

UNDERSTANDING OF KNOWLEDGE FROM TWO MUTUALLY RELATED ASPECTS

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The challenges of the new millennium and specific properties of knowledge require a new understanding of knowledge. Author's approach to knowledge is based on three mutually related aspects. From the aspect of substance, the author understands knowledge as a set of experiences where information, based on rational combination is classified into patterns of thought through cognitive processes. The subject (individual, organization) to whom the capacity of cognition is ascribed and in which knowledge is to a certain extent institutionalized may use and exchange knowledge, through the system of property rights, for other rights in the market. Characterizing knowledge as capital brings economic effects to its owners, as it is ascribed certain economic market value. From a subjective-market aspect knowledge is defined in the relation to the individual, organization and market.

1. IN PLACE OF AN INTRODUCTION

Knowledge appears as the subject of research of many scientific disciplines. We can hardly find a scientific discipline where knowledge or terms closely related to it are not mentioned. However, the history of science witnesses that these authors mainly define knowledge from the aspect of scientific communities to which they belong.

Psychology deals predominantly with the cognitive process, since authors hold that the capacity of the human mind is relatively small compared to the scale of problems that individuals face (e.g. Simon, 1979, 1955, 1957). Sociology studies the effect of relations and networks on the transfer of knowledge, which is thus becoming increasingly sociologically contingent (e.g. Granovetter, 1985; Etzioni, 1990). Economic theory equates knowledge mainly with information (e.g. Stigler, 1961; Hirshleifer, 1973), human capital (Schultz, 1961; Becker, 1964; Mincer, 1958) and technological progress (e.g. Solow, 1956; Romer, 1990, 1994). Such understanding of knowledge within the economic scientific community is also supported by the Machlup trilogy (1980, 1982, 1984) which is one of the most complete classifications of knowledge. Managerial theory foregrounded the categorization of various types of knowledge in order to generate sound business performance. Knowledge has been usually defined through particular pairs that express the opposite poles of the methods of acquiring, creating, and transferring knowledge (e.g. explicit/tacit, individual/social). Subsequently, attention was drawn to the problem of efficient knowledge management and evaluation of knowledge within intellectual capital theory (e.g. Roos 1997; Edvinsson and Malone, 1997).

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In the paper, I wish to: 1. Show, that a profound understanding of knowledge requires a considerable scope, or breadth, in the analysis and selected literature; 2. Define knowledge from the aspect of its content (substance view) and in relation to all major agents of knowledge (subjective-market view); 3. Show how these two aspects are mutually related; 4. Show how important is the concept of networks for the correct understanding of knowledge. Our analysis will identify three elements (e.g. social capital in organization, cooperation in the scientific community, market mechanism of social learning), in order to show the importance of networks for the understanding of knowledge.

2. KNOWLEDGE FROM THE ASPECT OF SUBSTANCE

Knowledge is a whole comprising experience where information, based on combination of data, is sorted through cognitive process into patterns of thought. Understanding knowledge as capital means that knowledge is ascribed a certain economic value that is defined in accordance with supply and demand for it on the market. From the aspect of substance, I shall consequently understand knowledge as information, cognitive process, and capital.

2.1. Knowledge as information

Knowledge can be understood as information based on rational combination and relation of data acquired by observation. Information is produced by combination and classification of data. Understating of information is of key importance for definition of knowledge, because information is important in decision-making of individuals or entities (Schwalbe, 1999) and in establishing their equilibria (Machlup, 1984). Regardless of the type of equilibrium (partial/general, static/dynamic), market is in the center of this type of analysis, as the occurrence of equilibria is ensured by its allocative efficiency which hence becomes a synonym of information efficiency. Rationality and utility maximization lead, through price mechanism, to a partial of general equilibrium.

However, information function of the market and equilibrium cannot provide a satisfactory insight into the understanding of. Knowledge should not be equated with information, because it is a set of experiences where information is classified into patterns of thought through cognitive processes. It means that knowledge, through cognitive processes, involves also capacity to solve problems (Dosi, 1998). The following section is dedicated to the cognitive processes.

2.2. Knowledge as cognitive process

Three aspects of cognitive process are perception, learning and thinking (Pečjak, 1975). Simon (1955, 1959) links the aspect of learning and thinking with the question of 'what is rational'. Blaug (1992) defines rationality as an approach where individual economic agents maximize their utility, subject to given constraints, by

choosing among alternatives in accordance with their preferences; furthermore, complete and free information is available to all agents. The desire for rationality is understandable, as it employs deduction to lead to elegant models.

Economic theory has performed a reduction of the entire cognitive process to rationality and mechanics of processes where one's conduct is subject to objectively calculated laws. Due to perfect information and unlimited cognitive capacity, individuals have no problems comparing and choosing among the alternatives (unbounded rationality). Socio-cultural considerations do not influence the choice (universal rationality), and subjective knowledge is – due to perfect information – not relevant in decision-making (objective rationality). However, completely rational and quantitatively utilitarian 'homo oeconomicus' does not have any psychological cognitive characteristics:

- Unbounded rationality requires mutual comparison and selection of the best possibility; however, the complexity of this task precludes human mind from accomplishing this in a rational manner, because its cognitive capacity is bounded (Simon, 1979). Simon (1955) proposes the substitution of rationality with 'satisficing behavior', as it better describes human conduct.
- Sociologization of economics proves that an individual is not merely 'homo oeconomicus', but most of all a social and cultural being; hence, we may only speak of socially contingent rationality. Cyert, March (1963), Sen (1977), and Fukuyama (1995) call attention to the fact that inclusion of an individual into the society has an impact on the cognitive processes. Mill (1956) holds that due to the integration into society, cognitive processes can never be entirely individual.
- Rationality of 'homo oeconomicus' is in relation to an external observer who evaluates the conduct of the subjects studied. According to the assumption of the neoclassical theory, future changes are known to economic agents with certainty; hence, it is also called the 'single outcome theory', as it only offers one à priori solution. However, subjects under study act based on their own knowledge and not according to the knowledge of an external observer. Penrose (1980) believe that rationality is subjective because it depends on individual's perception.

The contributions cited above point to the fact that human cognitive capacity is bounded, due to imperfect information and the limits of the mind. Knowledge as a cognitive process is basically related with the individual, since only subjective knowledge can provide the basis of decision-making. With individual's inclusion into the society, cognitive processes are becoming socially contingent. Nevertheless, the subject to whom the capacity of cognition is ascribed may use and exchange knowledge, through the system of property rights, for other rights in the market. Market becomes a process of value through which knowledge is becoming capital.

2.3. Knowledge as capital

Characterizing knowledge as capital brings economic effects to its owners, as it is ascribed certain economic market value. I believe that cohabitation of human, social,

and intellectual capital enables understanding knowledge as capital in its full meaning. The value of knowledge was defined for the first time through the neoclassical theory of human capital (e.g. Mincer, 1958; Becker, 1964; Schultz, 1961). Knowledge represents an investment into an individual who is giving up a part of his or her income during education, trading it for higher income in the future. However, the failure to adequately comprehend relations prevents the human capital theory from accounting problems related to the transfer of knowledge and returns:

- Coleman (2000) for example argues that the quality of knowledge transmission from parents to children depends on the education of parents, and the time devoted to their children. Lack of human capital can motivate parents to spend on much more time with their children, thus generating a higher level of social capital between them, and consequently in lesser percentage of school dropouts.
- Sawyer (1978) finds that falling returns of human capital are a result of the separation of an individual from the environment as the individual is bounded in the capacity to employ his or her knowledge efficiently. However, knowledge is not a conventional commodity, as it is never lost upon sale or purchase; each transaction only increases it, leading to increasing returns.

To properly understand the increasing returns of knowledge and the transfer of knowledge, the broader social inclusion of an individual should be grasped; it is only through relations that one can fully employ the knowledge acquired primarily for oneself. Human capital theory does not account for sociological factors, mostly because they are strongly subjective and because the theory does not wish to threaten the position of the individual as the fundamental unit of analysis; hence, society is understood as a group of atomized individuals (Sawyer, 1978).

Considering these shortcomings, the only sensible appraisal of the theory is one made from the viewpoint of an alternative one. Since human capital theory has simply no competition of a comparable scope in the field of economics, while the new theories (e.g. segmented markets theory, signal theory) mostly supplement it, it may be sensible to look for solutions in deeper cooperation with other disciplines.

Upgrading the concept of human capital with that of social capital requires an interdisciplinary approach which is reflected in the tradition of economic sociology. Economics and sociology are connected through the treatment of knowledge as capital which appears in the form of human capital in economics, and in form of social capital and its impact on knowledge in sociology. The emphasis on the word 'capital' indicates that the value component of relations is expressed, and that this component may become a source of competitive advantage (Nahapiet, Ghoshal, 2000; Adler, Kwon, 2002). Human capital theory underlines that knowledge is basically a personalized process. On the other hand, through learning, values, and communication, knowledge is becoming more sociologically contingent; hence, the failure to grasp properly the notion of social capital will prevent any adequate understanding of knowledge as a factor of production. I believe that the success of an organization depends on the ability to manage relations within organizations

(organizational level), among them (inter-organizational level) and on relations between organizations and its environment (institutional level).

The key inadequacies of such a socio-economic approach are manifested from the aspect of measuring external effects of knowledge. Without measurement, there can be no efficient knowledge management. Measuring human capital is not simple because its effect are not easily measurable (Machlup, 1984; Adler, Kwon, 2002). There is also no consent on the method of measuring social capital; thus authors arrive at opposing conclusions (e.g. Putnam, 1995 vs. Paxton, 1999). Hence, solution is sought in a more profound cooperation with the managerial theory that stresses measurement and management of knowledge. Knowledge management is becoming a tool for boosting intellectual capital. Wiig (1997) and Edvinsson (1997) understand intellectual capital as a broader term; knowledge management is focused on the processes related to knowledge (e.g. Roos et al., 1997; Edvinsson, 1997; Jones, Jordan, 1997; Edvinsson, Malone, 1997).

Knowledge is becoming today the center of the new managerial paradigm and a new way of managing business changes. This involves the use of management methods at a new intellectual level, establishing a new culture of business change, and the corresponding (re)forming of the organizational structure. Management of knowledge must ensure that knowledge is translated into action, with the maximum permanent effect. The ability to measure the externalities of knowledge is gaining relevance, since only what is measurable can be efficiently managed. New approaches to measurement are devised at the cross-section between the traditional approach that relies on recognition and management of knowledge and accounting techniques. Kaplan and Norton (2000) build a 'balanced scorecard', system which highlights the non-financial indicators that are related to knowledge.

The soundness of seeking solution in deeper cooperation with managerial theory and upgrading the understanding of knowledge in terms of human and social capital with intellectual capital is further corroborated by the fact that most definitions of intellectual capital emphasize the importance of human and social capital:

- Edvinsson (1997) divides intellectual capital into human and structural capital. Structural is divided into partnership and organizational capital, where the former is related to company's external environment and the second to internal.
- Roos, Roos (1997) divide intellectual capital into human, organizational, and relational-consumer capital.
- Sveiby (1997) divides intellectual capital into the capacity or capabilities of the employees, external relations, and internal relations.

The authors foreground human capital either directly (e.g. Edvinsson, Ross, Ross) or indirectly through the understanding of the capabilities (e.g. Sveiby). Highlighting relational capital (e.g. Roos), structural capital (e.g. Onge), and external or internal relations (e.g. Sveiby) certainly points to an understanding of social capital.

The theory of human capital emphasizes that knowledge is related to the individual. Through the processes of socialization, knowledge is becoming increasingly socially contingent; hence, adequate grasp of transfer of knowledge and

increasing returns on knowledge requires that more attention be paid to social capital. The major deficiency of the socio-economic approach is the immeasurability of the externalities of knowledge. Therefore, understanding of knowledge within the human and social capital theory should be upgraded through the theory of intellectual capital. Without measuring and market evaluation of knowledge there can be no economic decision-making and rational management of knowledge. Such definition of intellectual capital represents a conception of knowledge as capital in the full meaning of the word.

3. KNOWLEDGE FROM SUBJECTIVE MARKET VIEW

Knowledge requires its carrier (e.g. individual, organization) in which it is to a certain extent institutionalized, and by which this knowledge is used in the market and exchanged for other entitlements. Therefore, from a subjective-market aspect I understand knowledge in relation to the individual, organization, and to the market.

3.1. Individual as carrier of knowledge

Individuals are one of the main carriers of knowledge, since cognitive processes are basically related to the individual. Acquiring knowledge is an individual process and therefore the individual can acquire knowledge only through individual education. Nonaka (1994) and Grant (1997) emphasize that individual knowledge is stored in physical skills and in the brain, and can therefore only be transferred with the person that possesses it. Consequently, an organization can only learn by learning of its members or by accepting new ones (Senge, 1990). Contemporary business literature lists knowledge managers, knowledge engineers, and knowledge producers as the main agents of knowledge (Nonaka, Takeuchi, 1995; Davenport, 1997; Jones, 1999). Consistently, opening new posts has become a quite common practice in many organizations. Apostolou and Mentzas (1999) warn of the danger of 'knowledge bureaucracy' which can occur as a result of excessive zeal for establishing new functions. Hansen et al. (1999) find that knowledge-related processes should not become and end to themselves. Lank (1997) argues that agents of knowledge should only be focused on as long as the importance of knowledge management is not strongly 'anchored' in the organization.

Viewing individuals as the sole agents of knowledge is in part appropriate, since cognitive processes are primarily related to the individual. With individual learning, individuals upgrade their experience into individual knowledge. However, knowledge is transferred through relations, and it is often materialized in machinery, teamwork, and in production-organizational process; as a result, organization can be also an important agent of knowledge, besides the individual.

3.2. Organization as carrier of knowledge

Organization should be viewed as a lot more than a group of individuals. Numerous

authors acknowledge the organization's capacity to create, learn and store knowledge:

- Nelson and Winter (1973, 1982) stress that organization creates through its operations, learning, and experience its own organizational knowledge.
- Penrose (1980) and Nelson, Winter (1982) relate rational capacities with the individuals, and 'organizational routine' with the organization. Routine as a form of organizational memory, and the way the organizational knowledge is stored.
- Ule (1996) uses a metaphor of 'collective brains' which should point out that an organization by itself can 'know', independently of the individuals.
- Holzner and Marx (1979) assert that organization as a 'collective agent of knowledge' has the capacity to learn.
- Nonaka (1994) and Jones (1999) highlight that due to increased scale and complexity of interconnectedness, organization as the agent of knowledge is gaining significance.

From a subjective view, we are dealing with individual knowledge possessed by the individual, and socially contingent knowledge held by the organization. An individual can never appropriate the entire knowledge because some knowledge is necessarily dispersed and not given completely to anyone. Organizational learning, organizational routines, and collective brains are notions that point to a conception of the organization as an agent of knowledge. Thus, for instance, Senge (1990) speaks of a 'learning organization', Quinn (1992) of 'intelligent organization, and Nonaka and Takeuchi (1995) on 'knowledge enterprise'. The process of acquiring knowledge which is fundamentally related to the individual apparently generates externalities that are manifest at the organizational level. Accordingly, contemporary organizations are realizing that organizational knowledge is an important factor of business performance, and consequently devote more attention to its management.

3.3. Market mechanism and understanding of knowledge

Like any other commodity in the market, knowledge requires a carrier, an agent, who understands it as a property right. However, there are certain types of knowledge that can never be owned by an individual subject (e.g. individual, organization); hence, knowledge can never be appreciated entirely through individual subjects, but only through a more profound understanding of the market mechanism. Various school of economics developed different ideas of the market, consistently with the changes in the way economic theory viewed the importance and role of the market throughout the history and its evolution. I strongly believe that these changes also affected the capacity of economic theory to understand knowledge itself. From the aspect of knowledge, it makes sense to remain confined to three periods of development of economic thought that contributed by their differing views on the operation and the role of market mechanism to better apprehension of knowledge itself: 1) the (neo)classical school, 2) the Marxist school, and 3) the Austrian school.

In the classical political economy, Smith's invisible hand pointed to the attainment of broader social interests through maximization of individual benefit, to the importance of freedom of choice, to the division of labor, and to the competitive mechanism of market prices. Marginalists upgraded the ideas of the classical economists with methodological individualism, rationality, maximization of benefit, and the price mechanism that leads to market equilibria. In this period, market became an abstract notion and the main mechanism of allocation which employs the informational mechanism of price to provide for efficient allocation of factors of production, and brings social needs and preferences in line with the productive capacity. Kaldor (1972) and Swedberg (1994) maintain that such a narrow understanding of market mechanism 'only' underscores the allocative function of the market. It soon became clear that (neo)classical theory will not be able to present a satisfactory grasp of knowledge only by focusing on allocation, human capital, and interpreting knowledge as information.

Marxist school developed somewhat different approaches to understanding of market mechanism. With its theory of 'commodity fetishism', it pointed out that the market commodity relations actually hide the background of broader social relations (Swedberg, 1994). Knowledge is a commodity with both, use and exchange value. Knowledge is basically a private commodity because its acquisition pertains to individual who appropriate the majority of the benefit derived from the investment into knowledge. Since individual knowledge cannot be appropriated, only contractual relations are possible between employer and employee. However, such relations also generate externalities, as knowledge is increasingly spilling over to other users, and thus it is becoming a public commodity (World Report, 1999). Thus, social relations appear in the background of knowledge as a commodity; therefore, knowledge is not only embodied in individuals, but also resides in the relations between them.

Unlike (neo)classical and Marxist school, Austrian school was considerably more successful in understanding the relation between knowledge and the market. By viewing market as an economic system of knowledge, Austrian school spotlighted two aspects:

- Hayek (1945) underlines that market represents a means of conveying knowledge among various subjects in the market. Though the information function of prices individuals are learning from each other; hence, learning is not based merely on own experience, but also takes place through the market. It is in the rational interest of an individual to take into account others, which is how market becomes a way of social learning that emphasizes relations between individuals.
- Schumpeter's business cycle theory calls attention to the meaning of knowledge at the entrepreneurial level. Innovations implemented by the most daring entrepreneurs generate dynamic disequilibria and development.

Views of various schools of economics have clearly shown that concentrating merely on the allocative function of the market does not enable satisfactory understanding of knowledge. It is obvious that (neo)classical understanding of the market is too narrow, and that the contributions of Marxist and especially Austrian

school provide a deeper notion of knowledge. Highlighting the importance of entrepreneurial innovation and understanding of the market as a result of spontaneous action of the subjects who possess partial knowledge is an important contribution of the Austrian school. Market mechanism of social learning leads to transfer of knowledge between individuals in the market; hence, viewing market as 'only' providing efficient allocation of factors of production does not suffice if we are to understand knowledge inscribed in the relations between individual subjects in the market. This means that knowledge only 'fully comes to life' with Austrian school and its understanding of the market mechanism.

4. INSTEAD OF THE CONCLUSION

By defining an own theoretical model we managed to define knowledge from the aspect of substance and from subjective-market aspect. From the aspect of substance, or content, knowledge should be understood as information, cognitive process, and capital. From a subjective-market aspect knowledge is defined in the relation to the individual, organization and market. These two aspects are related.

Knowledge is from the aspect of substance a whole comprising experience where information, based on rational combination of data, is sorted through cognitive process into patterns of thought. Human cognitive capacity is bounded, due to imperfect information and the limits of the human mind. Knowledge as a cognitive process and the conception of knowledge as human capital highlight the fact that knowledge is a process related mainly to the individual. Acquiring knowledge is in essence a process that pertains chiefly to the individual, since new knowledge is generated primarily through processes of individual education.

Knowledge is becoming with individual's inclusion into the organization and through the processes of socialization increasingly socially contingent; hence, adequate grasp of transfer of knowledge and increasing returns on knowledge requires that more attention be paid to social capital on organizational, inter-organizational and institutional level. From the aspect of subject it is possible to explain that some forms of knowledge are socially contingent since they can be possessed by an organization. Knowledge is namely materialized in machinery, teamwork and production process.

However, there are also some forms of knowledge that cannot be appropriated by individual subjects (individual, organization), because they are inscribed in the relations between these individual subjects in the market, and as such they are dispersed and not appropriable by any single entity. Hence, knowledge cannot be entirely understood through the prism of an individual or an organization, but only through a more profound insight into the market mechanism. Knowledge enters the market through the system of property rights, where knowledge can be exchanged for other entitlements. Through market knowledge becomes a capital, since knowledge is ascribed a certain economic value that is defined in accordance with supply and demand for it on the market. I believe that cohabitation of human, social, and intellectual capital enables understanding knowledge as capital in its full meaning. Market mechanism is, becoming through Hayek's conception of social

learning, also an important way of transmitting knowledge as a specific type of commodity with increasing returns between individual subjects in the market. In the background, social capital keeps emerging through market as a process of social learning. Through these relations and through the materialization of knowledge, knowledge is increasingly becoming a public one. Knowledge ceases to become a private commodity, where individual subject appropriate the majority of the benefit derived from the investment into it, since knowledge is increasingly spilling over through the market to other users, and thus it is becoming a public commodity.

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