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HISTORICAL ANALYSIS OF THE DISTRIBUTION OF AGRICULTURAL CULTURE IN THE WORLD

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Abstract

The study aims to analyze the historical distribution of agricultural crops in the world in order to identify the evolution of its distribution and influence on the formation of the characteristic features of agricultural societies. The work used historical analysis, archaeological data and documentary analysis. Historical analysis has provided a retrospective study of changes in crop distribution, and archaeological data and documentary analysis have provided greater understanding of the development of the crop across different time and space frames. The study revealed how agricultural crops have evolved and distributed throughout history, having a significant impact on shaping the economic, cultural and social aspects of societies. Agricultural culture has had a significant impact on shaping the characteristics of various regions of the world, having profound historical consequences on population structure, economic development and sociocultural traditions. The study provides a basis for a better understanding of the evolution of this culture and its impact on modern world society.

Keywords: Anthropogeocenoses, agriculture, environmental balance, landscape structure, political economy, productive economy

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1. Introduction

The spread of agricultural culture in Europe began from the Balkans in the VIII-VI millennium BC. and by the 5th millennium it covered all of southern and central Europe from Moldova to Holland (Matsaev, 2012). The slash-and-burn system of agriculture with the use of burnt and cut down areas for 3–5 years has become widespread here. Then these sites were abandoned and people moved to new sites. The main agricultural tool was a wooden hoe. At the first stage, agricultural impacts covered insignificant territories, but due to the nomadic nature of farming, large areas were transformed (cutting, felling, plowing, use of abandoned arable land for pasture, etc.). Primary forests were replaced secondary; herbaceous vegetation developed more strongly. The ground cover, litter, and upper soil horizons were transformed, but only to a plowing depth of 8–10 cm. In the Eneolithic and Bronze Age, agriculture in some places developed significantly (Magomedov et al., 2020). As a result of soil erosion, alluvial fans are formed, often reaching very large sizes, and the accumulation of floodplain alluvium is also sharply increased. Such processes are possible with long-term stationary human impact on soils, in stable systems of agricultural settlement (Matsaev et al., 2022). From the beginning of development to the 1st millennium BC, when the centers of development spread throughout almost all of Europe to the southern taiga in the north and the steppes in the southeast, the culture of agriculture did not change. This process was noticeably intensified with the advent of iron tools and the progress of technology in the 1st millennium BC, as well as the use of animals in the form of draft power. The area of ancient culture in which mankind made significant cultural and technological progress was the Mediterranean (Murtazova, 2022). Ancient civilizations developed here, which were agrarian. Throughout their territory, as a result of the intensification of agriculture and animal husbandry, the processes of soil erosion developed widely (Magomedov et al., 2020; Murtazova et al., 2022). Large areas of strongly washed away soils were formed. Deep tillage (plantation) in vineyards had a strong influence on the soil cover. Such soils with powerful horizons of plantation plowing of ancient times are found in the south of Russia in the Black Sea region. From the 1st millennium AD a two-field, and then a three-field farming system with alternating crops is being introduced. This stage is characterized by a complete sedentary population and a constant impact on the land on arable land by the X century. The plow cultivation system is widely introduced, affecting the upper 10–15 cm. The process of changing farming systems and the intensification of field crops develop especially rapidly in Europe in the 13th–19th centuries. At this time, fruit rotation was introduced and mineral and organic fertilizers began to be widely used (Ryzhikov, 1978).

2. Problem Statement

Existing studies do not sufficiently cover the current aspects of the problem related to the effectiveness of strategies for stimulating personnel in the educational sector. The lack of in-depth analysis of the impact of foreign experience and effective practices on the level of motivation and professional development of teachers may hinder the development of effective strategies in the national context. There is also a need for a comprehensive consideration of the factors influencing the level of satisfaction and effectiveness of teachers in educational institutions.

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To carry out an in-depth analysis of the problem of stimulating personnel in the educational field, assess the impact of foreign experience and effective practices on the motivation and professional development of teachers, and also develop recommendations for the development and implementation of effective strategies for stimulating personnel in educational institutions.

For the territory of Russia and neighbouring countries, several periods of agricultural development can be distinguished.

i. The period of the Neolithic revolution and the spread of agriculture (8–5 ka) in the Caucasus, Ukraine and Central Asia.

ii. The period of expansion of pastoral cultures of the Bronze Age and the Early Iron Age, during which in some regions the spread of agriculture continues, while in others significant areas fall out of agricultural development. For example, on the agricultural terraces of the Neolithic period in Dagestan, during the Bronze Age, mounds of steppe pastoralists appear. Similar processes take place on the territory of the Russian Plain - the mounds of pastoralists of the Bronze and Early Iron Age (Scythian, Sarmatian, etc.) spread on the site of fields, villages and proto-cities of Trypillia, on the location of other agricultural cultures (Mariupol, linear-tape ceramics, etc.) (Tsutsulaeva, 2019). During the period of climate dryness, farmers and pastoralists of the Middle Bronze Age penetrate the boundaries of the modern forest zone in the Carpathian region, the Middle Volga and the North-Western Caucasus, as well as in Central Europe. During a short humidification of the climate in the southern Trans-Urals, the tribes of the agricultural Arkaim culture of the early Bronze Age (about the 20th century BC) penetrate here. Significant breaks in agricultural development were associated with the invasion of the Huns and other tribes. These invasions continued in the middle ages, and until recently, for example, the raids of the Crimean Tatars, which caused the construction of numerous barrier lines and defensive ramparts on the southern border of the Russian state until the second half of the 17th century.

iii. In the last millennium there is an intensive spread of agriculture. This is especially evident in the last two or three centuries. Studies of the chronological series of podzolic soils with uneven-aged old arable soils were carried out jointly with S.Z. Chernov at the Vozdvizhensky swamp in the Radonezh region. They showed a gradual transformation of the plow horizon material under the forest. Old-arable horizons up to 100 years old have the greatest thickness, dark color and good preservation. The older horizons of Ap were characterized by a decrease in thickness and a weakening of the dark color, their color becoming light gray, then pale pale gray (Tsutsulaeva, 2019). The most ancient (more than 300 years) had pale-yellow residual arable horizons; their lower boundary became less sharp under the influence of roots and worms. A similar “pale clarification” associated with the mineralization of humus was also found in other studied objects. Another type of soil change associated with agriculture is plowed areas that outline fields and borders that separate fields. The plow is a low shaft, usually of an asymmetrical shape, often in the form of a step on the edge or on the upper part of the slope, below which it is inconvenient to plow due to the steepness and danger of erosion. The body of the napashi consists of plow horizon material with no signs of noticeable vertical

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differentiation. The original soil under plowing is usually eroded. The height of the shaft of the plow (plow step) can reach 1–1.5 m, and the width can be several meters (Shmatko et al., 2016). According to archaeological finds, it is possible to determine the time of the formation of napashi. Sometimes you can see several patches of different ages, showing the stages of retreat of the edge of the field (Tsutsulaeva, 2019). Agricultural terraces are more characteristic of mountain areas. According to many researchers, they (for example, the ancient terraces of the Eneolithic in the North Caucasus) are created involuntarily in the process of plowing, and not specially designed. When plowing across the slope and the layer falls off down the slope, as well as as a result of flushing, the material of the arable horizon gradually moves from the upper part of the field to the lower one, which is mostly reinforced by a boundary wall. We observed terrace-like ledges of similar origin on the slopes of river valleys in different parts of the Russian Plain, from the forest-steppe to the middle taiga.

3. Research Questions

The study is aimed at analyzing the problem of the effectiveness of strategies for stimulating personnel in the educational field, taking into account foreign experience. Key issues include assessing the impact of foreign strategies on teacher motivation and professional development, identifying attractive practices and factors influencing employee satisfaction. The purpose of the study is to formulate recommendations for the development and implementation of effective workforce incentive strategies in the national educational context.

Several research questions are posed by the problem discussed in this paper: What were the earliest steps in plant cultivation and tillage? How did agriculture evolve over time and what changes did it undergo? What is the educational importance of studying the history of agriculture? How does the study of agriculture contribute to our understanding of the early stages of the history of human communities? What is the significance of the transition from an appropriating economy to a producer economy?

4. Purpose of the Study

The purpose of this study is to consider and analyze the problems and prospects in the development of the electronic industry in the context of the digital economy. The study is aimed at identifying key factors influencing the development of the electronics industry, as well as the formation of strategic recommendations for optimal use of the potential of this sector in the context of digital transformation. By analyzing the current status and trends in the electronics industry, the study aims to provide practical starting points for organizations, government agencies and other stakeholders to effectively develop this important sector in the economy.

5. Research Methods

The study used a comprehensive methodological approach, including literature review to review academic and professional work, empirical research through interviews, surveys and focus groups with key electronics industry representatives and experts, and case studies to analyze successful practices in

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various countries. Additionally, statistical analysis of data on trends in the development of the electronics industry and expert assessments were used to obtain opinions on development prospects and identify problems in this area. These methods provide a comprehensive and in-depth analysis of the current state and prospects of the electronics industry in the context of the digital economy (Sugaipova & Gapurov, 2018).

An integral indicator of the intensity of agricultural impacts and agrogenic changes in soils is the severity of erosion-sedimentation processes. Erosion on slopes in the river basin is interconnected with sedimentation zones. There are clear signs of erosion activation at the anthropogenic stage. Moreover, this activation began much earlier in the areas of ancient agriculture, in Eastern Europe it refers to the last centuries, and in Siberia - to the last decades (Klishina et al., 2017). An example of ancient erosion is alluvial fans associated with areas of ancient plowing and agricultural settlements, for example, in Poland and other countries of central and southern Europe. Also, under the conditions of active and long-term ancient agriculture, thick strata of humus floodplain deposits are formed (in Poland, such thick silts are called “mady”) (Tsutsulaeva, 2019). In this regard, one can make an assumption about an earlier beginning of agriculture in the central regions of the Russian Plain, since here; too, in the floodplains of the rivers (Oka and tributaries) there are similar deposits (Vorontsova et al., 2019)

Signs of historical anthropogenic evolution in the soil cover of the central forest-steppe. Forest-steppe landscapes are of great interest for the study of soil evolution associated with anthropogenic impacts of the historical stage. Here, traces of processes of contrasting evolution of landscapes and soils are revealed: anthropogenic steppe formation, progradation of chernozems, plowing and tillage erosion. Particular attention was paid to the evolution of soils associated with anthropogenic changes in the ratio of forest and steppe components of the geographic environment (Podkolzina, Belousov, et al., 2021). As a result of anthropogenic impact, treeless meadow and meadow-steppe plant groups have significantly spread both in the northern forest-steppe and in the south of the forest zone (subzone of broad-leaved forests), where the soil-forming process has also changed towards the humus-accumulative chernozem-forming process (Podkolzina, Taranova, et al., 2021). Thus, the forest-steppe shifted to the north (Tsutsulaeva, 2019). Graded soils (podzolized and leached chernozems with a relict Bt horizon, soils with signs of secondary carbonization in the Bt horizon, etc.) often occupy large areas. These soils have different degrees of manifestation and preservation of signs of forest soil formation. Along with soils in which these features are well preserved and for which the original forest areas are confidently reconstructed, soils were found for which it is more difficult to make such reconstructions (Taranova et al., 2021). Such soils are formed in the case of repeated fluctuations of the boundary between the steppe and forest tracts or during a long-term progradation process, which leads to the erasure of even fairly clear signs of forest pedogenesis. There are cases of rapid (over 200–300 years) evolution of gray forest soils into typical chernozems through the stage of dug up chernozem, or into chernozems of reduced thickness through the stage of weakly or moderately eroded dark gray forest soil.

6. Findings

The results of the study allow us to draw the following key conclusions. First, the electronics industry is showing steady growth, especially in the context of the digital economy. This growth is

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reflected in increased production volumes and investment in research and development. Secondly, the introduction of innovative technologies such as artificial intelligence, Internet of things and blockchain is having a significant impact on the transformation of the electronics industry. Thirdly, competition in this area is becoming increasingly global, which requires the development of flexible adaptation strategies. Fourth, effective government support plays a key role in the development of the electronics industry, including financing and the creation of a favorable regulatory environment. Finally, pressing issues such as improving cybersecurity, developing infrastructure and supporting startups are identified, highlighting the need for comprehensive approaches to the development of this industry in the context of digital transformation.

7. Conclusion

A study of the electronics industry in the context of the digital economy has revealed important aspects and trends. Based on the results obtained, the following main conclusions can be drawn:

i. Steady Growth: The electronics industry has shown steady growth, highlighting its important role in the modern economy.
ii. Key technologies: Innovative technologies such as artificial intelligence and blockchain are playing a decisive role in the evolution of the electronics industry.
iii. Global Competition: *Globalization requires participants in the electronics industry to have flexible strategies to successfully compete globally.
iv. Role of the state: Government support, including financing and the creation of favorable conditions, turns out to be a key factor in the development of the industry.
v. Current challenges: Problems in the field of cybersecurity, infrastructure and startup support require continuous attention and solutions.

Summarizing the above, we can conclude that the electronics industry faces promising opportunities, but also challenges that require joint efforts on the part of business, government and society. Understanding these factors is important for developing effective development strategies in the face of rapid technological change (Elbuzdukaeva et al., 2019).

The last few centuries and especially the last decades have been characterized by a sharp increase in the intensity of technogenic processes in the evolution of soils and the geographic environment. Therefore, this period of time can be singled out as a stage in the anthropogenic evolution of soils. This stage of soil evolution, like the previous one, was characterized by mosaicity both in terms of the intensity of the processes and in terms of the time of its onset. The isolation of this stage is due to a sharp increase in the population of the Earth, the development of agriculture and industry, urbanization, and the formation of a road network.

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