

Supply Chain Infrastructure Development in Russian Economy

Natalia V. Medvedeva^{#1}, Elena V. Frolova^{#2}, Olga V. Rogach^{#3}, Tatyana M. Ryabova^{#4}, Larisa N. Sorokina^{#5}

^{#1,2,3,4}Department of Management and Administration. Russian State Supply chain University

^{#5}Department of accounting, audit and statistics Peoples' Friendship University of Russia (RUDN University)

¹medvedevanv@rgsu.net

²efrolova06@mail.ru

³rogach16@mail.ru

⁴tani-87@inbox.ru

⁵lukshalar@mail.ru

Abstract- The article is devoted to the study of the activities of Zemstvo institutions for the development of supply chain infrastructure in the XIX-early XX centuries; identification of the role of the Zemstvo reform in the formation of supply chain infrastructure at the local level. Supply Chain infrastructure provides the means for chain economic entities and firms sharing a common interest to participate in a mutual exchange. Despite the fact that the provision of supply chain services was not among the priorities of the Zemstvos, significant results were achieved. The retrospective analysis allowed us to highlight the advantages and disadvantages of the Zemstvo self-government system. The comparative method helped to identify trends in the financial and economic support of Zemstvo bodies at various stages of the Zemstvo reform, and to analyze key indicators of supply chain infrastructure development. It is concluded that the success of the Zemstvo self-government bodies in the development of supply chain infrastructure was due to the availability of significant organizational resources, ensuring sustainable interaction of Zemstvos with the population, active support for local initiatives and the formation of a system of public control. The authors note that the experience of implementing the principle of consolidation of the main directions of management activities for the development of supply chain infrastructure, formed by local authorities, can be in demand in modern conditions and adapted to the current system of local government in Russia for economy efficiency.

Keywords: supply chain infrastructure, Zemstvo reform, and economic efficiency, socio-economic development.

1. Introduction

The socio-economic development of the state and territories and the well-being of the population largely depend on the level of functioning of the supply chain infrastructure development. Accordingly, the transformation of models of supply chain management of these processes arises from the need for continuous improvement of management practices, their adaptation to socio-economic and economic conditions of development of society. Key areas of supply chain infrastructure (such as housing and utilities, transport, supply chain security, health, education, etc.) throughout all stages of historical development needed legal, organizational, and financial and economic support. In different periods of Russian history, various factors have influenced the formation and functioning of infrastructure, especially at the local level [1-6]. At the same time, one of the leading factors is the level of development of local government, which was

most widespread during the Zemstvo reform of 1864, the implementation of which allowed providing the necessary conditions for solving supply chain problems in a particular territory. Zemstvo institutions assumed responsibility for providing most areas of life that were not a priority for state authorities; they promoted education and culture in cities and villages, thereby narrowing the disparities in their socio-economic development. During 1865-76, Zemstvo institutions were introduced in 34 Russian provinces, which indicates the broad scope of the ongoing supply chain changes. The significance of Zemstvo activity, according to the estimates of public figures of the XIX century, was not only that "the Zemstvo institutions contributed to the economy of the country in many areas of their feasible expenses, but also that they served as a school of political education of society and the people" [7-10]. That is why successful practices of Zemstvo management require a new understanding during the development of modern supply chain policy and local government reform in Russia.

The historical aspects of infrastructure development are now the focus of much scientific research. This is due to rather long-standing management practices for the development of infrastructure facilities. As Smith M. L. emphasizes, the infrastructure that shapes and facilitates everyday life is one of the most dynamic systems in both ancient and modern cities [11].

Of interest is the study by Bel G., who analyzes the directions of Spanish infrastructure policy since the early 1700s: the construction of roads in the eighteenth century, the creation and expansion of railways in the nineteenth, the expansion of highways in the twentieth. The scientist's conclusions illustrate the dysfunctions of public policy; the analysis shows a long-term model in which the activity of the government authorities in developing infrastructure in Spain is determined not by the needs of trade and economic activity, but rather by the desire to centralize its objects around the country's political capital [12]. An analysis of the development of infrastructure in post-independence African countries has shown that it is only through investment in infrastructure that the interests of the population have been met [13]. The work [14] is dedicated to identifying the role of charitable associations in the development of health care in the state of Sao Paulo from 1838 to 1915. In [15] examine the factors that drive political innovation among local governments to develop

infrastructure after democratization in Korea. The role and influence of ideology, technology, and geopolitics on the development of infrastructure industries from 1830 to 1990 are described in the work of [16]. Appropriate supply chain conditions, adequate funding [17], effective management practices, project approach and support [18] are essential conditions for urban infrastructure development.

The works of Russian scientists devoted to supply chain infrastructure at different stages of its historical development usually reflect the issues of the formation of individual infrastructure sectors: public education [19], Zemstvo medicine [20], etc.

The analysis of publications on the historical experience of infrastructure development shows a high interest of scientists in this issue: the factors of infrastructure functioning in the conditions of historical development of territories, dysfunction of management practices, specifics and directions of authorities' activity in various periods of supply chain development are studied. However, despite considerable amount of publications the scientific literature insufficiently investigated issues related to comprehensive analysis of the development of supply chain infrastructure in terms of land reforms, identifying the most promising managerial practices of providing supply chain services.

The purpose of the article is to identify the role of the Zemstvo reform in the formation of supply chain infrastructure in Russia, as well as to study the activities of Zemstvo institutions in the XIX-early XX century for the development of supply chain infrastructure facilities for improving economic efficiency.

2. Methods

Firms engaged in supply-chain relationships, as customers, suppliers, or providers of services, need to share a great deal of information in the course of their interactions. Over the years, companies have managed these information flows in a number of ways, including telephone calls, letters, telex, faxes, and electronic data interchange. The principle of historicism used in the research methodology allows us to analyze the historical experience of the development of supply chain infrastructure during the Zemstvo reform.

The method of retrospective analysis highlighted the advantages and disadvantages of the Zemstvo system of self-government. The comparative method allowed us to identify trends in the financial and economic provision of Zemstvo bodies at various stages of the Zemstvo reform. Analysis of key indicators of supply chain infrastructure development in the second half of the XIX – beginning of XX was carried out based on a statistical method.

The source base of the research was made up of archival materials of Zemstvo institutions, statistical data presented in encyclopedic publications of the XIX – early XX centuries, as well as articles, abstracts, reports, reviews of public figures of the XIX century.

3. Results

In this article, we define supply chain infrastructure and identify its key characteristics. We also explore some of the most common and costly mistakes made by companies that do not understand their supply chains in

terms of their infrastructure. Finally, we set out a process that supply chain managers can use to get their company's infrastructure under control and ensure that it is serving the true needs of their business. Issues of development of supply chain infrastructure of territories were most widespread as a result of the Zemstvo reform of the XIX century, thanks to which there was an institutionalization of public control, the practice of organizing local economy, activities to improve life and supply chain services of the population and to meet its needs by the authorities of a particular territory.

According to the Regulations of 1864, provincial and district Zemstvo institutions were created to resolve mainly economic affairs. Article 2 of the Regulations prescribes the competence of the Zemstvos: “managing the property, capital and monetary collections of the Zemstvos; arranging and maintaining buildings, other structures and communication routes belonging to the Zemstvos; providing people's food; managing Zemstvos' charitable institutions and other charity measures; participating in the care of public education, public health and prisons, etc.” [21-25]. The rather broad competence of Zemstvo institutions indicates a significant amount of activities assigned to these bodies, despite the fact that they were not provided with financial resources. Their budget was based on real estate taxes.

At the same time, the Zemstvos did not have full independence in solving local issues, as they were limited only to providing economic affairs. The lack of clearly defined competencies of Zemstvos in public life often became a source of conflict situations. In particular, the educational department did not recognize the Zemstvos' right to participate in the organization of educational affairs, leaving them only the economic support of educational institutions, despite the fact that it was during the period of Zemstvo administration that the greatest success was achieved in the field of public education.

On one hand, many scientists and public figures saw the Zemstvo reform as a path to decentralization and self-government [26-33]. According to B.N. Chicherin, “the Zemstvo has acquired independence and conducts the affairs provided to it as successfully as its forces and means allow it; it repairs roads, builds bridges, conducts household duties, starts hospitals, hires doctors, manages its charitable institutions, orphanages, paramedic schools, etc. ...These institutions are dear to us, we see the future of Russia in them” [34]. As V.D. Kuzmin-Karavaev notes, “The idea of local self-government is based on a proven ability to conduct business, a willingness to bring personal strength and funds to serve the needs and benefits of the local population” [24]. V.Yu. Skalon notes the usefulness of Zemstvo work: “Zemstvo work can not be considered fruitless, just because it resulted in a lot of very valuable materials” [31].

On the other hand, it was true that Zemstvo institutions did not have full independence in solving most issues, including infrastructure development. Zemstvo institutions, according to A. A. Golovachev, are only bodies of “central management for administrating a well-known branch of the economy, which they cannot dispose of independently” [18]. Bezobrazov and Gradovsky as the main drawback of the Zemstvo reform singled out the poor organization of Zemstvo institutions: “are not

introduced into the general system of state administration, but are placed next to it, as separate state and public bodies that do not have any organic connections with it" [13; 19]. The impossibility of organizing true self-government in the conditions of autocracy is pointed out by S.Yu. Witte, due to the fact that the Zemstvos as a result of the reform become only a part of the state system [17].

The uncertainty of the legal status of the Zemstvos and the growing distrust of the Government to the Zemstvo movement has led to the fact that according to the Regulations of 1890 the authorities have taken measures that strengthened the centralization of the state power and limit the autonomy of the Zemstvos: "the number of objects on which the resolutions of the meetings are subject to the approval of the governor or minister was increased; the Governor is given the right to review the provincial regulations not only from the point of view of

legality and national uses and needs, but also from the point of view of the interests of local people" [28]. As a result, the implementation of the powers of the Zemstvos in the field of infrastructure operation caused additional difficulties.

Special attention should be paid to the consideration of Zemstvo finances, on the volume of which the level of development of supply chain infrastructure facilities in a certain territory depended.

The main revenue items of the Zemstvo budgets were, as a rule, taxes on real estate (from 37 to 67%). In particular, statistical data from the Central Russian provinces allow us to note that the largest collections from real estate were made by the budgets of the Vladimir and Moscow provinces. This was largely due to the predominance of industrial and commercial infrastructure in these territories (figure 1).

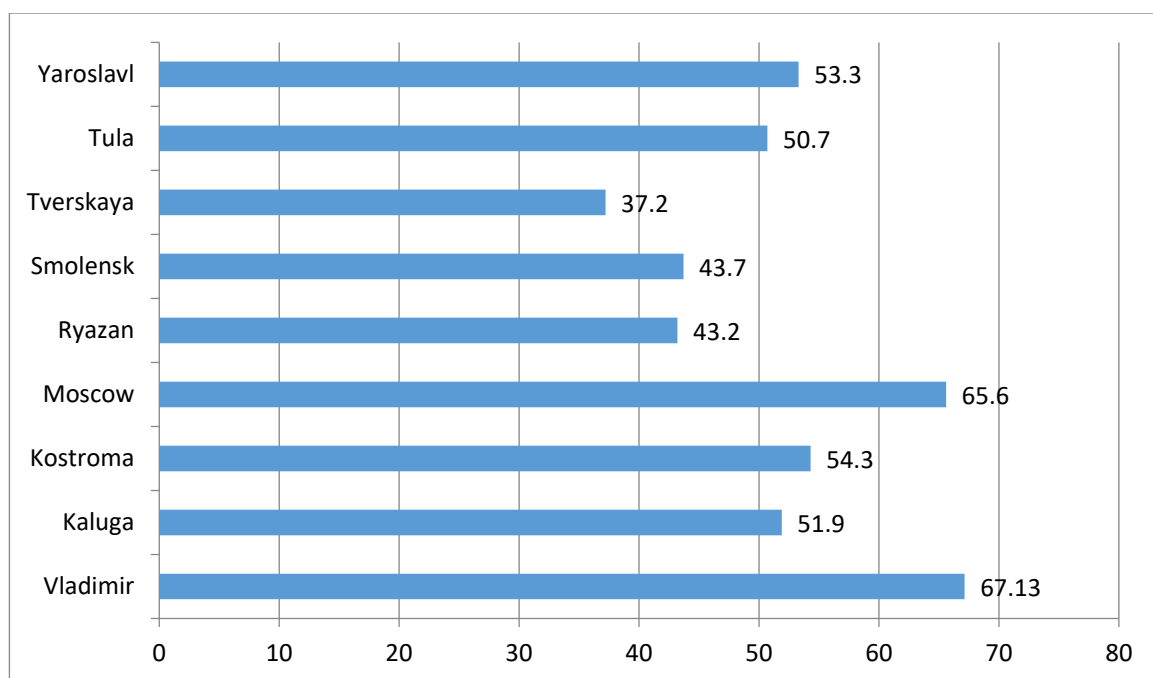


Fig. 1. Fees from real estate in the provinces of European Russia, 1912, %

In addition, Zemstvo property, various fees, allowances, receipts, etc. were sources of income for Zemstvos. For example, the Zemstvo revenue estimates of the Moscow province for 1912 show a significant

preponderance of fees from real estate, which accounted for more than 60% of all income (Income..., 1912). (Fig. 2).

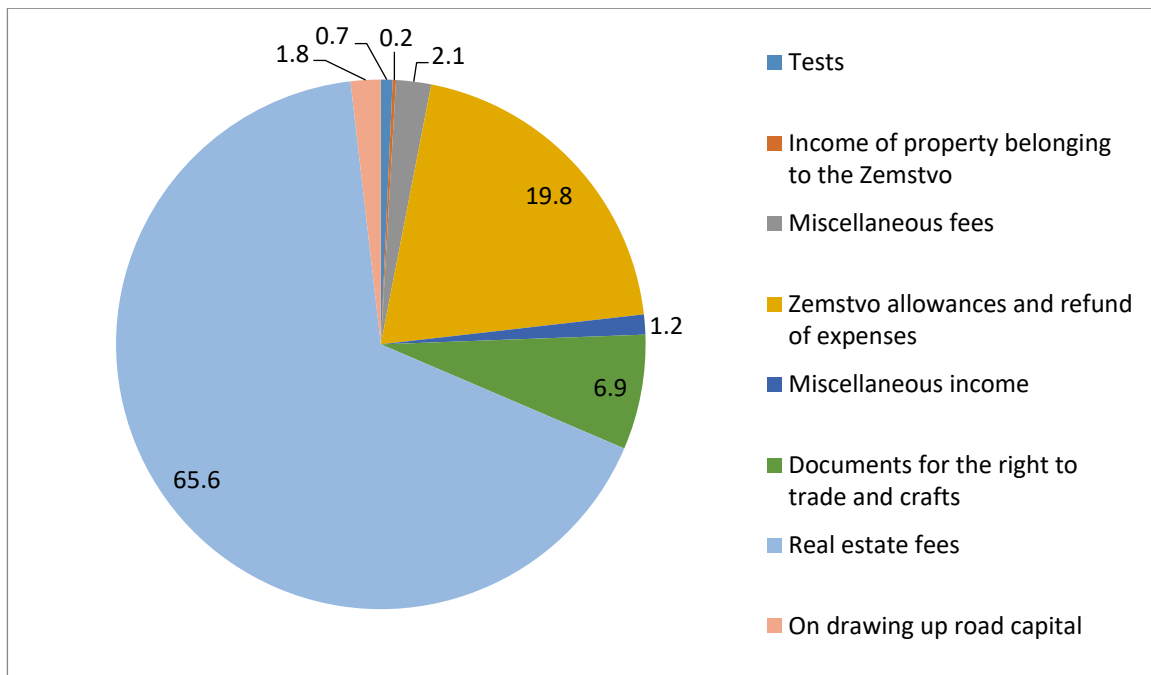


Fig. 2. Zemstvo revenue estimates of the Moscow province for 1912, %

Based on the Charter of 1851, Zemstvo duties were divided into general (state) and local (provincial) duties. The provisional rules of January 1, 1864 allowed the Zemstvos to add Zemstvo duties to their estimates at their own discretion. As a result, the expenses of the Zemstvos constantly increased: from 1814 to 1890, the Zemstvo fees increased from 4401684 rubles to 55896700 rubles. [Chronicles..., 1903] From 1853 to 1875, there was an increase in state duties by 76% [Chronicles..., 1880]. After the adoption of the Regulations of 1864, the expenses of Zemstvos in 30 provinces increased sharply. However, if in a number of provinces they increased by an average of 30% (Smolensk and Kherson), in some, they reached 420-440% (Moscow and Samara). This was largely due to the emergence of new Zemstvo duties and the creation of new Zemstvo institutions.

All land expenses were divided into mandatory and optional. Mandatory duties included road, apartment and underwater duties, maintenance of civil institutions, etc., and optional – solving issues of education, health, etc. Since the 1870s, there has been a downward trend in mandatory spending. If in 1871, they were 51%, by 1890 – only 39.4% of the total amount. Thus, large amounts of money were spent by the Zemstvos on “optional” needs, such as medicine and education. The analysis of the set of estimates for 1868 allows us to note that the expenditure on the medical part was 8.3%, on public education – 5.1%. By 1890, the situation was somewhat changing and the expenditure on education and health care became a priority for the Zemstvos (on public health and public charity accounted for 27%, on education – 13.4%). (Fig. 3).

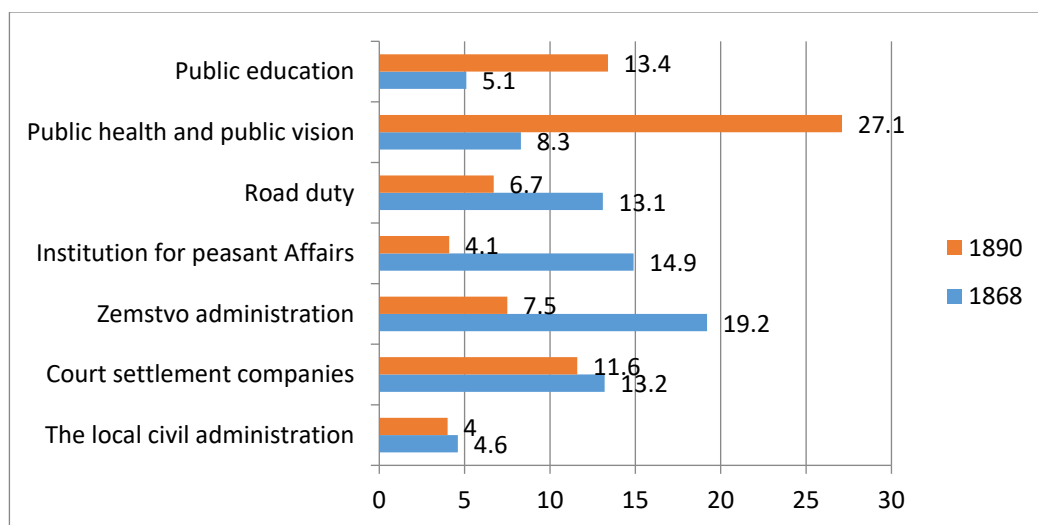


Fig. 3. Expenses of the Zemstvos (1868 and 1890), %

Thus, despite the fact that the provision of supply chain services was not a priority for the Zemstvos, it was

there that significant results were achieved: there were Zemstvo schools, hospitals, libraries, and museums.

4. Discussion

Supply chain infrastructure consists of both the physical and informational assets required to run a supply chain. This includes the buildings in which a company manufactures and distributes its products; the fixed and mobile equipment inside those buildings; the transportation fleet that moves product within the manufacturing and distribution network; and the information technology needed to plan, execute, and track supply chain activities. The results of the study indicate a significant role of the Zemstvos in the development of supply chain infrastructure.

According to the reports of the trustees of educational districts, in 1887, 42% of the total expenditure on the maintenance of rural and urban public schools was made up of Zemstvo funds. Issues of providing educational literature, expenses for school construction, and teachers' salaries were included in the Zemstvo budget. The Zemstvo authorities promoted the opening of new schools together with peasant societies, which built or allocated premises for the school, provided heating and lighting, first fully and then partially paid to teachers. Each County school had a Board of Trustees, working on a voluntary basis, which drew up the budget and distributed the funds of the school [32]. By 1910-11, Russia had opened about 30 thousand Zemstvo schools, their teaching corpus was more than 40 thousand teachers, most of whom were trained by the Zemstvos themselves, and "the level of organization of educational work in the Zemstvo schools was significantly higher than in the Ministerial and especially in parochial schools". In particular, in one of the reports of the Glazovsky Zemstvo Board, the Zemstvo school was considered as "the main means to raise the spiritual, civil and economic development of the population", and the main goal of education was "the moral development of the people, accompanied by the widespread dissemination of useful information and knowledge" [22].

Considerable merit of the Zemstvos is observed in the dissemination of cultural and educational work. The Zemstvos paid great attention to the organization of library services: central libraries were created in district cities, and volost libraries, libraries attached to Zemstvo schools, and mobile libraries were created in villages. Since the beginning of the twentieth century, Zemstvo museums have been actively developed. By 1917, the number of Zemstvo museums reached 1,700. Thirteen Zemstvos created local historical (they were called natural-historical) museums. At the beginning of the twentieth century, Handicrafts Museums were established in 15 Russian provinces. The main task of such museums was to provide artisans with raw materials and expand sales opportunities for finished products [35].

In addition, a separate area of activity of the Zemstvo institutions were issues of supply chain protection, which consisted not only in the construction of almshouses, orphanages, boarding schools, but also included their maintenance and arrangement. "Over three decades of local self-government (from the 60s to the 90s), the number of almshouses and disabled homes has been increased by 5 times. In the 90s, each Zemstvo province had two orphanages and foster houses" [26]. Such results of the Zemstvos' activities indicate positive trends in the

development of the local supply chain security system in the field. It was the supply chain character, the targeting of supply chain problems, and the orientation to the needs of a particular territory that contributed to the development of the Zemstvo business. Supply chain process in this development are considered as follows:

(1) Supply Chain Infrastructure are the buildings, equipment and I.T. required to operate a supply chain: When folks think "supply chain", they think processes, activities and the movement of goods from suppliers through to customers. What they seldom think about are the platform on which all this happens – the manufacturing plants and distribution centers, the materials handling systems and transportation fleet, the I.T. systems that coordinate all of this.

(2) Supply Chain Infrastructure is the single biggest factor in determining cost and service outcomes of a supply chain: Companies such as Unilever have undertaken studies of their end-to-end supply chains to identify and rank cost reduction opportunities. The results are as freakish as they are unsurprising: 80% of the opportunities to reduce costs come from massive re-engineering of their facilities (in terms of number and location) and I.T. systems (in terms of replacing). Only 20% of the cost reduction opportunities can be done "fiddling at the margins" with process improvements. (Another example of Pareto's law at work).

(3) Companies make large and small investments in supply chain infrastructure all the time: Every year, at budget time, we make small investment decisions in supply chain infrastructure. Replace a fork truck; buy a new trailer; upgrade our WMS. And, every few years, we make a major investment decision like replace our ERP or expand our distribution center. In fact, the number of investment decisions in infrastructure that companies make is almost staggering.

(4) Companies rarely make these investments as part of a comprehensive infrastructure road map: However, many companies divide the decisions between different departments – I.T., finance and operations all have responsibility over different parts of supply chain infrastructure. Rarely do companies coordinate these decisions such that they serve a larger infrastructure game plan. Too often, the opposite happens: infrastructure decisions are made to mitigate the "bad" decisions other departments are making in other areas.

(5) These investments compete for a company's limited capital: Capital is precious – and every dollar invested in supply chain infrastructure is a dollar that can't be invested elsewhere, like product development or building new stores. Invest too little in supply chain infrastructure and higher operating costs will result. Invest too much and not only will your company be burdened by unnecessary depreciation costs, but it will be deprived of capital to maintain and grow its position in the market.

5. Conclusion

Supply Chain infrastructure provides the means for chain economic entities and firms sharing a common interest to participate in a mutual exchange. Thus, the successful practices of the Zemstvo administration for the development of supply chain infrastructure at the local level indicate the significant organizational resources that

the Zemstvos had. The success of the Zemstvo self-government bodies was also due to their stable interaction with the population, support for local initiatives, and the formation of a system of public control, which was carried out through the reports of elected representatives on the work done before the meetings of residents. In particular, elected representatives of rural societies represented the interests of the peasantry, therefore for the first time it became possible to solve problems of rural infrastructure and improve the quality of rural life. However, the lack of support from state bodies, opportunities for independent financial and economic development, and a clear legal framework that ensures the full spread of Zemstvo administration in all Russian provinces, significantly limited the activities of Zemstvo bodies to meet the needs of the population. Despite this, the experience of management activity for the development of supply chain infrastructure, formed by local authorities, can be in demand in modern Russian conditions and adapted to the current system of local government.

References

- [1] Bel G. (2011) Infrastructure and nation building: The regulation and financing of network transportation infrastructures in Spain (1720–2010)// *Business History*. Vol 53. Issue 5. - Pp. 688-705. DOI: 10.1080/00076791.2011.599591.
- [2] da Silva, MRB (2019) History of hospital care in Sao Paulo: State grants to the misericordia charitable associations. *HISTORIA CIENCIAS SAUDE-MANGUINHOS*. Том: 26. Стр.: 79-108 DOI: 10.1590/S0104-59702019000500005
- [3] Hanley, Richard. (2002). Different Times, Different Places: Histories of Infrastructure Development. *Public Works Management & Policy*. 6. 170-171. 10.1177/1087724X0263002.
- [4] Lee, E; Li, XF; Jung, K (2019) Policy Innovation across Korean Local Governments after Democratization Community Safety Committee and Municipal Police System. *KOREA OBSERVER*. Том: 50 Выпуск: 3 Стр.: 443-478 DOI: 10.29152/KOIKS.2019.50.3.443
- [5] Medvedeva N.V., Frolova E.V., Rogach O.V., Ryabova T.M. Public Participation in Shaping the Tourist Attractiveness of Russian Territories at the turn of the XIX–XX centuries. *Bylye Gody*. 2019. Vol. 52. Is. 2: 838-847. DOI: 10.13187/bg.2019.2.838
- [6] Millward, Robert. (2011). The institutional economic history of infrastructure industries, 1830-1990: Ideology, technology, geopolitics?. *International Handbook of Network Industries: The Liberalization of Infrastructure*. 87-102.
- [7] Mironova Ye.V. Medical workers and clerical staff of Laishev Zemstvo. *Istoricheskaya etnologiya – Historical Ethnology*, 2020, vol. 5, no. 1, pp. 110–127. DOI: 10.22378/he.2020-5-1.110-127
- [8] Pozdnyakov A. N. Zemstvo and the Problems of Development of Public Education (Review of Certain Documents Zemstvo Institutions). *Izv. Saratov Univ. (N. S.), Ser. Philosophy. Psychology. Pedagogy*, 2018, vol. 18, iss. 1, pp. 95–99. DOI: 10.18500/1819-7671-2018-18-1-95-99.
- [9] Smith M. L. Urban infrastructure as materialized consensus. // *World Archaeology*. 2016. Vol.48(1).Pp.164-178. DOI: 10.1080/00438243.2015.1124804.
- [10] Wethal, Ulrikke. (2019). Building Africa's infrastructure: Reinstating History in Infrastructure Debates. *Forum for development studies*. 46. 473-499. 10.1080/08039410.2019.1616609.
- [11] Frolova E.V., Vinichenko M.V., Kirillov A.V., Rogach O.V., Kabanova E.E. Development of supply chain infrastructure in the management practices of local authorities: trends and factors *International Journal of Environmental and Science Education*. 2016. T. 11. № 15. C. 7421-7430.
- [12] Rogach O.V., Ryabova T.M., Frolova E.V., Bogacheva T.V., Shalashnikova V.Yu. Project management under risk. *Opcion*. 2020. T. 36. № S27. C. 743-761.
- [13] Bezobrazov V. P. (1874) Zemstvo institutions and self-government. Moscow: Univ. type. (Katkov and Co.), 52 p.
- [14] The Great Soviet Encyclopedia. Volume 9. 3rd ed. Moscow, 1972. P. 507.
- [15] Vasilchikov A. I. (1872) On self-government: a comparative review of Russian and foreign, Zemstvo and public institutions. 3rd ed. Saint Petersburg, 477p.
- [16] Veselovsky B. B. (1909) History of the Zemstvo for forty years. Vol. 1. Saint Petersburg: publishing house of O. N. Popova, 724p.
- [17] Witte, S. Y. (1903) the Autocracy and the Zemstvo. - Stuttgart: editorial "Liberation", 224p.
- [18] Golovachev A. A. (1872) Ten years of reforms 1861-1871. Saint Petersburg: Bulletin of Europe, 398p.
- [19] Gradovsky A.D. (1878) local government Systems in the West of Europe and in Russia. Saint Petersburg: V. bezobrazova & Co., 53p.
- [20] Dzhanshiev G. A. (1905) the Era of great reforms. Saint Petersburg: typo-lithography of B. M. wolf, 859p.
- [21] Revenues and expenditures of the Zemstvos of 40 provinces according to estimates for 1912. Saint Petersburg, Pp. 79-121.
- [22] Evdoshenko I. V. (2014) From the history of the formation of Zemstvos in the Vyatka province. // *Bulletin of Udmurt University*. Vol. 2. Pp. 124-126.
- [23] Zvyagintsev E. A. (1915) half a Century of Zemstvo activity on national education. Moscow: Zadruga. 1915. 96 p.
- [24] Kuzmin-Karavaev, V. D. (1904) the district Council and the village. 1898-1903. Articles, abstracts, reports and speeches. - Saint Petersburg, 429p.
- [25] Lokhvitsky A.V. (1864) the Province, its Zemstvo and government institutions. Saint Petersburg: I. Bochkareva type, Part 1. 224p.
- [26] Melnikov V. P., Kholostova E. I. (2002) History of supply chain work in Russia. Study guide. Moscow.: "Marketing", Pp. 102-106.
- [27] Regulations on provincial and district Zemstvo institutions from 1.01.1864. Complete collection of laws of the Russian Empire. Collection 2. Vol. XXXIX. Department 1. Saint Petersburg, 1867. Pp. 1-21.

-
- [28] Regulations on provincial and district Zemstvo institutions of 12.06. 1890. Complete collection of laws of the Russian Empire. Collection III. T. h. Department 1-e. - Saint Petersburg, 1893. no. 6922. P. 465.
- [29] Summary of income and expenses according to Zemstvo estimates and layouts for the period from 1871 to 1880 inclusive: Publication of the economic Department of the Ministry of internal Affairs. Saint Petersburg. 1880. 41p.
- [30] Sets of information about Zemstvo income, expenses and capital. 1884-1903. Saint Petersburg. 1903. 141p.
- [31] Skalon V. Yu. (1884) Zemstvo views on local government reform: review of Zemstvo reviews and projects. Moscow, 236 p.
- [32] Falbork G., Charnolusky V. (1899) National education in Russia. Saint Petersburg, 270 p.
- [33] Frenkel Z. G. (1913) Essays of the Zemstvo medical and sanitary Affairs (according to the works produced for Dresden. and all that. hygienes'. exhibitions'). Saint Petersburg: type. "Word", 228 p.
- [34] Chicherin B. N. (2010) Memories. in 2 volumes. Moscow University. The district Council and the Moscow Duma. Moscow. Ed. Sabashnikovs. 528 p.
- [35] Yankovsky A. Yu. (2016) Organization of education in the Zemstvo primary school of the Moscow province in the second half of the NINETEENTH century. Bulletin of the Moscow state University. No. 3. Pp. 60-70.