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The Role of Transport Vehicles in Ancient Eurasian Integration

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ABSTRACT

The article is devoted to assessment of the role of transport in development and integration of the Eurasian continent in ancient times. Upon analysing the role of water (river and sea) transport in establishing connections between remote regions of Eurasia, it is highlighted that, given the geographical features of Eurasia, its integration could not be achieved based on the use of water transport alone. Attention is focused on the importance of land transport innovations (the use of horses for riding and the emergence of wheeled carts), thanks to which previously inaccessible areas in the steppe zone of Eurasia became suitable for use and the productivity of cattle breeding increased. It resulted in strengthening of intergroup interaction and development of integration institutions that determined both the life of individual societies and the interaction between them.

New transportation opportunities, increased spatial mobility, and the growing complexity of public institutions gave rise to new social and material needs, stimulated migration and development of interregional exchange. At the same time, not only was there an exchange of surplus products, but production expanded to increase exchange, becoming a commodity manufacture. All this contributed to implementation of the geographical advantages of Eurasia and provision of a higher population density and economic productivity of the use of the territory there compared to the world average.

The synergetic development of water and land transport vehicles and transportation and the long-distance trade based on their use resulted in the transformation of Eurasia by the beginning of II millennium BC into a single system of interconnected cultures.

Keywords: transport, transport vehicles, trade and transport activities, transport innovations, Eurasian integration, population density, economic growth.

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INTRODUCTION

Eurasia is the largest continent, occupying almost 36 % of the earth's land. At the same time, its demographic and economic share is even more significant. According to A. Maddison's estimates [1], the share of Eurasia in both the world population and the world GDP at the beginning of our era (these are the deepest estimates in chronological terms) was almost 90 %, and at the beginning of this century, respectively, over 72 % and over 65 %. Thus, the higher population density and economic productivity of Eurasia, compared to the world average, were already formed in ancient times, which makes it relevant to consider the factors that influenced this.

J. Diamond explains the initial successful development of Eurasia by natural and geographical factors, in particular, its latitudinal orientation, which facilitated the spread of innovations between similar geographical zones located at the same latitude [2]. However, although natural and geographical factors are important, they are not sufficient in themselves to ensure successful development [3–5]. Therefore, it is necessary to analyse other factors. Considering that several studies, in particular [6–11], have revealed a significant influence of transport on development of ancient societies, a reasonable *task* is to assess the role of transport in integration and development of the Eurasian continent in ancient times, based on the method of *historical analysis*.

RESULTS

The settlement of Eurasia by modern humans was completed in the Upper Palaeolithic, about 30 thousand years ago, including the Arctic and the islands of Southeast Asia [12; 13]. The latter fact leads to an «important conclusion: the material culture of the people of that time made it possible to create the first waterborne vehicles and use them to cover significant distances by sea» [12, P. 191].

Data from archaeological excavations in Voronezh region, where Kostenki Upper Palaeolithic site complexes existed more than 40 thousand years ago, indicate the use of «stone, which could only be found 100–150 km from the site» and shells, which «could only have been brought from the Black Sea coast, located more than 500 km away» [13, P. 371]. This demonstrates the deep antiquity of the elements of interregional integration, including movement of both people and material goods. However, they covered only neighbouring regions and were fragmentary. In conditions of extremely primitive means of transportation [6], integration processes could not reach large scales either in distance or intensity.

Significant improvements in transport occurred during the Mesolithic (10^{th}-7^{th} millennia BC) and Neolithic (7^{th}-3^{rd} millennia BC), especially during its final division, the Eneolithic (4^{th}-3^{rd} millennia BC), when metal processing began: processing of copper, gold, and then bronze – an alloy of copper with arsenic or (which gave the best result) – with tin [4; 6; 14]. Considering the dispersion and rarity of metal sources, their significant remoteness from the most ancient economic centres with the highest concentration of population, improvement of means of transportation and development of trade and transportation activities based there-on were *necessary* conditions for development of production and use of metals, which played a key role in formation of ancient civilisations.

Water transport development

First, it is necessary to note development of water (river and sea) transport, which ensured the greatest carrying capacity and low cost of transportation [15]. It is no coincidence that the most ancient civilisation not only in Eurasia, but also in the world – the Sumerian – was formed in Southern Mesopotamia, where two of the «great historical rivers» [16] – the Tigris and Euphrates – flowed into the Persian Gulf, which gave the Sumerians the opportunity to trade both with regions located in the gravitational zone of the Tigris and Euphrates in their northern reaches, and with regions on the shores of the Persian Gulf and, further, of the Indian Ocean. This was extremely important, since in Southern Mesopotamia there were practically no minerals (no stone, no metals), and either no wood [14]. All this had to be brought form hundreds (and sometimes thousands) of kilometres away. So, without long-distance trade, the material basis of which was improvement of transport vehicles, this ancient civilisation could not have existed.

It is worth noting the innovative approach to solving the problem of return (empty) movement of river vessels that delivered goods downstream of the Tigris and Euphrates to the urban centres of Mesopotamia. These vessels were made of skins stretched over a wooden frame. After unloading, the frame was sold along with the cargo or thrown away, and the skins were folded and transported back, loaded onto donkeys, to be used later for the construction of new boats [15; 17]. Considering that the problem of empty movement of vehicles is one of the fundamental ones for transportation activities in our time, its original solution in ancient times is an illustrative example of innovative transport development.

The importance of regular and reliable supplies of raw materials was so great for the Sumerian civilisation that already in the 4^{th} millennium BC Sumerian trading posts were established in Northern Mesopotamia [4]. This was of great importance for interregional integration.

In 3^{rd} millennium, development of navigation led to establishment of stable trade and transport links between Mesopotamia and the Indus Valley, where the Harappan civilisation arose (very likely under the influence of these links) [14; 17], englobing the entire Indus Valley (which was also an important transport artery) and the coast of the Arabian Sea [18]. Thus, a unified trade and transport system was formed, including Mesopotamia (up to the mountainous regions at the sources of the Tigris and Euphrates), the Persian Gulf region, the Arabian Sea coast and the Indus Valley [15], within which a stable movement of goods was carried out, allowing individual regions to specialise in the

production of goods that suited local conditions and to conduct effective exchange with other regions.

In the neighbouring Eastern Mediterranean, navigation also developed, which was facilitated by the appearance of long multi-oared boats at the end of 4th – beginning of 3rd millennium BC, which could accommodate from 20 to 40 rowers [4]. Archaeological data suggest that with their help, contacts were also established with the Northern Black Sea region.

Thus, following development of river and sea transport in the Eneolithic era, connections were established between very remote regions of Eurasia. Where transportation by water was unavailable, pack donkeys were used [15].

Trade relations over significant distances could be carried out not directly, but through intermediaries. A good example of developed intermediary trade is the port of Dilmun, located on an island in the Persian Gulf and providing trade and transport interaction between Mesopotamia and the regions of Arabia and India [11; 19].

However, all these trade and transport links covered only a small part of the Eurasian continent. Most of it was inaccessible to the listed transport means. It is not surprising that the spread of agricultural culture in Europe in the early Neolithic proceeded at about the same rate as the settlement of Upper Palaeolithic Cro-Magnons about 40 thousand years earlier [13]. In inland areas, interaction even between neighbouring cultures developed rather slowly [4].

Land innovations

The situation changed qualitatively after the emergence of a few land transport innovations. Probably, at the end of 5th millennium BC, in the Black Sea-Caspian steppes, where the horse had been domesticated before for the first time, the use of horses for riding began [4]. Horseback riding dramatically increased the productivity of shepherds, the scale and efficiency of cattle breeding, and, accordingly, the volume of surplus product produced. The increase in herds required the use of new pastures, which was associated with the need to regulate land use issues with other clans or tribes, stimulated the expansion of contacts and the development of gift exchange and the «prestigious» economy – important integrative mechanisms [20].

In the middle of 4th millennium BC, wheeled carts appeared in Mesopotamia and that was another important transport innovation [14]. Initially, oxen or donkeys were harnessed in them. Several centuries later, wheeled vehicles spread to the Black Sea-Caspian steppes, but here horse traction was used [4]. The appearance of horse-drawn carts meant the emergence of a fundamentally new means of transport, which became the basis of land transport for the next five millennia. And at that time, this led to a radical transformation of steppe pastoral societies. The synergy of horse-drawn wheeled carts and horseback riding made it possible to move to a mobile (without permanent settlements) form of cattle breeding, which made previously inaccessible (due to remoteness from settlements) steppe regions suitable for use, made it possible to further increase the livestock population, strengthened intergroup interaction and contributed to strengthening and development of integration institutions that determined both the life of individual societies and the interaction between them. (First of all, it is necessary to highlight the institution of mutual hospitality and the patron-client relationship [4]).

New transport opportunities, increased spatial mobility, new social and material needs, and the increasing complexity of social institutions stimulated migrations of the Proto-Indo-European tribes inhabiting the Black Sea-Caspian steppes both in the western and eastern directions.

In the latter case, new cultures formed in the steppes of the Southern Trans-Urals at the end of 3rd – beginning of 2nd millennium BC, characterised by fortified settlements and metal processing «on a scale unprecedented for the steppe zone» [4, P. 560]. Metallurgical production was largely export-oriented. Its «launch occurred as a result of contact with the markets of urban civilisations [located further south – *author's note*], but the increase in metal smelting led to an increase in its consumption in the steppe and forest-steppe zone, marking the beginning of an intra-European cycle of exchanges, which after 2100 BC led to a boom in metal production in the Eurasian steppes» [4, P. 589]. The resulting Eurasian steppe metallurgical province spread «in 2nd millennium BC from the Dnieper basin to the upper Ob and from the foothills of the Caucasus, Pamir and Tien Shan … to the taiga zone of Eurasia» [21, P. 514], occupying an area of up to 7–8 million sq. km. It should be noted that it had «close interpenetrating contacts with the centres of the East Asian and European metallurgical provinces» [21, P. 514].

There is an assumption that some settlements in the steppes of the Southern Urals specialised in breeding horses for export [4]. This is consistent with archaeological data, according to which «stable supplies of horses [to the regions of Central and Western Asia – *author's note*] began between 2100–2000 BC» [4, P. 569]. Soon, chariots invented in the steppe zone appeared in all regions of the Middle East. «Chariots… were the first type of wheeled carts designed for fast travel, and this innovation changed land transport forever. The main element that made high speed possible was the spoked wheel» [4, pp. 540–541]. (Previously existing carts had solid wheels).

Due to the transport innovations implemented in the steppe zone, in 2nd millennium BC «for the first time in history, a chain of broadly similar cultures spread from the borders of China to… Europe. Innovations and raw materials began to move across the continent» [4, P. 591]. Thus, «the transformation of Eurasia from a series of isolated cultures into a single, communicating system» [4, P. 618] took place, the catalyst for which was the innovative development of transport.

Socio-economic aspects

Having revealed the role of transport innovations in Eurasian integration in the ancient period, it is necessary to pay attention to a series of important socio-economic aspects of the issue under consideration.

A modern interpretation of the relationship between nomadic tribes and ancient states of Eurasia at the turn of

3rd and 2nd millennia BC, based on archaeological data, indicates that the ancient urban civilisations of Western and Central Asia depended on steppe cattle breeders [4]. Urban civilisations needed supplies of metals from the steppe zone, and then of horses. At the same time, the inhabitants of the steppes were, for the most part, self-sufficient in satisfying their basic needs. They produced the necessary amount of meat and dairy products (gathering was the source of plant food), mined ore and independently manufactured metal products. However, socio-economic developments led to the emergence of new needs that went beyond the basic ones, including the need for luxury goods. Such goods, for example, bronze mirrors and semi-precious stones, apparently fabrics, as well as thin-walled ceramics, were received by the inhabitants of the steppes from the south, in exchange for metals and horses. Thus, in one of the steppe settlements in the territory of northern Kazakhstan, 12 % of the ceramics found were imported, thin-walled ceramics, made in the south of Central Asia, and 88 % were produced locally [4].

Around the same period, on the island of Santorini in the Aegean Sea, which was one of the centres of the Minoan civilisation, the structure of origin of ceramics, according to archaeological excavations, was almost the same: 85 % were produced locally and 15 % were imported [22]. It can be concluded that development of a «prestigious» economy and transport capabilities in different regions of Eurasia by the beginning of 2nd millennium BC led to the fact that «in the course of trade, not only goods were imported that were not produced in a given place or could not be produced in sufficient quantities …, but also goods that … made the satisfaction of increased effective demand more diverse and sophisticated» [22, P. 8].

Equally indicative are the same results of cessation of trade relations for different regions. The collapse of the ancient Sumerian system of long-distance trade due to internal problems in Southern Mesopotamia at the end of 4th millennium BC led to the demise of the Maykop culture, which had flourished in the North Caucasus due to the supply of metals to Mesopotamia in exchange for highly valuable handicrafts [4]. And at the beginning of 2nd millennium BC, the degradation of the highly developed Harappan civilization in the Indus Valley began, ending in its complete collapse. This was apparently caused by a combination of various factors, including ecosystem degradation and external invasions. There is reason to believe that one of the most important reasons was the sharp weakening of trade relations with Mesopotamia after the collapse of Sumer [23]. In any case, such an explanation fits into the paradigm of the implementation of the ««advancement effect»» based on trade and transport links (which was fully manifested for the Harappan civilisation in the middle of 3rd millennium BC due to the beginning of intensive trade with Southern Mesopotamia) and decline in the event of the cessation of such links [11].

How had the Eurasian world changed as a result of thousands of years of development, stimulated by transport innovations and exchange, by the beginning of the period of the continent's most ancient integration? According to modern estimates, the population of Eurasia increased 30-fold from 2 to 60 million people between 10000 BC and 2000 BC [24]. In other words, a dramatic increase in population density was achieved, which was a key condition and result of successful socio-economic development [25; 26]. Although the average annual population growth rate was small, only 0,043 %, this is approximately twice as high as, for example, in 1st millennium AD [1]. In the era under consideration, population growth was the main result of economic growth (and, at the same time, an incentive for it). Almost all the increase in gross domestic product in the long term was absorbed by population growth, which was an essential feature of the prevailing so-called «Malthusian economy» [27].

However, in parallel with the increase in population density, there was also an increase in per capita consumption, called «Malthusian singularity» [28, P. 18]. If we assume that on average about 90 % of the increase in gross product was absorbed by population growth and only about 10 % became the source of growth in per capita consumption (i.e., the per capita gross product grew by at least 0,005 % per year – a negligible amount), over an eight-thousand-year period, per capita consumption should have increased by 1,5 times. Taking into account the formation and, by the end of the period under consideration, the strengthening of social inequality, such *per capita* growth created the opportunity for a radical increase in the well-being of the upper classes of society, which, on the one hand, was stimulated by development of transport and trade, and on the other, within the framework of the «prestigious economy», prompted the intensification of gift exchange, from which commodity exchange grew [25].

CONCLUSION

The analysis shows that development of both water and land means of transportation in ancient times played an important role in the integration of the Eurasian space and the economic progress of the peoples living there. This made it possible to implement the geographical advantages of Eurasia and ensure a higher population density and economic productivity of the territory compared to the world average.

Such results were achieved largely due to the synergy of a number of transport innovations and the development of various types of transport: river, sea and land transportation, which made it possible for regions with different geographical locations to join long-distance trade networks and ensure their effective specialisation within the framework of the interregional division of labour.

Already in ancient times, transport innovations increased the productivity of economic activity, allowing new resources to be involved in it and increasing labour productivity, a clear example of which is the development of an effective pastoral economy in the Eurasian steppes.

At the same time, a surplus product was created that could be used for exchange; there was a growing complexity of social organisation and the development of institutions, which also stimulated exchange. There was no longer a simple exchange of surplus products – production expanded with the aim of increasing exchange, becoming a commodity manufacture.

Thus, the first, but very important steps were taken on the long path of progressive development, which led to the era of modern economic growth and the formation of modern society, at all stages of which transport played a very important and ever-increasing role.

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