

Production Forces: Mechanisms, Structure, Transformation

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ABSTRACT

The present paper further expands the authors' new conceptual approach as a system of views and analysis in studying the category of productive forces. The role and position of productive relations in the structure of economic production methods are established. The drivers and indicators of productive force development are analysed, with an emphasis on their evolutionary nature. The authors' vision is outlined of the fundamental principles of their formation and evolution predetermining regional economic modernisation as they undergo spatial transformations over time.

Key words: productive forces, cycle, evolution, transformation, productive relations, region, infrastructure, system, territory.

1. INTRODUCTION

The issue of productive force development, as well as the issue of its immediate factors involved, have long been a major much focus of researchers across various economic schools and movements, even from the earliest stages of development of economic thought.

Their analysis concerned the processes in human society and sought to specify the relations between various aspects of social life and, particularly, social and economic spheres, production and consumption, production and population, society and geographic conditions. All this significantly influences economic analysis and social life as well. As A. M. Kovalev writes, "a society is an unprecedented, complex but flexible and adaptive social organism, which is constantly changing, evolving and developing. Revolutionary shifts in the society's productive forces make the inner source of social development, serving as the major human levers of influence on nature. Productive force development is the specific realisation of practical human energies, meeting the society's material requirements to support its steady development. With

that, depending on the nature of productive relations, such activities may be more or less efficient. This means that not only productive forces but productive relations as well shape the essence and mechanism of the driving forces of a society" [1, p. 122].

Even with the expansive body of research and varied approaches to analysing the notion of productive forces, there is yet no clear consistent and objective line to describe the whole process of their emergence and development. On the contrary, it is often the case of many contending paradigms, concepts and single-sided and tendentious or opportunistic directions, which hinders a detailed and in-depth analysis. The established traditional approach of the Soviet period to analysing the category of economic thought such as productive forces describes them as *a combination of specific types of production factors (means and objects of labour) and humans, with their immanent knowledge, skills and competences*. However, the essence and role of productive forces are constantly transforming and growing exponentially, as the transition is underway to the post-industrial development stage. Moreover, the current stage of development has changed the structure of productive forces by expanding their scope and integrating science. The ripe need for a completely different approach to analysing the category of productive forces inevitably invokes ideas of changing them and revisiting their structure, essence and composition, identifying the driving forces and refining the interpretation of the notion.

Notably, today, despite all conceptual nuances, scholarly research mostly operates a converging view of the essence and structure of productive forces in an area, *implying that the complex of productive forces is understood as the whole range of elements engaged in the creation and distribution of public goods* and there is a visible trend toward the expansion of the element platform of productive forces, while all interpretations, subject to a reduction to some extent, point at a sum of elements without any specification of their interaction and development lines. Meanwhile, they, beyond doubt, cannot be shown to be a plain sum of elements

arranged in a mechanical combination. Their interaction creates a system and each integrated and inseparable system is fundamentally different from the sum of its elements.

2. LITERATURE REVIEW

In observing a certain sequence and cline of stages, we further choose to focus on works by K. A. Kotelnikov [2]-[5] leading to the establishment and substantiation of a new conceptual approach as a system of our views and judgements summing up the issue and essence of the economic category of productive forces, in contrast to other researchers' positions, as "*an arranged connected set of the regional environment elements of individual and material nature changing in their interaction and transforming the socioeconomic landscape of the area*". This approach departs from a mere sum toward an *organised* set of elements of the territorial environment commanding, in their *interaction*, further *evolution* and, as a consequence, *transformation* of the territorial socioeconomic landscape.

Based on the above argument, the obvious *inference* is that any development of productive forces is plainly ruled out outside certain territorial borders. The process of development of productive forces takes place within certain time and territorial boundaries within the country and its constituent entities. Consequently, productive forces should be viewed not only as a *subject of economic theory* but also as a *constituent of the regional socioeconomic system*.

The multidimensional process in the formation and development of regional productive forces and the distribution of its results in the modern environment is determined by the rising influence of a large number of variables of the internal and external environment related to both the inherent characteristics of productive forces and their spatial aspects, the specifics of regional production and distribution of products, the relation between real and nominal incomes and popular wellbeing and consumer preferences, as well as the development profile of market and social infrastructure. This brings about the acute issue of identifying the elements of productive forces influencing directly or indirectly the scale and pace of spatial development taking into account the reason for their emergence, scope and frequency of effect.

3. PROPOSED METHODOLOGY

3.1 General description

Building on the earlier proposition that the operation of productive forces is a process supported by *the dominants of socioeconomic space and predetermined by the aspects of territorial development*, we should specify the environmental factors substantiating, in essence, the differentiation of the basic elements of productive forces and their localisation through the functional and territorial lens. The departing point here is the quite reasonable proposition of S. G. Falko that the

criteria factors of a territorial environment largely determining the process of formation and development of productive forces should include the *following*:

- natural factors, i.e. the scope of material resources, particularly related to nature and climate;
- demographic factors, i.e. labour quality and potential at the regional level, migration intensity, the sex and age structure of the population, current and potential unemployment;
- social factors, including the level of disposable income of the economically active population, its structure and occupational profile;
- economic factors, including the number of industrial enterprises in the area, infrastructure development profile, the volume and structure of fixed asset investment, the regional logistic profile;
- science and technology factors, including the automation and informatisation of social life, globalisation and internalisation trends in production and distribution.

The above approach allows substantiating the proposition that productive forces are shaped and developed under the *mutual* influence of territorial environment factors reflecting, to some extent, the qualitative and quantitative aspects of the entity development, the key trends and specifics of regional production and prosperity.

Taking into account the essence of this approach and following the logic of research by K. A. Kotelnikov [2]-[5], the specifics and multifaceted profile of the current stage of regional economic development and the existing profile of productive forces in dialectic with regard to the combination of individual and material environment factors, it appears possible to differentiate and identify, based on such criterion, *the factor elements of the territorial arrangement organisation of productive forces*: territorial labour resources; regional logistics system; complex natural resources; regional financial and credit system; innovative component of productive forces.

3.2 Algorithm

For the purpose of their visual adaptation and uniformity, the above elements of productive forces appear in the figure below as *labour, capital, logistics, innovation and nature*, where the latter refers to the complex of mineral, biological and energy resources in this context. All of the above elements largely define the development trends of productive forces and enable to identify the turning points of change. However, we do not contend to propose an ultimate description and understand that such representation does not reflect a whole complex of elements of the region's productive forces and thus allows an adjustment and expands the scheme to include the so-called *latent* elements of productive forces

(designated as N) introduced as a condition of further refinement and development of the proposed theoretical model. With that, the *factor activity of regional productive forces* is interpreted by us [2] as an *aggregate characteristic of determinant and resultant properties reflecting the level of activity in the territorial organisation of productive forces*

within a time interval and following common causative relations.

The combination of interrelated spheres of elements of productive forces in their interaction is shown in Figure 1.

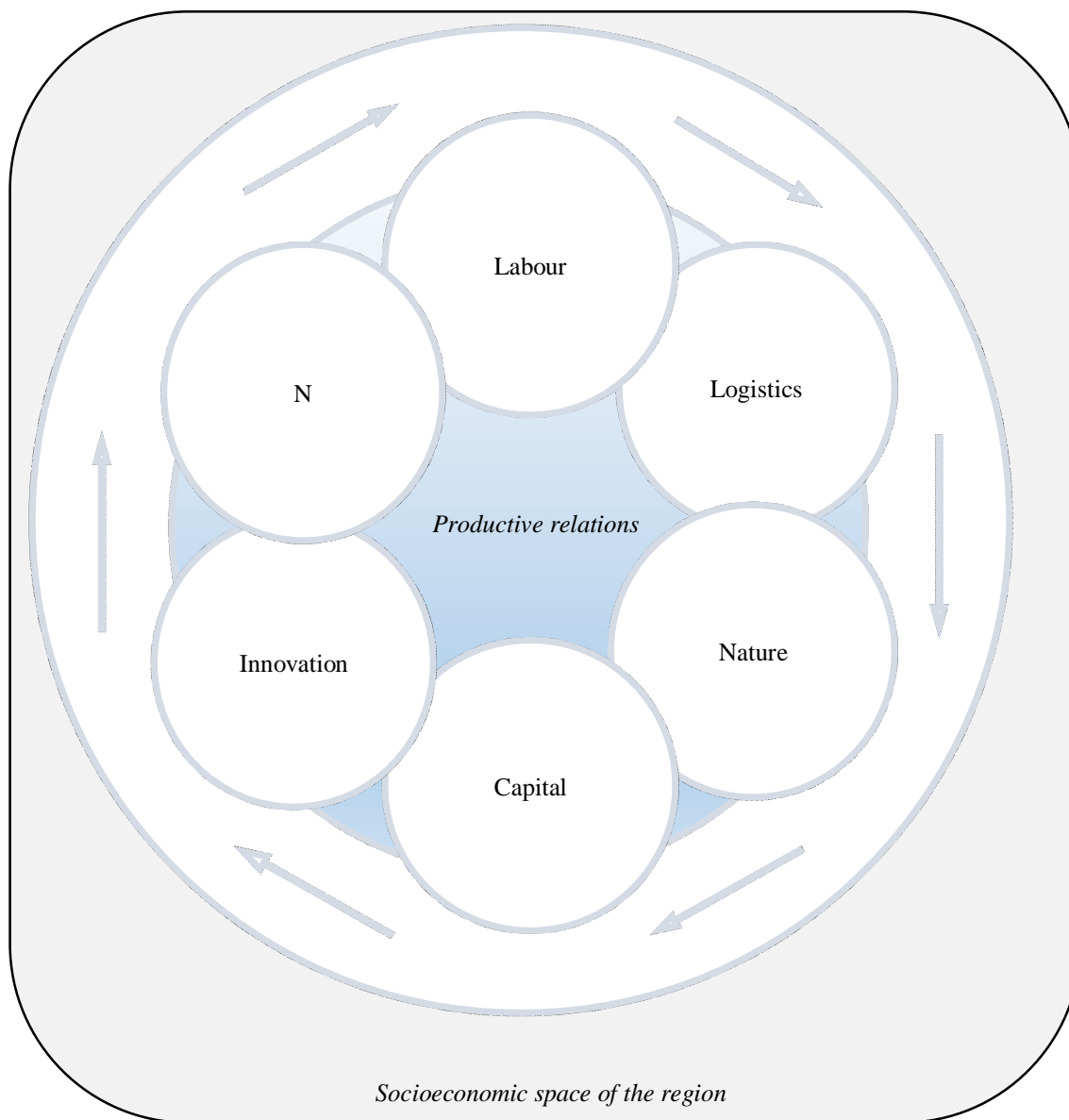


Figure 1: Structure of elements of productive forces and their interaction in the regional space.

The scheme was developed in accordance with the research by K. A. Kotelnikov [2], [4] with further systematisation and interpretation as part of the present analysis.

We find it reasonable to make certain adjustments and principal remarks concerning the common term of scholarly sources, namely, the notion of development factors of territorial productive forces. In this respect, the research by K. A. Kotelnikov dots the i's. Note that the category of productive forces is broader, if not universal, and, as indicated above, cannot be limited to a combination of elements arranged by the mechanical principle. Thus, the logical *consequence* is that factor elements of productive forces

correspond *closely* to the definitions of production factors or development factors, which are categories of somewhat different level structurally not absorbing, but also not excluding one another from the territorial development process. While the former represent in their essence the inner structure of productive forces, meanwhile the latter are the determinant factors, the preconditions of development of the whole regional complex of productive forces with similar socioeconomic conditions and stimulus, as a sequence of

cause-effect relations and significant conditions of the territorial environment acting as its *drivers*. Meanwhile, *the development indicators* (assessment criteria) serve as a *reference* and gauge of the regional productive force

development profile. This approach enables to chart a clear distinction between the identified notions to prevent cognitive dissonance in both this research and the theory of regional economy (Table 1).

Table 1: Aggregate table of determinant and resultant factors of the spatial development of productive forces

Factor elements of productive forces ¹	Production factors	Development factors of productive forces in a territory	Factors indicative of development level
Labour resources	Labour	Socioeconomic factors	With regard to the calculation method: Individual and Complex; Absolute and Relevant indicators. With regard to the territorial development process: Per capita GDP; GRP; Territorial business environment conditions; Optimisation levels of internalities and externalities of industries and many others.
Complex natural resources	Land	Political and legal factors	
Financial and credit system	Capital	Environmental (including ecology)	
Logistics system	Entrepreneurial abilities ²	Historical and cultural	
Innovation component in productive forces	Information ³	Scientific and technological (innovation)	
¹ The classification is drawn up by the authors and further detailed below. ² The production factor is relevant in perfect competition ("olipoly", i.e. the ideal market state where all participants have equal opportunities). ³ This factor is missing in traditional concepts of production factors, however, it is now a specific production factor (the owner earns information rent).			

*The table was developed in accordance with the research by K. A. Kotelnikov with further adaptation and interpretation as part of the present analysis

The primary productive force at all stages of technological progress has been *humans*. However, human relations with the means of production have not always been subject to cardinal transformations. The interaction most of the time has followed evolutionary patterns with partial abstractions and transfer of some capabilities from humans to the means of labour, making the ground for further cardinal changes in this interaction. Today, despite the technological and structural change, the human role in the production is still definitive.

Humans as a constituent part of the wider category of *labour resources* of a territory, from the sociobiological point, appear as a factor element of productive forces, being at the same time the cause and important function of socioeconomic development and exerting definitive influence on regional economic growth. Meanwhile, the qualitative and quantitative characteristics of this type of resource produce considerable control influences on the development of productive forces, as well as the rates of economic growth in the region.

As to the *control of productive force development*, this function will be fully reserved to humans. It is associated with solving new urgent issues, deep understanding of the natural laws and properties of matter and energy, as well as the objective ways of their utilisation in production. This is exclusively the domain of science and practical applications of basic scientific principles and, thus, is exclusively reserved to humans.

According to the research by K. A. Kotelnikov [2], [4], it was established that *productive force development control constitutes a top form of human activity, which may be*

described as a technologically defined and balanced method of connecting humans with the structural elements of productive forces enabling higher efficiency of their systemic interaction processes in a regional socioeconomic realm. This technologically defined and substantiated method of connection between humans and the elements of the surrounding environment has developed since the time when science became a productive force of its own, when consistent adoption of scientific results began in production.

The close integration of science and production began a little less than a hundred years ago. Now, one may be assured that it was exactly this integration that appeared to be the pillar and carrying the structure of modern society. As to the role and place of *science as an outright productive force*, these now seem to us to be not only obvious but also principal. In the current reality, *the degree of influence of the scientific and innovation-driven element of productive forces over social and production processes is mediated by the measure of its engagement into the modern industrial process and serves as a catalyst of social development.* We should specify also that the dynamic nature of science makes it most responsive to transformations, among other constituents of productive forces; meanwhile, the primary productive force is still *humanity as the creator and agent of science.*

The surrounding natural environment appears not only a life factor for humans, but also a requisite condition for their labour activities. The whole scope of natural conditions, the degree of their saturation and resource utilisation appear to be an important element of regional productive forces with the

potential of exerting a meaningful, if not definitive, influence on the specifics and structure of the region's industry profile and the existing specialisation of territorial complexes.

Today, the category of complex natural resources falls logically within what Iu. V. Mikhailov and V. V. Kovorova (V. S. Chernomyrdin Moscow State Open University) designate as the *concept* of complex use of natural resources, referring to "meeting a society's requirements in specific types of natural resources based on economically and environmentally viable use of all their useful properties". This principle makes the basis of rational management of natural riches with maximum mitigation of potential negative consequences of man-caused effects on the environment" [6]. Therefore, the category of *complex natural resources* traditionally includes *land (spatial) and derivative resources closely tied to them in terms of location, such as mineral, biological, energy, water and other resources*. Today and in the foreseeable future, complex natural resources serve as the natural environment for humanity stepping up the use of such resources by defining its requirements, goals and methods of achievement.

The financial and credit infrastructure as an element of productive forces at the current stage is one of the departure points in establishing productive forces and productive relations at the regional level, being the standing condition of stable economic operation and a determinant of growth in most indicators of spatial development and production sector as well.

3. RESULT ANALYSIS

In view of the interconnected category framework and referring to the common definition levels in this discussion, K. A. Kotelnikov sticks with his own view that the regional financial and credit infrastructure is a strictly aligned structured scope of institutions running the processes enabling, in the fullest, the efficient accumulation, distribution and redistribution of financial resources and the establishment of appropriate conditions for stable functioning of the regional reproduction system.

Today, one of the main constituents of a regional economy is its logistic infrastructure representing a complex system of managing material and intangible flows that connects industrial and agricultural enterprises, intermediaries, commercial and transportation organisations to achieve a common goal. The basic notion of logistic potential is today an integral notion combining diverse spatial capabilities of all levels in production, processing, distribution and transportation of certain volumes of inventories, with strictly defined quality criteria of logistic processes and taking into account the existing levels of potential risks. The formation and development of a regional economy largely depend on the conditions of activity for a specific element of productive forces and the specifics of its evolution in the region.

The factor elements in the spatial organisation of productive forces and their identifying criteria in the regional socioeconomic space with common development conditions are laid out in Table 2.

Table 2: Factor elements of productive forces and their identifying criteria

Factor element of productive forces	Criterion of factor activity of regional productive forces	Indicator of factor activity of regional productive forces
<i>Territorial labour resources</i>	Territorial labour resources and intensity of economic use in the regional economy	<ul style="list-style-type: none"> - Working-age population; - Employed in the regional economy
<i>Regional logistic system</i>	Output (external) material flow for integral types of logistic operations	<ul style="list-style-type: none"> - Volume of material flow; - Average distance
<i>Complex natural resources</i>	Aggregate size and intensity of economic use of natural resources	<ul style="list-style-type: none"> - Land resources of various designations; - Water resources of the territory
<i>Financial and credit system</i>	State of loan settlements of regional entities with financial institutions	<ul style="list-style-type: none"> - In current (actual) prices; - In comparable (fixed) prices
<i>Innovation component of productive forces</i>	Total exclusive patents issued	<ul style="list-style-type: none"> - Inventions; - Utility models and advanced technologies

The table was developed in accordance with the research by K. A. Kotelnikov with further adaptation and interpretation as part of the present analysis.

The traditional political economy presents productive forces in terms of a specific degree of combination of production means (objects and means of labour) and humans, with their immanent knowledge, skills and competences. Without extensively going into details of the eternal division in the (idealistic) economic science between the forces of simple labour, social labour, etc., abstracting at this stage from

analyses of social and production-related aspects of the labour process itself, one should recognise that, whatever the stage of human evolution, productive forces operate and develop, in their essence, in connection with each other, rather than in isolation.

Today, Russia, as well as the world, anticipates the emergence of the sixth "transindustrial" technology paradigm, after a sequence of the previous five stages, with only nascent contours emerging for the new wave [7-10]. It is worth noting that the process of transition to a new platform (paradigm) in each case consists in a logical dynamics of stages taking over in a cyclical order [11].

It was established in line with the research by K. A. Kotelnikov that productive relations, appearing as *the external* contour, create the *connection* between the structural components of productive forces to make them a single

whole, and setting forth the primary development rule described by the three following points: *firstly*, productive forces and productive relations in the space-time system create an inseparable entity; *secondly*, for any method of production, productive relations depend on productive forces and their level of development; *thirdly*, productive relations inevitably exert active influence on the development of productive forces themselves. In this logic, productive forces represent a meaningful aspect of the production method, where productive relations should necessarily *fit* the given development stage of productive forces in society.

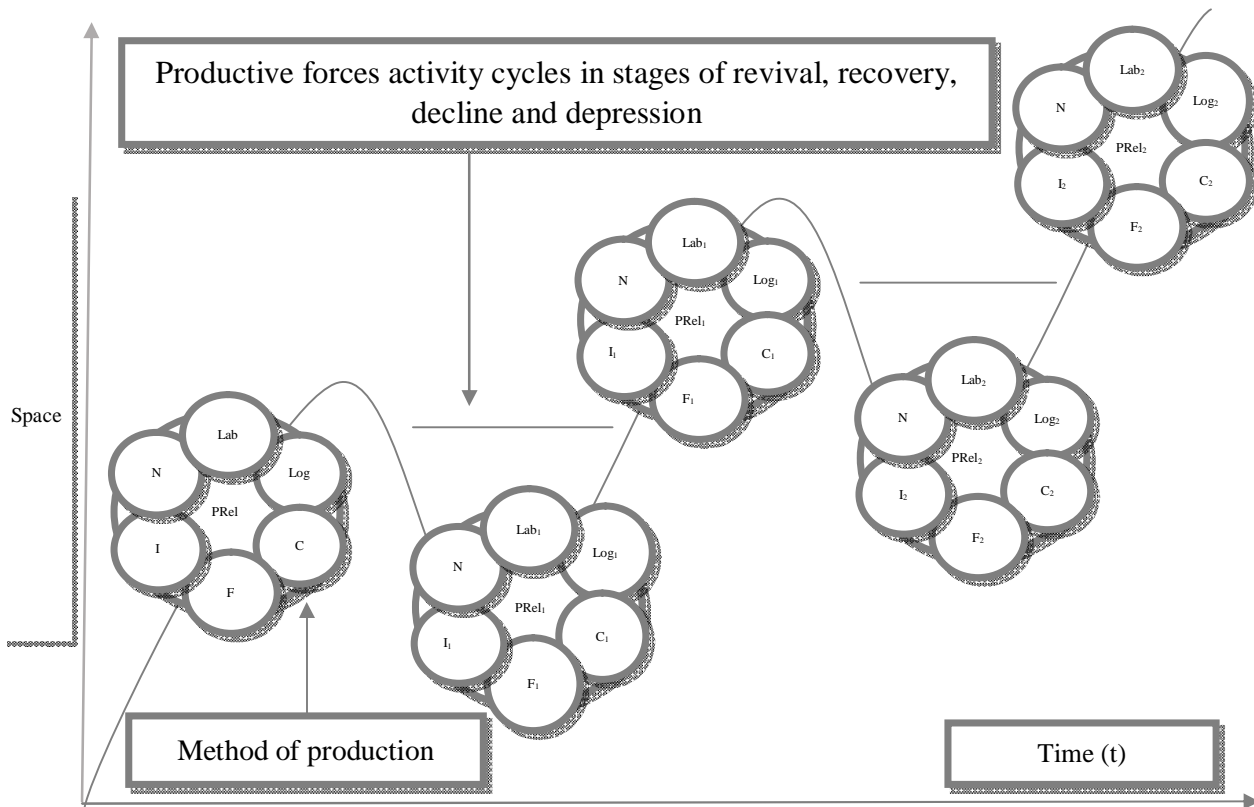


Figure 2: Evolutionary development of productive forces in a region.

The scheme was developed in accordance with the research by K. A. Kotelnikov [2], [5] with further systematisation and interpretation as part of the present analysis.

Definitely, the active role of productive relations in the development process of productive forces is unique. However, in principle, they may either promote or put a brake on such processes. "Then, the first case may suggest that productive relations *fit* the nature and development profile of productive forces" [12]. In the second case, "productive forces and productive relations are posing, or have emerged in, *conflict*. And conflict, as we know, may be resolved either by an *evolutionary*, or by a *revolutionary* method" [13]. Both bring about development. The main difference is, the first scenario reflects quite energetic but gradual development of the productive force complex within a production method until it is eventually taken over. Meanwhile, the second path is a shift in production methods with a cardinal breakup of the

existing structure of productive forces, elimination of its former basic elements and adoption of new ones with a transition to a completely new level. Notably, both scenarios follow a common trajectory through the cycles of *revival, recovery, decline and depression* toward the next stage of development, with the only difference in the nature and dynamics of structural changes. With that, the more *active* productive forces, the faster the transition from one production method to another one and the less visible peaks and cycles of productive forces and the more *efficient and smooth* the economic development. To avoid misunderstanding, neither scenario comes in contradiction with the basic propositions of evolutionary economics; thus, the latest trends in a regional economy can be used to observe

the development process and identify the place of productive forces and productive relations the space-time system.

One of the main propositions of evolutionary economics is that "any evolution is adaptive" [13]. The interpretation of this proposition for the category of productive forces shows a dependent nature; the evolution of productive forces has not necessarily led to all their elements being replaced for good, with a majority of them attaining new properties and structure, and transforming in a way and enriching as they are integrated with the conditions of external environment. Meanwhile, the introduced latent elements of productive forces (N) are developed further, being not only an important source of the concretisation of productive force structure but also their further development.

4. CONCLUSION

Maintaining consistent views and propositions and following the academics of major scholarly movements and dimensions in economic theory, our position and evolutionary views do not exclude productive relations neither diminish their active role in the development of productive forces, but rather approach them from a different angle to analyse all processes of the past, present and future in their interaction, without excluding the scholarly achievements of the past.

The theory of productive forces, cycles and evolutionary economics are not integral, however they are closely intertwined, since the process of development of any technological paradigm follows a cyclical trajectory, while the emergence and development of any further paradigm is represented with a new structure of productive forces and, thus, new method of production at a higher level of the evolutionary ladder. Meanwhile, the process of their further development is understood to be a logical condition for steady and balanced regional development reflecting the principles of systemic interaction of the productive and social areas of the territory.

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