays. It enables companies to focus on core competencies, reduce costs, access to a huge pool of expert, enhance processes, introduce innovations, adjust time zones, increase flexibility, share risk with outsourcing provider, and reduce time-to-market. In order to lower the risk of outsourcing (overdependence on supplier, loss of competencies, quality-of-service risk, information security, redundancy issues, geopolitical risk and cultural differences) client company have to take every step in the outsourcing process consistently and thoughtfully.

IT outsourcing can be defined as relocation of IT function to external parties. The entire IT function is often viewed as a noncore activity, so the outsourcing partners can perform it with more efficiency and effectiveness. There are many IT outsourcing business models, but the one that is more and more often used at the time is multi-sourcing model that eliminates overdependence on just one provider.

Some of the IT outsourcing patterns can be recognized in symbiotic relationships. The matter of fact, some species practically outsource their IT function (collecting security information from the environment) to other organisms. They are achieving mutually beneficial symbiotic relationship or mutualism in which one party provides lookout and security alerts and the other party provides food, habitat or something else in return. Therefore certain parallels between this type of mutualism and IT outsourcing can be noticed:

- outsourcing of IT function to other party,
- beneficial relationship,
- parties are focused on what they do best,
- risk related to reliability,
- synergistic effect, and
- survival as the ultimate objective.

Main direction for the future research is mutualism abstracted in the form of business model. This article provides currently most valuable information that the resources exchange between the cooperating species in the relation that resembles IT outsourcing have completely different value for the parties, e.g. impalas drive away insects, which uses practically no resources they would not spend otherwise, while baboons raise alarm, again at marginally low cost. Parallel in the business environment can be illustrated by supposed relation where one company gives its data for processing to the IT outsourcer. In return, outsourcer is free to combine received data with the others in data mining, as long as direct identification and personal data from the outsourcer are not revealed. Outsourcer can compensate little or no direct income by selling synthesized analysis and data mining conclusion. Thus both parties create value without exchanging valuable resources, mimicking parallels of IT outsourcing in the wildlife environment.

Other future research aims are to recognize patterns developed and finely honed for millions of years in IT outsourcing parallels of ecological systems and try to maximize its usage and gains for the business systems.

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