

Aleksandar Kešeljević<sup>1</sup>

## KNOWLEDGE AS A FACTOR OF EVOLUTIONARY PROGRESS WITHIN THE THEORY OF FIRM

*The article highlights a new path along which the theory of the firm evolves. The author wishes to point out how the evolutionary progress in the theory of the firm brings about increasingly improved understanding of knowledge. The concession required for this improvement is a dismissal of some restrictive assumptions of the neoclassical theory. The author argues that there appears to be a trade-off between the benefits of the neoclassical consistency and the costs of more contemporary theories of the firm, which fail to comprehend the complex nature of knowledge.*

**Keywords:** theory of the firm; knowledge; evolution.

**JEL:** D80, D20, L20, A12.

Александр Кешелевич

## ЗНАННЯ ЯК ЧИННИК ЕВОЛЮЦІЙНОГО ПРОГРЕСУ В РАМКАХ ТЕОРІЇ ФІРМИ

*У статті висвітлено нові шляхи розвитку теорії фірми. Відзначено, як еволюційний прогрес в теорії фірми призводить до покращеного розуміння знання. Як поступка для цього нововведення потрібним стає зняття деяких обмежувальних припущень неокласичної теорії. Стверджено, що існує компроміс між перевагами неокласичної послідовності і витратами на застосування сучасніших теорій фірми, які не дають можливості зрозуміти складний характер знань.*

**Ключові слова:** теорія фірми; знання; еволюція.

Александр Кешелевич

## ЗНАНИЯ КАК ФАКТОР ЭВОЛЮЦИОННОГО ПРОГРЕССА В РАМКАХ ТЕОРИИ ФИРМЫ

*В статье освещаются новые пути развития теории фирмы. Отмечено, как эволюционный прогресс в теории фирмы приводит к улучшенному пониманию знания. В качестве уступки для этого нововведения требуется снятие некоторых ограничительных предположений неоклассической теории. Утверждено, что существует компромисс между преимуществами неоклассической последовательности и расходами на использование более современных теорий фирмы, которые не дают возможности понять сложный характер знаний.*

**Ключевые слова:** теория фирмы; знания; эволюция.

**1. Introduction.** The theory of the firm consists of a number of economic theories of organization that describe the nature of the firm, including its existence, boundaries, structure, and relationship at the market. Zukin, DiMaggio (1990) and Kantarelis (2007) see the following theories as the central ones in this regard: neo-classical, principal-agent, transaction-cost and evolutionary theory of the firm. We attempt to place them in understandable relation to one another by arraying and contrasting them. The article highlights an alternative theoretical perspective from which the theory of the firm can be viewed evolutionary, regarding knowledge as its common

<sup>1</sup> PhD, Assistant Professor, Faculty of Economics, University of Ljubljana, Slovenia.

denominator. At the risk of oversimplification, our approach focuses on one knowledge dimension, knowledge as a cognitive process. This dimension, which can be linked with rationality, has been only partly foreshadowed in the discussion and economic literature so far. Winter (1993) uses (un)bounded rationality as an element to relate orthodox transaction cost and evolutionary theory of the firm. In our approach the cognitive process is understood more profoundly, through 3 different aspects of rationality, in order to relate 4 theories of the firm.

The paper seeks to show how deep the understanding of knowledge as a cognitive process is within the theory of the firm in order to employ knowledge as the lowest common denominator within the theory of the firm. We shall argue that the more contemporary is a theory, the more advanced is its understanding of knowledge. In the paper, the problem of choice is presented between the neoclassical and more contemporary theories of the firm, from the viewpoint of knowledge.

**2. Knowledge as a cognitive process.** Knowledge is becoming today an increasingly important factor of production (Zharinova, 2010). Knowledge is a comprehensive experience in which information based on combination of data is sorted through cognitive process. Cognitive processes are important as knowledge cannot exist without its subject to which the capacity of cognition is ascribed. Thinking and learning are of particular importance for understanding knowledge as a cognitive process (Pecjak, 1975). Simon (1955; 1959) links these two aspects with the question of what is rational. Knowledge as a cognitive process can therefore be apprehended through the prism of rationality. Nooteboom (2009) argues that since the field of cognition is a wide one, one has to make a reasoned choice and to familiarize oneself with one option regarding cognitive understanding (e.g., rationality). Blaug (1994) and Becker (1976) define rationality as an approach wherein individual agents maximize their utility by choosing among alternatives in accordance with their preferences. Trstenjak (1982) warns that in this case, any deeper study of cognitive processes is entirely impossible, because a utility-oriented "homo oeconomicus" simply has no cognitive characteristics. Unsustainability of neoclassical reductionism can be illustrated through 3 pairs of concepts that emphasize the transition from a neoclassical to a much more profound understanding of cognitive processes.

*a) Subjective and objective rationality*

The neoclassical theory reduced the entire cognitive process to a set of objectively calculated laws. Rationality of homo oeconomicus is a manifest in relation to an external observer who evaluates the conduct of the subjects studied. Future changes are known to economic agents with certainty; hence there is only one a priori solution that provides objectivity (objective rationality). However, Penrose (1972) maintains that only subjective knowledge can provide a background for decision-making since subjects under study act based on their own knowledge (subjective rationality). Subjective rationality is also related to various agents of knowledge. From an ontological perspective, we are dealing with individual knowledge and social knowledge which is integrated in the relations between individuals.

*b) Bounded and (un)bounded rationality*

In the neoclassical theory, individuals have, due to perfect information and unlimited cognitive capacity, no problems comparing and choosing among the given alternatives (unbounded rationality). However, due to the immense complexity of

such a task, human mind is hardly capable of performing it in a rational manner, as rational capacity of an individual is bounded (Simon, 1979). Instead of maximization, Simon (1955) puts forward the process of choosing the first possibility in which the desired level of utility is exceeded, although the domain of alternatives has not yet been exhausted (bounded rationality).

*c) Universal and socially contingent rationality*

Neoclassical economics is establishing a tendency to search for universal rules of human behaviour by employing the methodology of natural sciences. Socio-cultural factors are seen in neoclassical economic theory as having no effect on choice and decision-making, regardless time and space in which an individual is located (universal rationality). Many authors argue that due to the increasing embeddedness of the individual into the society, cognitive processes are also becoming more embedded (Granovetter, 1985; Cyert, March, 1992). Therefore, we may only speak of socially contingent rationality since an individual is not merely a homo oeconomicus, but also a social and cultural being.

Arguments cited above point to the fact that human cognitive capacity is bounded due to imperfect information and limits of human mind. Knowledge as a cognitive process is basically related with the individual subject, since only subjective knowledge can provide basis for decision-making. With individual's inclusion into society, cognitive processes are becoming increasingly socially contingent.

**3. Understanding of knowledge within the theory of the firm.**

*3.1. Understanding of knowledge within the neoclassical theory of the firm.* It can also be called the orthodox theory as it is the theoretical view that largely dominates the textbooks on introductory and intermediate microeconomics. The neoclassical theory of the firm has become rooted in methodological individualism, rationality, and profit maximization. A firm is a profit-seeking transformer of inputs into outputs, formally by production functions. These assumptions largely affect how deeply the neoclassical theory of the firm understands cognitive processes in 3 aspects:

a) rationality is related to objectification of knowledge as an external observer rates the (ir)rationality of subjects under investigation. According to the assumption of the neoclassical theory, future changes are known to economic agents with certainty; hence, the theory is also called the single outcome theory (O'Brien, 2000) (objective rationality). Neoclassical theory fails to account the history of its own cognition (Braunerhjelm, 2000). It assumes equal cognitive capacity since one organization cannot absorb knowledge faster than others (Knudsen, 1995). In its purest form, theory does not even assume the existence of a firm; hence, it is at a loss to ascribe to it any capacity to accumulate knowledge. As a result, neoclassical theory is characterized by inadequate understanding of various bearers of knowledge (Nelson, Winter, 1982).

b) The assumption of a rational individual is the starting point of the neoclassical theory of the firm, which equates rational behaviour of an individual with behaviour of an organization (Papandreou, 1952). Neoclassical theory states that human mind is supposedly capable of processing and applying all information, and hence of comparing possibilities and choosing the best one (unbounded rationality). On the other hand, the cost curves (U curve) ultimately turns upwards and this means that cognitive decision capacity is assumed to be limited and cannot be increased in pro-

portion to the increase in other inputs, which is completely inconsistent with the assumption of unbounded rationality (Demsetz, 1993).

c) Sociocultural factors have no effect on choice and decision-making in the neoclassical theory. The main reason lies in the methodological individualism according to which the ultimate unit of analysis is always the individual, and this precludes any understanding of the relations among individuals. Admittedly, this is largely a consequence of fascination with algebraic models. Arrow (1974) and Demsetz (1993) argue that neoclassical theory in its purest sense is a theory of relative prices, with emphasis on allocation of production factors. There is not a single reason for the existence of firms in the neoclassical theory (Kay, 1984). Rationality is, because of this stark underestimation of the inner organizational structure (black box) and the broad environment, always the same regardless time and space (universal rationality).

Methodological individualism, rational behaviour and the concept of equilibrium drove the neoclassical theory into the embrace of scientific deductivism which has prevented the understanding of the cognitive processes to go any deeper than to the level of objective, unbounded, and universal rationality.

*3.2. Understanding of knowledge within the agent/principal theory of the firm.* Beginnings of the agent/principal theory can be traced back to the 1930s (Berle, Means, 1932). More interest rose in the 1970s and 1980s with the contributions of Alchian and Demsetz (1972), Jensen and Meckling (1976), Fama and Jensen (1983). The agent/principal theory stresses rational behaviour in a contractual relationship. Individual conduct is strongly influenced by the asymmetry of information as the parties in relationship have different amounts of information at their disposal. The next section explains how deeply cognitive processes are understood by the agent/principal theory:

a) The theory emphasizes that both individuals (agent, principal) in a contractual relationship behave rationally. Individual conduct is egoistic as his activity is aimed at maximization of his target function. The theory thus builds upon the principle of maximization of benefit, and objective rationality; this makes it perfectly clear for an independent observer what rational or irrational behaviour of the subject under observation is (objective rationality). The theory does not recognize an organization as a potential bearer of knowledge.

b) The agent/principal theory correctly views individual rationality as bounded, which is a result of the limits to the capacity of human mind, and information asymmetry (bounded rationality). Because human mind is limited in its capacity (Fama, Jensen, 1983) and because of the fact that individuals always possess more knowledge than can be defined in a contract (Foss, 1995), contracts are never perfect. Therefore, even after a contract is made, breaches and problems in supervision often occur as agents' behaviour does not comply with expectations and prior agreements (Moe, 1984; Knudsen, 1995).

c) Several authors (Moe, 1984; Collier, 1998) emphasize that understanding of relations between individuals within the agent/principal theory is based on efficiency, which implies a continuation of the neoclassical tradition. Leibenstein (1979) argues that the theory conceives organizational relations predominantly from the aspect of opportunism. Hence, the theory embodies a view of humans as undersocialized; it denies the inequality of power within employment relationship; and it is obsessively

concerned with the potential malfeasance of employees to the exclusion of employers. Some understanding of the environment can be seen in a wish to draw information from it in order to make more rational decisions. Because of this stark underestimation of relations, rationality is more universal than socially contingent.

Due to the boundedness of human mind and negligence of effects of the environment, understanding of cognitive processes in relation exclusively to an external observer who evaluates the conduct of the subject studied, leads to the notion of bounded, universal, and objective rationality. The theory pays too little attention to organization as an important carrier of knowledge and to social contingency of rationality. The agent/principal theory is, in spite of having a more advanced understanding of the cognitive process than the neoclassical theory, still incapable to fully grasp the concept and the meaning of cognitive processes.

*3.3. Understanding of knowledge within the transaction cost theory of the firm.* One of the biggest watersheds in microeconomics was the finding that information in the market is related to costs. Coase's article "The Nature of the Firm" (1937) is seen as the beginning of the transaction cost theory. Coase's work was subsequently upgraded by Williamson (1975, 1981). By economizing transaction costs, the theory builds on efficiency, on which the choice between two modes (market, firm) is based. The following section is dedicated to the explanation of how thoroughly the theory understands a cognitive process:

a) The theory builds upon the principle of comparing transaction costs between the market and the firm; hence it is perfectly clear for an independent external observer what kind of mode of performing an activity should be chosen (objective rationality). On the other hand, the theory strongly emphasizes the individual as the key bearer of knowledge since the nature of the employment relation depends on asset specificity (Williamson, 1981). Organization as a bearer of knowledge is also put forward, particularly through the knowledge materialized in vertical relations. It seems that, on one hand, theory builds upon objective rationality, however, on the other hand, it emphasises various knowledge carriers (subjective rationality).

b) Transaction cost theory adopts Simon's view of the limited capacity of the individual's mind and the resulting boundedness of the individual's cognitive abilities (Williamson, 1975; 1981; Nooteboom, 2009) (bounded rationality). This introduces a certain level of inconsistency in the transaction cost theory itself as it is unclear how an individual with bounded cognitive capacity could correctly identify the amount of transaction costs.

c) Transaction cost theory understands the relations in an organization (employment) and among them (vertical integration) mainly from an efficiency perspective (Pitelis, 1993). However, relations cannot be understood based exclusively on the market logic. Leibenstein (1979) stresses that employment relations are not based merely on efficiency, but also on loyalty, respect and trust. Even Coase (1993) considers that one of the main weaknesses of his article from 1937 stems from the use of the employer-employee relationship as the archetype of the firm. Pitelis (1993) argues that methodological individualism precludes the theory from recognizing the importance of the environment. It means that socially contingent rationality is not seriously considered by the theory in spite of the fact that the basic unit of the analysis is a transaction, which actually constitutes a relation. Rationality is, because of this stark

underestimation of the inner organizational structure and the environment, universal.

As a result of understanding the cognitive process as being related mainly to the individual subject with bounded cognitive capacity, and due to the deficient understanding of the broader environment, the transaction cost theory views rationality as being bounded, universal and more subjective (than objective). The theory obviously deals more profoundly with the nature of cognitive processes. Despite that, the theory is still incapable to fully grasp the concept of socially contingent rationality. Nevertheless, as far as understanding of cognitive processes is concerned, it is more advanced than the ones previously discussed.

*3.4. Understanding of knowledge within the evolutionary theory of the firm.* For the largest part, evolutionary theory of the firm has been promoted and developed by Alchian (1950), and especially by Nelson and Winter (1973; 1982) in the 1970s and the 1980s. The main characteristics of the theory are the following: 1) the fundamental problem of economics is not the study of equilibrium but historical development; 2) the process of organization's adaptation to the environment and the selection carried out by the environment (the market) are two mutually combined processes; 3) the meaning of routine. The next section shows how deeply the evolutionary theory understands cognitive processes:

a) Evolutionary theory of the firm stresses that in the long run, only the organizations with a long-term capacity to generate profit will survive. However, these profits are not necessarily the maximum possible ones (Hannan, Freeman, 1977). Evolutionary theory of the firm thus rejects the principle of profit maximization and objective rationality, since the complexity of the environment prevents the existence of clear instructions as to what is (ir)rational. Continuously changing environment renders the "optimum" state impossible. Therefore, adaptation of managers to the environment is of key importance, rather than seeking "optimums" (Alchian, 1950). The subjects act and make key decisions based on their own knowledge (Ponivar et al., 2009), and therefore the decisions differ between particular firms (Moe, 1984). Winter (1975) contends that managers continuously improve their decisions through the processes of learning (subjective rationality). Numerous authors emphasize the organization as an important agent of knowledge processes. Nelson and Winter (1973; 1982) assert that organizations are important bearers of knowledge and that their activity generates organizational knowledge. Hannan and Freeman (1977) note that decisions are often made based on routine, i.e. repeated activity, and experience that map out the future of an organization. Hence, one of the key features of the theory is that it places organization as a relevant bearer of knowledge, rather than an individual, in the center of the analysis.

b) Evolutionary theory of the firm adopts Simon's idea of bounded rationality (Nooteboom, 2009). Human mind is not capable of processing all information, to compare and to choose the best. Bounded rationality is also the result of imperfect information. The theory emphasizes the inevitability of mistaken decisions in an uncertain and complex world; the focus is the dynamics and the tendency toward better economic behaviour rather than towards hypothetical sets of alternatives (Winter, 1993).

c) Evolutionary theory underlines the sociological aspect of cognitive processes, since decisions of individuals are strongly affected by external environment. Such



influence of the environment takes the form of natural selection at a market. Through this process, organizational forms that adapt better than others are awarded. Additionally, organization is changing the methods of its own operation and decision-making through processes of learning at a market, according to the newly emerged circumstances and conditions (Alchian, 1950; Fliegstein, Dauber, 1989; Zajc, 2011). The organizational structure is therefore formed through the cognitive processes of adjusting to changes in the environment and through selection of organizational forms at a market. Apparently, environment has an important effect on cognitive processes (socially contingent rationality).

From the aspect of cognitive processes, the theory is adopting the notion of subjective, bounded, and socially contingent rationality. Knudsen (1995) even believes that from the neoclassical viewpoint, such understanding of knowledge cognitive processes represents a deviation of such a magnitude that evolutionary theory actually pays virtually no attention to rationality. As far as understanding of cognitive processes is concerned, the evolutionary theory is the most advanced among the ones considered in the paper.

#### **4. Knowledge as a factor of evolutionary changes within the theory of the firm.**

Arguments cited above point to two facts. Firstly, an analysis has revealed that only evolutionary theory fully understands the true nature of the cognitive processes through subjective, bounded, and socially contingent rationality. Neoclassical theory of the firm views cognitive processes from the completely opposite aspect. The agent/principal theory sees cognitive processes within the notion of objective, bounded and universal rationality, and the transaction cost theory points out subjective, bounded and universal rationality.

Secondly, cognitive processes obviously arise in the background of the theory of the firm; thus knowledge as cognition processes can be understood as one of its key elements and least common denominator. Such an understanding of cognitive processes, through rationality, enables us to define knowledge as a factor of evolutionary change within the theory of the firm. It seems that deficiency in understanding of cognitive processes within the neoclassical theory of the firm spurred the emergence of new economic theories of the firm which have demonstrated an extended capacity to understand the complexity of the cognitive dimension.

Thus, the agent/principal theory of the firm is comparatively more sophisticated in understanding of cognitive processes than the neoclassical theory. Similarly, the transaction cost theory is undoubtedly more advanced than its forerunners (neoclassical theory, agent/principal theory). And finally, the evolutionary theory is the most advanced theory, among the ones considered in the paper, regarding the understanding of knowledge. It is obvious that recent theories have a more thorough understanding of cognitive processes.

**5. Knowledge and the problem of choice within the theory of the firm.** Analysis also shows that the problem of choice between the neoclassical and the more contemporary economic theories of organization applies with regard to (the lack of) understanding of knowledge. Theoretical analysis indicates that recent evolutionary theories seem to have larger capacity for understanding of knowledge as cognitive processes. However, the concession required for this progress is a lower degree of theoretical generalization and more intense heterogeneity of the theory itself. A deeper compre-

hension of cognitive processes requires the dismissal of some restrictive assumptions of the neoclassical theory (e.g., unbounded rationality). Neoclassical tradition with its scientific positivism was oriented on the application of apparatus that gave way to inward theoretical unity and consistency. Obviously there appears to be a trade-off between the benefits (theoretical rigor, inward theoretical consistency) and the costs which appear in the form of failure to comprehend the complex nature of knowledge. It seems that the theory of the firm progresses through its evolutionary course; it becomes less homogeneous, but nevertheless yields increasing returns in the form of theoretical findings about understanding of the knowledge as a cognitive process. It seems that knowledge has driven the discipline away from the neoclassical orthodox starting points.

**6. Conclisions.** Cognitive processes are important for understanding of all the processes related to knowledge, as knowledge cannot exist without its subject to whom the capacity of cognition is ascribed. Cognitive process can be understood through rationality as one of the pivotal assumptions of economic theory. We believe that cognitive capacity is related particularly to the individual subject to whom the capacity of cognition is ascribed (subjective rationality). Due to the limited capacity of human mind, individual's cognitive capacity is bounded (bounded rationality). As a result of increasing embeddedness of the individual into the society, cognitive processes are becoming ever more socially contingent. Our approach highlights an alternative theoretical perspective from which the theory of the firm can be viewed from an evolutionary perspective, regarding cognitive processes as its minimum common denominator. The analysis revealed that only evolutionary theory fully understands knowledge as a cognitive process, while its predecessors (neoclassical theory, agent/principal theory, and transaction cost theory) only consider some partial aspects and dimensions thereof. The theory of the firm appears to evolve proportionally to its capability to understand cognitive processes. The more contemporary the theory is, the more advanced it is in understanding of knowledge. Theoretical analysis also indicates that the opportunity cost, incurred because of the larger capacity to understand cognitive processes, takes the form of a departure from the original neoclassical starting points.

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