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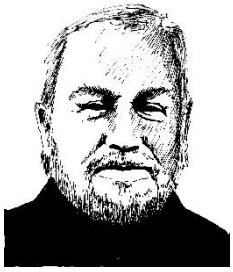

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DYNAMICS OF THE RUSSIAN, JAPAN AND THE UNITED STATES LIVING PREMISES GEOMETRY

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ABSTRACT

The main purpose of studying the dynamics of the geometric parameters of the country's living premises is to determine the patterns of their transformation as a result of changes in the lifestyle of the population. An analysis of official statistical information presented in the reports on population censuses and inventory of residential premises conducted in recent years in Russia, Japan and the United States made it possible to identify the dependence of changes in the number and area of living premises on the direction of development of the property structure in the country. Despite the relative stability of the reproduction of the traditional spatial image of the country's living premises, the change in its characteristics also depends on the level and character of the distribution of housing provision among the population. In the 19th century, a wide variety of living conditions with a low level of housing provision for the population led to an increase in state support for the construction of housing, which made it possible to narrow the geometric parameters of housing under construction and increase the average level of provision in countries. With the increase in the economic opportunities of households, it becomes preferable to purchase housing in private ownership, which makes it possible to expand the variety of living conditions and increase the average provision of housing for the population. The complete privatization of dwellings, observed at the end of the 20th century, leads to the emergence of private rent, which narrows the geometric characteristics of the dwelling under construction and increases the uneven housing supply again. During periods of economic crises, there are noticeable shifts in the transformation of the spatial image of a dwelling, associated with the search for the highest quality geometric forms of a dwelling, which change the direction of its reproduction during periods of restoration.

Key words: living premises, housing unit, census, average living area.

1. INTRODUCTION TO THE PROBLEM OF DESCRIPTION THE GEOMETRIC QUALITY OF LIVING QUARTERS

In the minds of each society, there is a unique idea of the geometric parameters and properties of premises that correspond to their qualitative suitability for living, which also changes as a result of the transformation of the properties of the living environment. Information about the buildings of past eras demonstrates the stages of a quantitative increase in the number of similar in shape and size living premises, as well as periods of their qualitative transformations caused by a sharp change in the direction of construction, determined by social changes (Wright, 1902; Gardiner, 1974; Kartashova, 1985; Schwartz, Tsenkova, 2022).

Already at the initial stage of anthropological evolution, an open area of the terrain, becomes the primary form of living premises, serving as a place for satisfying the inevitable human need for short-term sleep. That geometrically diverse form of dwelling, defined as “ephemeral or transient,” survives today among a small group of aboriginal and modern homeless people (Severin, 1973; Schoenauer, 2000). With the development in people of the ability to create, with the help of construction activities, stationary or mobile structures with internal containers of certain geometric parameters, the variety of their forms expanded so much that they could be compared with the individuality and uniqueness of their inhabitants.

Nevertheless, in comparison with the theoretically possible diversity of them, the characteristics of known living premises fit into a rather narrow spectrum, which allows their territorial or social identification at each stage of historical development. The identification of patterns leading to the elimination of unsuitable for living premises, or their geometric transformation caused by the need to adapt to new requirements, remains content with a complex subject of study due to the lack of a clear boundary separating the open forms of living premises (which do not have pronounced structural features) from closed or chamber forms (with pronounced design boundaries, providing a significant difference between internal and external properties). Only with the advent of statistical analysis techniques, developed in the last century, based on the identification of structural boundaries, the description of geometric characteristics of the living premises of the state became possible, which caused the emergence of a new subject of scientific research.

The increase in the volume of housing construction due to the improvement of design methods and production technologies is reflected in different ways on the ability to acquire them by population, Part of the population is ready to invest in high-quality, large-area dwellings located on plots of considerable size far from the city, equipped with modern engineering equipment, decorated with expensive finishing materials. Another part of the population focuses on the rental of smaller living spaces, located in areas with high public services and fairly isolated and autonomous rooms.

There are also groups of people who agree on significantly smaller premises that meet their financial capabilities. The discrepancy between the requirements and capabilities of the population with the existing geometric characteristics of the dwelling is corrected by development communities, which do not always cope with social or natural crises, leading to the growth of empty dwellings or their transformation into non-living premises.

In the context of the growing dynamics of lifestyle and the growing diversity of its forms, due to socio-economic reasons that prevent the acquisition of appropriate premises, the density of residence, unauthorized construction in the number of places of residence rises, dissatisfaction with living conditions is growing, morbidity and crime are increasing, migration is intensifying (Jacobs, 1960; Freeman, 1972; Gillis, 1977; Baldassare, 1979; Glaeser, 2000). Observations of the nature of the use and transformation of premises, which began at the beginning of the last century, allowed politicians in many countries to find means that could improve housing conditions and achieve higher socio-demographic indicators. From that moment on, the collection of statistical information about the dwelling and the peculiarities of its use became a priority in understanding the patterns of its development and in finding ways to improve the quality of the dwelling environment.

There are various interpretations of the concept of "living premises or living quarters", which are largely determined by the real forms of dwellings in modern states. In Russia and Japan, for a long time, there was a narrow interpretation of the concept of living premises, which made it possible to

determine its area as the sum of the areas of living rooms. With the appears of the opportunity to place kitchen equipment in one of the living rooms, many European countries have difficulties in defining the boundaries of the living space. (Baranowski, 1999; Dol, Haffner, 2010). A similar problem exists when comparing dwellings in different regions of the planet (Page, 1990).

In the United States and the former USSR, an expanded interpretation of this concept was used, which makes it possible to consider living premises as a set of living rooms and other non-residential utility or auxiliary premises belonging to them. Currently, most countries use a broad interpretation of this concept, which makes it possible to cover the entire range of territorial and historical forms of dwellings (Durmanov, 1992; Rosstat, 2020a). Living premises were also an integral part of the concept of "residential ownership", which was used in early inventories of European real estate, allowing it to include open areas of the territory, as well as other structures used as a place of residence - summer cottages, overseas houses, hotels, ships, etc. belonging to the owner. In the second half of the last century, a simplified interpretation of living premises, represented by the concept of “housing unit”, is defined as “*the usual residences of one or more persons. They are structurally separate and independent places of abode that: (a) have been constructed, built, converted or arranged for human habitation, provided that they are not, at the census reference time, being used for other purposes and that they are occupied at the census reference time; or (b) though not intended for habitation, were in use for such a purpose at the census."* (UN, 1968, 1971, 2015).

Not all countries use this concept in modern regular censuses of housing and population, however, in many cases, behind the different names of regional forms of dwellings, sufficiently close geometric types are hidden, which makes it possible to use the obtained statistical data for comparative analysis. In this study, the geometric characteristics of the dwelling are determined by the dimensions of the interior of the housing unit with various ways of dividing it into rooms and by the placement of engineering equipment necessary for household activities. Taking into account that a detached house refers to another taxonomic unit representing a possession, the description of which is associated with both open and closed places, the definition of the parameters of living premises in it is also determined by its inside isolated part.

The selection of the geometric characteristics of a housing unit as a subject of research is aimed at identifying and correcting the negative consequences arising from their reproduction. From an economic point of view, the living premises of housing unit is a source of financial capital, which, in the context of the globalization of real estate, can lead to profound social upheavals (Dallas, 2017), especially when the population in many countries begins to decline and housing policies will require new solutions (Premus, 2002).

In this regard, the observation of structural changes in the dwelling of the state can prevent the threat of the emergence of foci with an unfavorable housing situation and apply the necessary geometric changes in its properties to achieve the necessary social effect. The criterion for identifying the main structural social characteristics of a dwelling is the division according to the nature of the life of the people living in them. The largest group of residential premises, defined as "private", includes such premises, the geometric parameters of which allow for independent living in them, that is, persons who have sufficient physical activity and social and financial security, allowing them to purchase the necessary funds to support independent and fairly autonomous living.

In Russia, private households include people who are living in residential premises of individual houses (detached estates, villas, etc.) or in apartment buildings, dormitories, or other structures in which an independent lifestyle is possible. Households that are made up of a group of persons whose cohabitation and feeding is caused by obeying common rules and purposes are considered “collective”. These include those permanently in medical or social services, barracks, places of detention or religious organizations (Census, 2002, 2010).

In Japan, private households include one person or a group of persons who live together and are able to pay the costs of maintaining their home and persons who occupy housing provided by companies for independent living of its employees. The rest of those living in student homes, hospitals, correctional colonies, military barracks, as well as those who do not have a permanent place of residence is classified as institutional households (JSYB, 2021).

In the United States, private households include any group of persons occupying a dwelling, with the exception of those who are individually provided with all the necessary means to maintain life in the premises of special institutions, defined as "groups of residents" (Group of Quarters). Usually, these are numerous groups of people who are not related by kinship, with a joint budget, who occupy living premises of large territorial complexes (USC, 2021).

Despite the differences in the interpretation of the concept of "private housing unit", adopted in statistical studies of different countries, this form of dwelling (in terms of the population living in them) prevails over "institutional housing units". The share of the population living in them was in Russia - **3.1%** (Census, 2010), Japan in 2015 - **2.3%** (JSY, 2021, tab. 2-13), **2.7%** in 2009 (SAUS, 2011, tab. 74).

The existence of institutional dwellings is determined by the cultural specifics of the country and is considered in statistical studies as a separate phenomenon, as well as temporary dwellings resulting from emergencies. It is known that the main focus of the country's housing policy was not influenced by the accident of the nuclear reactor at Chernobyl in 1986, which led to the evacuation of **335 thousand** people, the social transformations of the USSR in 1991, which caused the appearance of **710 thousand** refugees, the disaster in the Fukushima province, which required temporary placement in 2011 **154 thousand** people, legalization of the right to stay in the United States, which received **707 thousand** migrants in 2020 year, or the dynamics of the number of homeless people, which, despite the social significance, in Russia in 2010 amounted to **64 thousand** people, in Japan in 2020 - **4 thousand**, in the USA in 2020 - **580 thousand** (Census, 2010; Zlokozov, 1991; Hasegawa, 2016; DHS, 2020).

As evidenced by the results of population censuses conducted over the past decades, the rate of increase in the number of housing units among housing units in Japan and the United States is slowing, while in Russia it continues to increase. Various trends in the development of the size of living premises are associated with the state of specific housing provision. At present, the housing provision with living space and the number of dwellings per US resident exceeds that in Japan and Russia and can serve as a leading model for countries that embarked on a policy of housing privatization much later.

The uneven settlement of the population on the territory of industrially developed countries was a consequence of the industrial revolution, generated by a dynamic market economy, suffering from constant financial crises. The most powerful of these occurred in 1846-1947, causing the bankruptcy of Bank of America and then famine and unemployment in Western Europe, which became the cause of armed clashes with the authorities called the Spring of Nations.

The need to solve the problem of employment and the growing imbalance in the living conditions of entrepreneurs and wage workers forced governments to look for ways to solve the problem, which led to a change in the social structure of many industrial countries. Serfdom was eliminated in Russia (1861), slavery in the USA (1865) and feudal rule in Japan (1867). A huge mass of former peasants found themselves without property and means of subsistence. In America, according to the 1860 census, slaves made up about a quarter of the US population. After the liberation, a significant part of them joined all branches of production, creating places with a high density of residence throughout the country. A similar situation has occurred on all continents among the industrialized countries, causing numerous social conflicts. Changes in the political structure caused unusually high overcrowding of urban dwellings in which up to several dozen people had to spend the night at the same time. In the middle of the twentieth century, statistical observations of the state of the country's living quarters were not carried out and it was difficult to notice the movement of huge masses of the population who were looking for a way to spend the night in an urban environment.

The book “The Condition of the Working Class in England in 1844” published in 1845, describing the living conditions of the working population in England, originally pursued the goal of describing the critical situation of the living conditions of workers, as a result, formulated the housing problem in a market economy (Engels, 1887) Subsequent studies of housing have noted incredible overcrowding living in many large cities of Great Britain (Booth, 1894). In rooms consisting of two rooms and a basement, up to 20 people could live, and 120 people use one latrine (Kozerenko, 1928). Then

a wave of infectious diseases hit the cities, which was reflected primarily in the increase in child mortality. Governments tried to take measures to improve the lives of workers by building special houses with the financial support of insurance companies and the support of a cooperative movement.

The solution of the housing problem, the purpose of which is a narrow sense is to eliminate pockets of density, and in a broader sense - the creation of such properties in the residential premises of the state that are able to provide a dynamic balance between demand and supply among of all social groups of society was seen at the end of the 19th century in different directions. The first of them suggested increasing the number of residential premises in the real estate market with **minimal geometric parameters** for less wealthy strata, in order to bring the cost of construction closer to their economic capabilities, which meant creating conditions in industrial construction that would ensure an outstripping growth of housing units in relation to the growth of the urban population. Between 1891 and 1901 the population of London grew by **0,571 million** and the number of housing units by **0,082 million.** This meant that for every resident who arrived in the city, there was only a sixth of the housing in the new building. Providing each visitor with a room meant multiple increases in the pace of construction, which, without solving the issue of constant supplies of building plots with certain characteristics to the real estate market, and the development of financial institutions, was impossible

The second direction considered that in the conditions of market competition, investors would strive to create residential premises focused on wealthy clients and their quality would be incompatible with the requirements of the bulk of households, causing dissatisfaction. Others assumed that only with the elimination of private property will society be able to decide what kind of premises should be built and how to distribute living quarters. This concept, presented by Engels in 1847 at the first congress of the communists, was to outline the goal of creating a state with a socially controlled economy. Engels and Marx did not give recommendations on what geometric type of living premises should be built and on what principles they should be distributed assuming that the development of future science will find a way to solve that problem.

All directions considered it important to start a statistical description of residential premises in order to clarify the real situation in housing provision. It was assumed that with the increasing transformation of residential premises and the increasing mobility of society, there would be a convergence of the variety of geometric characteristics with the variety of social parameters of households. The desire to bring the spatial lifestyle of the population closer to the spatial image of their living quarters should form a theoretical basis that determines the direction of the transformation of the living environment. Despite the lack of objective information on the state of these characteristics, countries have begun to formulate housing policies based on the current specific socio-economic situation.

The living conditions of the population became much worse after the First World War, in which human losses amounted to **30-45 million people** killed and wounded disabled (Haythornthwite, 1993; Urlanis, 1960). The density of living in cities increased again due to the increase in the number of enterprises employed in the military industry. The subsequent transition to a peaceful lifestyle caused unemployment and exacerbated the housing problem. Most of the European countries participating in the hostilities of 1914-1918 began to develop programs for active urban construction. The volume of housing needed for England and France was about **one million** housing units and for Germany **1,4 million**. The post-war economic recession in European countries made it possible to fulfil this task only partially. For example, Germany by 1922 managed to implement the program only by **3%** (Bunin, 1979).

2. THE EVOLUTION OF LIVING PREMISES IN THE BEGINNING IN XX CENTURY

2.1. The main characteristics of the urban living premises of the USSR

The First World War led to the collapse of the Russian Empire and the emergence of a new state - the Union of Soviet Socialist Republics of the USSR, which included different ethnic communities living in unique climatic conditions with an unusually wide variety of levels of economic development, lifestyles and geometric parameters of living premises. It is assumed that the social changes that

swept the period from 1913 to 1926 led to a decrease in the country's territory, reduced the number of dwellings and reduced the population from **159,2 to 147,0 million** people (NHR, 1962, p. 7). The new government of the USSR, which united a number of national republics, on the basis of theoretical ideas about the possibility of the existence of a non-market economy, **the main driving force of which was considered the process of constant equalization of material benefits of citizens with the help of state management of socialized property**, began to reform the administrative management, the purpose of which was to create a centralized economy by eliminating private property - the main obstacle to the development of industrial production in an economically backwards agrarian country. The abrupt transition from a market economy to a distributive economy triggered a social crisis that manifested itself in civil war, economic decline and emigration. The Russian Socialist Federal Soviet Republic (RSFSR or Russian Federation), as the largest republic in terms of area and population, suffered less, maintaining the growth in population from 1914 to 1926 from **89,9 to 92,7 million people** (Rosstat, 1988). From 1918 to 1928, **42,9 million m^2** of living space was built in the USSR, in which state construction accounted for more than **55%**, which, with an increasing population, could lead to new centers of dense living, which required determining the direction of construction development (NHR, 1956, p. 176). The question of what to build arose with renewed vigour.

After the implementation of a number of pilot projects involving the construction of low-rise buildings in Moscow (the village of Sokol, the village of AMO, 1923) and multi-story buildings with small apartments with a living area of **40-45m^2**, the focus of state construction on the mass production of medium-rise apartment buildings was determined. Three-four-story houses with four small apartments, equipped with a compact toilet and a small bathroom, overlooking one stairwell, appear in large cities of the country. The lack of private ownership of land allows for development in large blocks. In place of the old low-rise barracks for workers, settlements with stone buildings equipped with the necessary engineering equipment are being built (Bylinkin, 1985).

The transfer of private urban residential premises into a socialized form of ownership allowed the post-war republics of the USSR to move part of the population from non-residential premises to multi-room comfortable apartments of wealthy households. The lack of dwellings with a smaller area and compact rooms and a variety of engineering equipment forced several families to be settled in spacious apartments which were constructed before for rich households, which is why such apartments became the places for collective residence, called «communal apartments". For people who were previously housed in rooms without a kitchen, bathroom and the necessary insolation, such a movement, even with an increase in the density of residence, meant a significant improvement in living conditions.

Streamlining the process of allocating dwellings required justification, which led to a general census of urban dwellings. Methods for conducting censuses in pre-revolutionary Russia were mainly guided by the collection of information designed to solve economic problems, which was not enough for the country's new housing policy striving to create equal living conditions. Despite the methodological unpreparedness of the USSR for collecting statistical information on the geometric characteristics of residential premises and limited economic opportunities, in 1926 one of the most complete censuses of the urban population was carried out. Unfortunately, rural dwellings, in which more than **75%** of the country's population lived, as well as settlements in which more than half were peasants, was not been described (Census, 1928).

The 1926 census destroyed the prevailing idea of the similarity of the geometric characteristics and properties of the living quarters of the USSR and Russia with other countries. Out of **1,84 million** urban residential buildings of the USSR, **74%** were found to be single-storey and **72%** were constructed of wood. The share of stone urban residential buildings, which were mainly constructed in large cities, did not exceed **12,9%.** In other republics of the USSR, due to the preserved traditions, the share of residential buildings built of clay or adobe bricks was almost **40%**. Only **1,1%** of all urban residential buildings in the country had three or more floors. Profitable multi-storey apartment buildings were located only in large administrative and industrial centres (Census, 1928). A distinctive feature of the early dwellings of the USSR was the unusually wide variety of their design features, caused by the technological evolution that developed in certain regions of the country.

In 1926, the USSR had an area of **21,3 million km²**, of which **92,5%** belonged to the territory of the Russian Soviet Federative Socialist Republic (RSFSR), which housed **68,6%** of the country's population, with an urbanization rate of **17,9%** (Census, 1927a). The rest of the republics of the country had a lower level of urbanization -**17,3%** and a different level of housing provision. For example, in the Belarusian USSR, it was **7,8m² per inhabitant** of the republic, and in the Uzbek USSR - **6,0m²**.

The census for the first time established the total number of private living premises in the cities of the USSR, which amounted to **4,679 million** housing units with floor area (total, according to the census definition) – **157,223 million m²**. In the RSFSR at that time, there were **2,978 million** housing units with floor area of **126, 343 million m²**. With a very rough comparison based on the level of urbanization and population, it can be assumed that the number of housing units in the mid-20s of the 20th century in the USSR and Russia could be one and a half to two times more than in the USA and Japan.

The number of living rooms in occupied premises in cities in the USSR and the RSFSR amounted respectively to **9,013 million** and **5,970 million rooms.** The average provision of each inhabitant with a living premises in the USSR reached about **6,0m²**, and in RSFSR - about **7**,**2m²**. On average, one room in the USSR was occupied by **2,9** people. The average number of person in households living in such urban housing units in the USSR was about **5,5** people, and in RSFSR - **5,8**. The majority of the country's population lived in two-room housing units with a total floor area of about **40m²**, in which the area of living rooms was about 80%. The remaining portions of the floor area in living premises served as kitchens, corridors and restrooms, which were often located in structurally isolated rooms considered as auxiliary. Achieving the same level of development of urbanization and housing provision required the formation of an approach to eliminating the existing inequality, which was also traced in different ways of domestic life.

The 1926 census found that **3,3%** of the occupied apartments in the USSR were empty. In the Uzbek SSR, where the tradition of seasonal temporary residence of households in their own gardens and orchards, located outside the dense urban development, has been preserved, almost every sixth dwelling was empty in the summer (Census, 1928). Unoccupied living quarters in the suburbs of cities spread in Russia as early as the Peter the Great period, when the government administration began to acquire ownership of city dwellings while maintaining a permanent place of life on estates. In 1902, within the city boundaries of Moscow, the city had **6%** of unoccupied dwellings, and in its suburbs – **15,7%.** The established differences in the average indicators of housing provision in the regions were supposed to be eliminated, but this task was not solved until the collapse of the USSR.

Difficulties in equalizing housing provision in the country appeared during the transfer of housing units of various private forms of ownership into state, cooperative and public property. In 1926, only **18%** of all residential buildings in which there was **42,9%** of the country's living premises floor area was socialized. Mainly the property has been changed by quality of construction. The average size of buildings transferred to state ownership was **197m²** which mainly consisted of large apartments or estates of wealthy owners. Smaller living premises were transferred to the cooperative and public sector, in which the average floor area was **134m²**. The attitude of authorities to private property as a source of undesirable household income was negative, therefore, small private living premises, overcrowded by inhabitants, which were mainly located in detached small-room dwellings, were not socialized. It was believed that single-family rural houses created with the help of archaic construction methods would disappear, and the rural population would live in multi-apartment buildings, like the entire population of the country. In the context of the new management, apartment buildings were supposed to show the advantages of corporate construction. However, it did not appear when the land value was eliminated.

The first years of activity of socialized construction companies showed their low productivity and convincing advantages of private construction, which accounted for more than 60% of the commissioned area of living premises. State construction companies were able to produce no more than 25% of the required area, due to the orientation of construction towards multi-apartment high-rise buildings. The average area of living premises in buildings constructed in Moscow in the 1920s was about **234m²**, although the bulk of the country's new urban dwellings were single-family houses with an area of near **40m²**. Therefore, the pace of Soviet construction in the USSR remained insufficient

in relation to the growth of the urban population. During the period from 1918 to the first half of 1941, **165,8 million m^2** floor area of living premises was built in the USSR, providing an increase in the total housing urban stock from 1913 to 1940 year from former Russian Empire to Soviet Union from **180** to **421 million m^2**, which increased the average housing area before the Second World War provision of urban dwellers up to **6,7m^2** (Census, 1927b). Mainly due to the transformation of rural settlements into urban settlements in which the population engaged in agricultural activities was less than half.

The deterioration in housing provision of population, which arose as a result of the stimulation of socialized forms of construction, caused alarm among the country's leadership, however, most politicians viewed the situation as temporary and did not seek to analyse the reasons for the change in the social characteristics of the living premises of RSFSR and former USSR. The population censuses conducted in the USSR from 1937 to 1979 years did not provide for the collection of data on the number of housing units and the total dimension of the floor area of living premises. Figure 1.

Control over the geometric characteristics of new living premises was aimed at increasing their total area in urban state construction; therefore, it is not known about the construction activity of private households and collective farms during the first five-year plans. Information on the area of all housing units in the country and the union republics was obtained only in 1980. Despite the lack of information about the housing conditions of the population, these censuses show the pace of urbanization, which allowed at period 1917 - 1939 years increase the population in cities from **17% to 33%** especially in the big cities where the number of inhabitants in large cities grew faster. For example, in St. Petersburg and Moscow population increased from 1920 to 1939 from **0,7 and 1,0 million inhabited** to **3,0** and **4,1 million** respectively (Census, 1939).

It is believed that the development of housing conditions has little impact on the demographic development of the country, although statistical studies in the first half of the last century demonstrate this interconnection. During the period from 1920 to 1940, the size of the Soviet population increased **1,4 times** and amounted to **192,598 million people** January 1940 year (Andreyev,1993). In Russia, during this period, the increase in the population was **1,25 times** reaching in the beginning of the 1940 **110,098 million people** (Rosstat, 1998, tab. 1). Problems associated with curbing the development of rural housing, high costs for the construction of multi-apartment buildings could not but affect the growing difference that was observed in the demographic development of different regions of the country. Despite the rapid increase in urbanization, two-thirds of the country's population continued to live in villages, maintaining a traditional way of life, which compensated for the downward trend in demographic growth, which is common for industrialized countries, caused by a decrease in fertility and an increase in life expectancy. The general direction of social transformations in the USSR, associated with the elimination of regional differences, has not yet come into full force, which, most likely, has not significantly affected the rate of demographic growth. In the United States, the population over the past two decades has increased by **1,25 times** and amounted to **132,164 million peopl**e at April 1 of 1940 year (SAUS, 2010, tab. 1). That year, the population of the USSR was 1.5 times greater than the population of the United States as same the Population of Russia was greater than the population of the Japan, which chose the path of integrated development of the megalopolis, with the preservation of a single-family dwelling corresponding to the traditional way of life, ensured an increase in the population over the same period by **1,29** times, reaching **71,933 million people** in 1940 (JSYB, 2021, tab. 2-1). The economic crisis of the late 1920s did not have a significant impact on the demographic processes in Russia. Also, the level of the negative impact from dense living in urban apartments was lower in the former USSR due to the relatively low part of the urban population.

2.2. Japanese adherence to the traditional detached one housing unit

In Japan, at the beginning of the twentieth century, the number of living premises, represented mainly by detached rural houses, could be close to the Russian one. The warm climate has influenced the somewhat larger floor area and the number of living rooms in a traditional Japanese house compared to a Russian one. Their appearance, represented by a gable thatched roof, was similar to some types of European dwellings, although the use of a pile-framing structure with mats placed above sufficiently moist soil and light paper partitions had a different level of isolation from warmer climates

(Taut, 1958). The territory of Japan, elongated in the meridian direction, is characterized by significant climatic diversity, which is reflected in the geometric characteristics of the traditional dwelling (Arutyunov, 2014).

The course towards the industrialization of Japan, undertaken by the new government, led to the emergence in 1872 in the centre of the new capital of Tokyo, multi-apartment brick buildings, which were not popular due to their unusual geometry, physical properties and high prices. Failures to adapt to the Western building tradition stimulated the search for their own spatial policy, the main priority of which was to preserve the real estate market and improve the quality of residential premises to Western standards. At the beginning of the twentieth century, the country's economy relied on the development of agriculture as the main source in the creation of industrial infrastructure, and after the end of the First World War, the government began to form six territorial centres of industrialization, for these purposes laws on urban planning and urban construction that clarified the requirements for the hygiene of premises, site boundaries, fire safety and structures in conditions of increased density of residence (Zhukov, 1939).

The Kanto earthquake and the financial crisis of 1927 contributed to the militarization of industry caused by the territorial expansion of Japan in Southeast Asia, which changed the attitude towards the direction of urbanization. The architect Uzō Nishiyama, based on the works of the German social-nationalist Gottfried Feeder, proposed to develop the country's urban development framework based on agricultural settlements through the dispersed placement of new industrial centres in them along with the development of services and communications. This policy did not lead to the sharp overpopulation observed in the middle of the 19th century in some European cities or in the USSR during the implementation of the program of the first five-year plans for the creation of large state industrial area.

Population censuses in Japan were also carried out during the feudal period; however, the necessary information on the geometric characteristics of residential premises, intended for the formation of housing policy, was first collected in Japan in August 1948. Despite the lack of information about the transformation of the living premises, one can judge the active urbanization of the country. From 1920 to 1940, the Japanese population increased every five years from **5,6**% to **7,9%.** (JSYB, 1943/45, p. 27), mainly due to the decrease in the number of small rural communities with a population of 500-2000 people, which became the main supplier of the urban population. From 1935 to 1940, the population of Kyoto remained almost unchanged and amounted to about **1,0 million** people, while in Tokyo it increased from **5,9 to 6,8 million** inhabited. According to the census of October 1, 1940, which included all settlements with a population of more than 100,000 included into the concept of the city, the level of urbanization exceeded the Russian level and amounted to **37,7%** (JSYB, 1943/44, p. 27), which prove the effectiveness of housing construction throughout the all the metropolitan area, and not only in its dense part. The average number of people living in one dwelling reached in Japan by this time 5 people, which was also close to the number of people living in Russian housing units.

Until the beginning of 1950, there is no data on the geometric characteristics of the country's dwellings. Figure.1. Post-war housing inventories established the preservation of the traditional form of Japanese dwelling. In the 1953 year, among the **6,964 million** occupied urban dwellings housed in **98%** of wooden buildings, **1,898 housing units** had rooms for agricultural, commercial, handicraft and other activities, reflecting the preservation of the feudal image of Japanese household activities, which was mainly represented by small detached house located on a small area of the city (JSYB, 1955/1956, tab. 229). In the 1955 Census, persons living with traditional households but not sharing expenses with them were classified as “quasi households” (approximate form of communal living or group of quarters) amount to 2% to all private household members (JSYB, 1955/1956, tab. 13). The average household size of 5 people and the average area of a living room of **3,7 tatami per person** (**6,1m^2**) brings together the average housing provision of the Japanese and Russian populations (JSYB, 1955/1956, tab. 228).

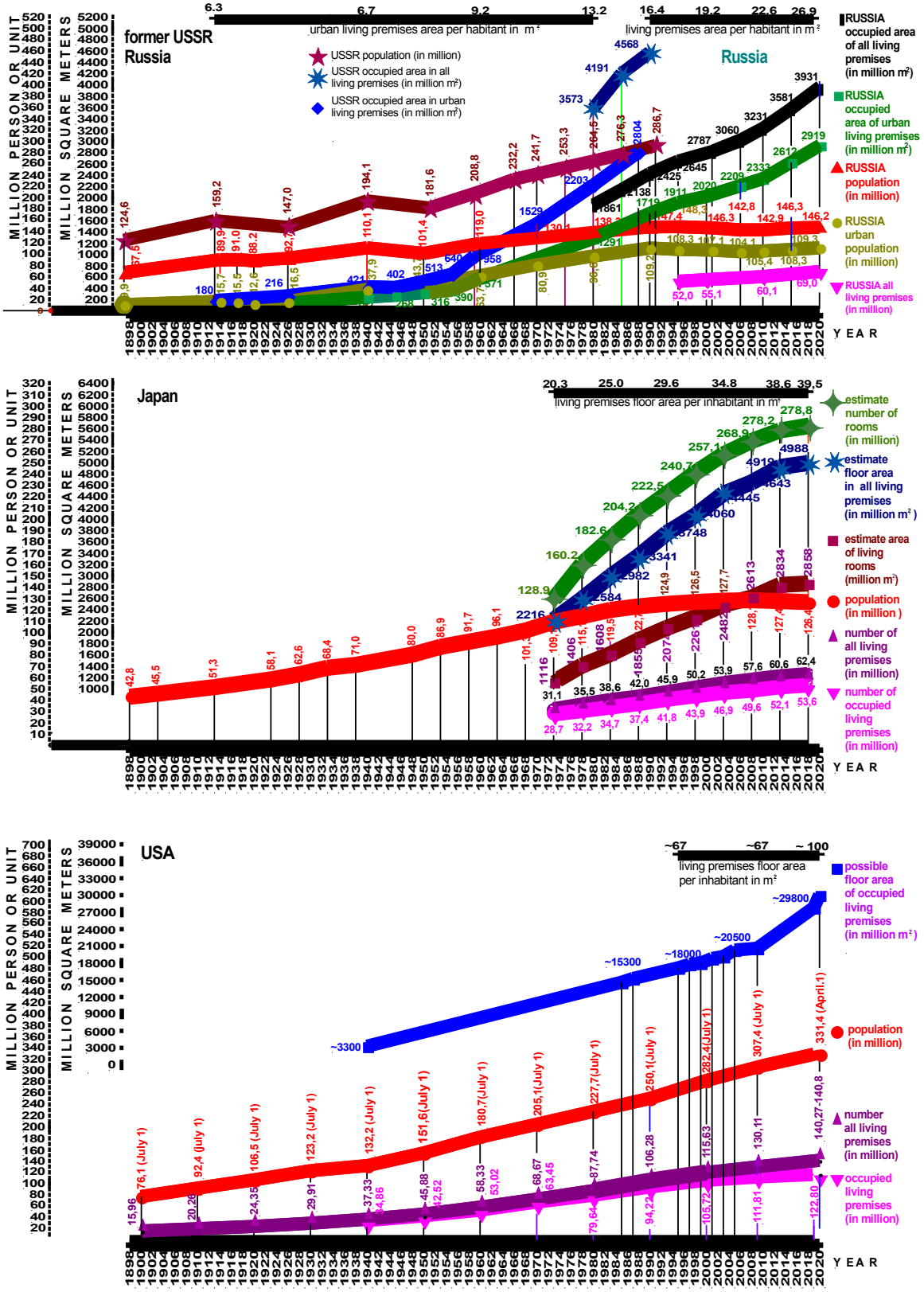

Figure 1.The development of the geometric characteristics of living premises on the background of the changes of the population of Russia (NHR, 1956-1990; RSY, 1996-2021), Japan (JSYB, 1940-2022), USA (SAUS, 1940-2012; USB, 2019).

2.3. The United States between the of city life and home in the suburb

The source of the demographic development of the United States of America was immigration. It is assumed that between 1800-1830 years **40 million people** left Europe, of which **30 million** went to America. Urbanization in America was very active. In 1860, America had about 9 cities with a population of 100 thousand, then in 1910 there were five times more (Cowan, 1997).

The small number of surviving ethnographic materials that provide a generalized description of the early settlements of the United States, due to the rapid urbanization that caused the massive disappearance of traditional dwellings, complicates the study of the evolution of the spatial image of American dwellings in the early years of colonization. Nevertheless, some of the geometric features of the living premises of a traditional Anglo-Saxon house, represented by a large living room with a fireplace, in which all economic activities were carried out, survived despite four centuries of intensive mass construction.

At the beginning of the 19th century, the spatial image of the dwelling in the American house was significantly different from the widespread in Northern Europe single-family log house with a gable roof and a stove in the middle, a characteristic dwelling of the first settlers. (Wilson, 2004). Wealthy estates in the early 19th century built large estates with multi-story buildings reminiscent of Georgian villas, which later acquired features of federal architecture under the influence of classical French architecture (Jackson, 2010). The idea to solve the problem of housing for numerous migrant workers by creating specialized housing based on the ideas of Charles Fourier and Robert Aries did not take root in the US either.

The second type of the American dwelling was multi-apartment high-rise housing, which differed little from the port buildings of Amsterdam and London. The Tenement Buildings Act 1867 required that buildings, in addition to an elevator, have fire escapes and at least one toilet for every 20 occupants, and, if possible, be connected to the city's sewer system. However, many apartment building owners did not comply with the law, so it did not have much of an effect. The historic tenement that was home to an estimated 7,000 people from over 20 nations between 1863 and 1935 located in 97 Orchard Street, which consisted of 22 apartments, had windowless living rooms.

The fire of 1871 in Chicago showed the flaws of high-rise buildings, but the geometric characteristics of the living quarters were sufficient to serve as rental housing for constantly arriving migrants. They could continue to adapt to such living quarters if not for The Tenement Buildings Act 1879 prohibited the construction of this type of building, requiring all rooms to be open to the street, backyard, or ventilation shaft so that the tenants could leave the building for the emergency situation. This led the owners to develop "the dumbbell" apartment building, which also proved to be economically ineffective for the growing number of rental dwellings. The new Tenement House Act of 1901 eliminated the type of such dwelling and required buildings to have running water, gas, light and ventilation.

In the United States, the importance of information about the distribution of the population and the development of its socio-demographic characteristics was realized after the 1790 census. However, the questions of establishing the number and types of living premises were relevant only after the First World War, when the living conditions of the population its worse.

The United State census1920 was able to determine important demographic characteristics of the population and establish the number of dwellings. For the first time, information has been obtained to determine whether housing units are owned or rented and it’s free from mortgage. Questions related to the equipment or the number of rooms were not established (SAUS, 1920).

The economic crisis called the Great Depression, which started at the end of 1929, contributed to the expansion of the indicators described the economical aspect of the population in the census, conducted by the Census Bureau from April 1, 1930, which made it possible to collect data on a fragmentary description of urban dwellings, among 64 large cities and didn't concentrate on the other of living premises (SAUS, 1939).

During the First World War, the middle class strengthened financially and was able to improve living conditions. From 1920 to 1926, the number of non-farm houses built increased almost 3.5 times,

while the construction of apartment buildings accounted for almost half of the dwellings under construction. The new wave of migrants in the 1920s had a higher level of qualifications and sought to stay in cities.

From 1920 to 1930, the populations of New York and Chicago, where migrants accounted for a third of the population, increased by **20%**, while major industrial cities such as Detroit grew by **57,9%.** By the early 1930s, one in ten Americans was an emigrant. Previous influxes of migrants were generally fairly evenly distributed throughout America, filling small businesses associated with small-scale manufacturing, retail trade and agriculture with labour. The average household size was **4,2** people. However, no significant changes were observed in the rather low density of residence, since the number of urban households per housing unit from 1920 to 1930 decreased slightly from **1,35 to 1,33** (SAUS, 1940).

The massive purchase of cars by wealthy households has spurred the construction of summer cottages in the suburbs, which quickly evolved into multi-room pitchforks. At the same time, in the village, the technology of mass prefabricated timber construction saved farmers from the participation of architects, who found their application in the unique urban construction of 3-4 - story buildings with an average number of apartments, called "gardens apartments", which appeared on the outskirts of cities among small parks, and seemed an ideal place for workers and employees to live. The rapid rise in the value of land plots in city centers contributed to the search for the profitability of multi-story construction. Twelve-story homes with elevators, restaurants, public spaces and underground garages have sprung up in every major city in America and have had a huge impact on the growing demand for new quality living spaces. By the end of the 30s, the proportion of high-rise rear buildings under construction reached a third of all new construction. Until that time, multi-apartment construction did not exceed **10 - 20%** (Khayt, 1981).

The United States Census, conducted ten years later in April 1, 1940, established for the first time the number of rooms in living premises and their equipment. The gap in the quality of housing in metropolitan areas and rural area began to widen. More peasants lacked running water and sewerage, while many urban dwellings were equipped with multiple, bathrooms, individual staircases and lifts. The collapse of the stock market in the late 1920s halted the development of large living premises and led the government to introduce new minimum standards for floor area and equipment, in order to expand the availability of buyers when real estate prices changed, which forced some large apartments to be converted into smaller ones, giving an opportunity for development mortgage lending The introduction of new geometric and engineering standards has developed the industry of mass-produced building products, which has allowed lower prices for home equipment, which bridged the gap in the quality of living spaces (SAUS, 1940).

From 1920 to 1940, the urban population of the United States increased from **51,2% to 56,5%.** The populations of Chicago and New York increased from **2,7 and 5,6 million** to **3,3 and 7,5 million** over two decades. At the same time, the share of the population employed in farming decreased to **23,2%**. The main source of the increase in the urban population was the influx of migrants. The economic crisis of 1930 had a negative impact on the demographic development of the country. In the next decade, the rate of population growth in the United States was more than half that of the previous one (SAUS, 1950).

The 1940 census found that in USA were **37,325 million housing units** (urban **21,616 million** and rural **15,709 million**) for **34,855 million** permanent housing households, which meant that about **5%** of housing units were unoccupied. That census did not determine the area of housing units. All characteristics of dwellings were based on their median number of rooms. For 1940 census it was **4,73** (SAUS, 1955, tab. 976). If we assume that the average minimum size of a dwelling unit built with this number of rooms in the pre-war period in the US could be about **88m^2**, then the total area of a US living premises in 1940 could be about **3300 million m^2**. Figure.1.

It can also be assumed that the average housing supply for the **132,2 million people** living in the United States in 1940 could be close to **25 m^2 per person**. The credit for this high housing supply was due to the transformation in housing construction that took place after the Great Depression,

which forced housing to be seen as a subject of credit policy and a source of household financial capital accumulation.

Japan will achieve such an indicator of housing security in the 80s, when there had been improved the credit system and provided construction with a stable supply of land, after the global economic crisis of 1973. Russia should have been also had to overcome a number of economic crises and undertake significant social reforms in order to achieve such housing security in 2016 (SAUS, 2018, tab. 6.28).

However, with such housing provision, one in five US citizens did not have their own isolated room - **20.3%** (SAUS, 1955, tab. 976). In urban areas, the share of housing units in which household members were forced to share a room with others was **15%** and was slightly better than in housing units located on farms, where it reached **30,4%** (SAUS, 1944-45, tab.1000). The average number of people per housing unit in 1940 was **3,44** in the city and **3,64** in the countryside. Differences in the average number of rooms between urban and rural areas were small - **4,78** and **4,61** due to the high proportion of large single-family houses, the share of which in the city reached **44,8%** and in the countryside, where their area and number of rooms was less, maintained at **83,2%** (SAUS, 1944-45, tab. 999).

The 1940 census showed the persistence of differences between living quarters located in the city, outside it and farms. In the city, **73%** of living premises were equipped with gas stoves, gas cooking was **24%** outside the city in rural areas, and competed with wood stoves, the share of which reached **28,6%,** then **83,6%** of farm dwellings were used for this purpose a coal and firewood. There were similar differences with electricity supply, which reached **95,8%** in cities, **77,8%** in rural areas and **31,3**% in farms. The use of hazardous kerosene lamps remained at **20,2%** housing units**.** A central heating was present in **42,0%.** Plumbing and toilet facilities were absent in **45,3%** of all US dwellings (SAUS, 1944-45, tab. 1000).

The city was attractive because of the greater opportunity to find housing with private bathrooms, which 76.9% of housing units had. That comfort had only **10,6%** of farm dwellings. There were also fewer residential premises in the city with more than 6 rooms – **15,4**% compared to farms where their share was **23,6%** (SAUS, 1944-45, tab. 999). The compactness of the placement of buildings provided the city with the best engineering support with a wide variety of numbers of rooms in the country's housing stock. The compact placement of buildings provided the city with the best engineering support with a wide variety of housing stock in the country, which made it possible to consider renting a dwelling as one of the conditions for greater opportunities to find better-paid work.

The rental form of home consumption remained dominant in the beginning 1940. The share of own dwellings was **46,65%** in the country and **37,5%** in cities (SAUS, 1944-45, tab. 987). The rental form of dwelling spread mainly among multi-apartment buildings. The direction of investment in the skyscraper sector showed some advantages of their operation and contributed to the construction of multi-apartment buildings with a population of 10 or more apartments, which was **11,1%** in 1940, indicating a tendency for an increase in the share in subsequent years.

In the inventory description of US living premises, the determination of their area was initially complicated by the difficulties in determining their boundaries, due to the many auxiliaries and semi-open premises included in structural elements of housing units. This problem is also present in a significant part of the censuses of southern European countries (Dol, Haffner, 2010). Data on the area of some rooms in living premises helps to describe its distribution between the main and auxiliary rooms, which indicates the structural transformations that the dwelling is experiencing under the influence of social changes.

The lack of data on the structure of living premises, presented by area and its distribution between premises for various purposes, does not give us a detailed idea of their relationship with forms of ownership. However, the presence in the construction of various forms of properties, which the US government resorted to, testifies to the effectiveness of this approach. From 1933 to 1940, the number of housing units built annually in the United States increased from **0,093 million** to **0,603 million.** The share of multi-apartment housing supported by state-owned construction companies rose from

12,9% to **13,3%,** had been created the basis for further development of both the city and its suburbs (SAUS, 1946, tab. 880).

There is little statistical data on the geometric characteristics of living residential premises built before the start of World War II. The American city development model based on the analysis of the real estate market, proposed by representatives of the Chicago School (Burgess, Park), provided for a difference in the geometric parameters of housing units based on land values, which usually decreased in the direction from the centre of the metropolis, providing a wide choice of building types and searching for its better properties of living premises.

The early industrialization of US housing construction and the full mobilization of funds from various sources led to the emergence of a wide variety of housing, which has accelerated the increase in the housing supply in the country. Thanks to the description of the general characteristics of the dwelling in the 1940 census, the direction for further improvement of the dwelling in the country was determined, but the beginning of the war corrected these plans.

3. THE GEOMETRIC PARAMETERS OF LIVING PREMISES AFTER THE II WORLD WAR

3.1. From city communal room to the standard Russian apartment

Under the influence of the devastating consequences of the Second World War, the pace of demographic development of the countries changed. From 1940 to 1960, the population of Russia increased **1,08** times; USSR-**1,09**; Japan-**1,31** and USA-**1,36**. According to the latest estimates of Federal State Statistics Service, the population of the USSR lost **39,3 million** people, and that of Russia **19,8 million** people, which exceeds the loss of the entire European population in the First World War by almost two times, because of which one-fifth of the population was deprived of the possibility of full-fledged development. The population of the USSR from 1940 to 1950 decreased by **7%**, and of the Russia in that time by **9%**. The war turned **1,710** Soviet cities into ruins and destroyed **70 000** villages. It is believed that **25 million people** were homeless and forced to seek refuge in temporary structures or find shelter with other households. During the war period from 1940 to 1945, the area of living premises in the country decreased by almost **5%** (**from 421,0 million m^2 to 402,0 million m^2**). The social catastrophe forced to change the attitude of the authorities of European countries to housing policy. The leadership of the USSR was also forced to allow the population to build dwellings using their own funds and resources (Rosstat, 2020b).

In USSR, the mobilization of state, cooperative construction enterprises (without collective farms) with the attraction of funds from the population and with the help of state lending made it possible for the period from 01.06.1941 year to 01.01.1950 year was built **152,6 million m^2** area of living premises in, which by a fifth exceeded the achievement of the two previous five-year plans. Although the size of the financial participation of the population in the construction of dwellings in the country amounted to only -**29,6%,** it made it possible to significantly improve the living conditions of the part of the country's population that was in greatest need**% (**NHR, 1960, p. 613).

The construction of a single-family house during this period was allowed only according to standard projects developed in accordance with state standards established in 1938, 1944 and 1948 years, prohibiting the construction of living premises in which the total area of living rooms exceeded **60m^2**. Kitchens with an area of more than **8 m^2** it was not allowed to arrange in new houses. At the disposal of the population there were several hundred typical projects of residential buildings, but most of them did not take into account local traditions and real possibilities. Nevertheless, over the past ten years since 1940, the average area of living premises that comes to a resident of the country has increased from **6,7 m^2 up to 7,4 m^2 per person** (Ovsyannikov, 1982).

An important event in the development of the geometric characteristics of residential premises was the decision of the Soviet government to increase their area of living premises through the mass industrial production of standard apartment buildings by creating large industrial enterprises focused on the production of big reinforced concrete details with finished bathrooms and wall panels with windows and huge floor panels, from which the structural frame of a building can be erected in any

urban planning conditions (Resolution, 1957). Such industrial construction enterprises, focused on the rapid construction of 5-12 story buildings, made of large reinforced concrete panels, appeared throughout the country.

Soon, in the suburbs of large cities, districts built up with such houses appeared, with social service buildings, kindergartens and schools located close to them. From 1956 to 1980 (sixth to tenth five-year plan), **56,5 million** housing units were built, the area of living premises built during this period reached **2239,3 million m²** which meant that the average area of living premises under construction in multi-apartment buildings for 25 years was about **40m²,** bringing it closer to the parameters of a two-room apartment (excluding the volume of construction on collective farms). The concentration of building resources on multi-story urban construction has reduced the volume of annual construction of single-family individual houses located mainly on collective farm territories in the countryside to **2% (**NHR, 1980, p. 387; 1988, p. 152).

In 1980, the Central Statistical Office of the USSR carried out a complete inventory of permanently occupied residential premises in the country, which made it possible for the first time to establish their full size, which amounted to **3573 million m²**. The population of the United States in 1980 was about **228 million people** and began to approach the population of the USSR (**265 million people**), while the size of area of all living premises in the United States was almost **4 times larger**, although the number of housing units in both countries could been comparable if accepted take into account that the average area of a Soviet apartment at that time was about **60m²**. Figure 1.

From 1960 to 1980, the population growth rates in the USSR and Russia were **1,25** and **1,16,** respectively, which corresponded to the population growth of the United States and Japan, which increased by **1,26** and **1,24**. Population censuses conducted in the USSR in 1970 and 1979 made it possible to assess the consequences of housing policy, demonstrating that only in periods of the significant increase in the geometric parameters of residential premises, a positive impact on the demographic growth of the population can trace. Table 1. Such periods in these countries occurred in the late 50s and 80s before the political and economic crises of the 60s and 90s, which suggests a significant impact of social change on the change in the geometrical and demographic characteristics of housing.

An attempt to increase the number of housing units in the USSR by introducing a new housing design standard in 1971, which obliged to build the same type of apartment with a little bigger floor area in high-rise building in micro-districts throughout the country, regardless of climatic conditions or the size of the settlement, turned out to be ineffective. Compared with the period 1966-1970 in 1971-1976, the volume of construction decreased from **518,5** to **377,4 million m²** (NHR, 1988, p. 152; 1922-1972, p. 384). In addition, all building resources were directed to state building, which in 1976 was **77,9**% reducing the volume of construction performed by the population at their own expense to **11,4%.** The population lost the support of the state in the modernization of their living quarters. There was no running water in **34 million** urban households and **76 million** rural households. Only **12%** of the rural population had a bathroom and **7%** could use equipment that provided hot water to sinks (NHR, 1977, p. 411).

At the beginning of the 60s, the country's leadership thought it was possible to achieve by the 80s the goal of providing each family with a free apartment by expanding the state's construction of small-area apartments in multi-apartment buildings. Despite the fact that in the period from 1960 to 1980 the growth rate of living premises outstripped population growth by one and a half times, this turned out to be insufficient to provide a solution to the task, due to severe restrictions on the distribution of housing, which it did not take into account the development cycles of households. Annually, only a small part of the country's population could improve living conditions by relocating to new apartments, which became cramped again with the appearance of a new family or the birth of a child. In addition, the welfare and lifestyle of families have changed since the end of the war. The number of household appliances, cars and summer cottages has increased. More than thirty years of use of practically the same design standard supporting the mass standard construction of geometrically identical types of housing units ceased to meet the requirements of the population already at the end of the 70s, prompting the development of proposals for improving the Soviet laws of the housing construction (Kartashova, 1985).

In the USSR, in 1990, the growth rate of the housing stock over the decade increased by **27,8%,** which made it possible to increase the area of living premises to **4568 million m^2**, while the population grew by **9,3%,** reaching **288,6 million** (NHR, 1990, p. 67; p. 188). The five-year construction volumes during this period in the USSR and Russia were comparable to the construction activity in the USA and Japan, in which the increase in population was accompanied by an increase in the area in newly built housing units.

The methodology adopted in the USSR to distribute public housing on the basis of the average area per person led to the fact that the differences in the average density of residence increased, amounting to **16,0m^2** per person in the city, and **16,9m^2** in the village. In 1990, only one-fifth of the built area of living premises was built with the funds of the own funds of households or with the help of a government loan.

It was not possible to solve the housing problem that arose in the 19th century in the Russian Empire as a result of the industrial revolution, which caused a social reorganization of society with the help of the predominant development of state construction and the principle of distribution of living space according to the accepted standard of living. The geometrical parameters of the living premises did not correspond to the diverse lifestyle of the population. Housing policy in the USSR was based not only on the equalization of living conditions between town and country but also between the republics that retained socio-economic differences. From 1926 to 1990, the share of the area of Russian living premises in the housing stock USSR and the share of the urban population of Russia in the urban population in the USSSR decreased, respectively, from **81,2%** to **58,8%,** and from **66,2%** to **51,5%.** The policy of equalizing living conditions through centralized management had a negative impact on the state of housing provision in Russia and became the basis for the emergence of separatist sentiments among politicians. The adopted design system did not have sufficient operational statistical information to ensure the effective design of residential premises of various forms of ownership, taking into account the local features of the construction site on the vast territory of the country, which was one of the reasons for dissatisfaction of population with housing conditions leading to the collapse of the USSR.

A critical situation has developed with people waiting for better housing conditions. The new construction could only provide for a part of the population requiring resettlement due to the low average area, which did not allow for a separate sleeping room for households' members. In the 80s, **1,728 million families** and singles improved their living conditions, which meant about **1,68%** of their total number, taking into account persons living separately from the family. As of January 1, 1991, in the USSR, the number of families and singles waiting for a decade to receive a new apartment was **14,54 million** of which **9,456 million** were residents of Russia. This meant that in the beginning of 90s every fourth Russian household had a legal basis for providing new living premises (NHR, 1990, p. 191).

The adopted design system did not have enough operational statistical information to ensure effective design of dwellings of various types of property, taking into account the local characteristics of the construction site on the vast territory of the country, which was one of the reasons for the population's dissatisfaction with housing conditions and what was one of the internal causes of the collapse of the USSR.

3.2. In the way of improving the Japanese traditional detached living premises

After II World war, Japan politics managed to hold in implement real estate reforms aimed at developing state support for private investors by expanding the credit system and accessibility to construction sites. From 1940 to 1950, the population of Japan, despite wartime losses estimated at **1,7 million** persons increased by **16,5 million** persons. The end of the war caused a wave of Japanese influx into the country from the territories captured during the war. In 1945 alone, they numbered about **3,5 million** persons. Deprived of homes and land, they join into the households of relatives and fill the rented dwellings densely. (JSYB, 1955/56, tab. 6). The inventory of residential premises conducted on August 1, 1948 and September 1, 1953, together with the population census on October 1, 1950, made it possible to give a holistic view of the residential premises of Japan in the early 50s. Most of the housing units were located in urban areas, which, with the exception of **2%**, were

built of wood. Two-thirds of the country's housing units were housed in traditional free-standing residential buildings, of which more than **40%** were built during the interwar period. By the beginning of 1953, no more than **1%** of temporary shelters remained.

Table 1. Key characteristics of Japan's living premises after World War II (JSYB, 1955/56-1990)
*) 1950; 1) 1955; 2) living rooms

	1948	1958	1963	1968	1973	1978	1983
All living premises (million)	13,847	18,115	21,090	25,591	31,058	35,450	38, 607
Unoccupied living premises (%)	4,3	3,8	3,4	5,4.	7,5	9,2	10,11.
Resident population (million)	80,010	91,767	96,156	101,331	109,104	115,174	119,483
Owner in occupied living premises (%)	67	71,3	64,27	60,3	59,19	58,14	62,38
Average person on occupied living premises	5,78	5,07	4,56	3,96	3,51	3,25	3,09
Median number of rooms in occupied living premises	-	3,6	3,82	3,84	4,15	4,52	4,73
The average area of living premises(m^2)	-	34,22[2)]	72,52	73,86[2]	77,14	80,28	85.92
Tatami on person (m^2)	6.12[2)]	7,11[1)]	8,11	9,19	10,93	12 86	14.13
Detached single-family dwellings(%)	-	77,2	-	66,54	64,8	65,12	64,27
Average site area of detached housing unit (m^2)	-	-	196	238	275	280	282
Number living premises in started construction (million)	0,223*	0,413	0,761	1,291	2,030	1,754	1,331
Average area of living premises in started construction (m^2)	55,84*	57,47	55,93	64,76	75,07	83.182	81,56
Share of own living premises by use in started construction (%)	82,53*	55,82	44,38	45,55	40,16	47,29	35,99

Among the **7,210 million** cities living premises, every sixth of them were used for various types of commercial activities. Own dwellings accounted for **67%**. The proportion of households renting dwellings in public organizations had **7,5%.** Households living with other households, representing a form of communal living, accounted for a tenth of all urban households. The area of the rooms in the average dwelling was **17,1 tatami** (**62,4m^2**). On average, for each inhabitant in 1948-50 in Japan, the country accounted for **6,12m2 - 7,11m^2** of the room area. Such a size of living quarters and a similar housing supply (**about 6,0m^2 per person**) was in Russia in the mid-20s. A third of households occupied rooms with an average provision of less than **2,4 tatami per person** (**about 4,0 m^2 per person**). The ratio of the population and living quarters indicated that there were almost **6 people per one housing unit**. Table 1.

The government had seen the solution to the problem as urgently providing households with plots for private construction, therefore established the Land Conversion Act (1954), which created the Japan Housing Corporation (1955) focused on providing financial support to households and construction companies that build the houses for private owners and tenants. K Later, the need for regulatory and methodological assurance of the quality of residential premises in local communities led to the emergence of the Corporation for the Development of Local Buildings (1965) and the Corporation for Urban Development (1975), which focused efforts on finding and engineering preparation of land plots for the construction of multi-storey buildings. The creation of these institutions made it possible to transfer state management of construction to private companies with the aim of intensifying construction by looking for a closer match between the geometric type of dwelling and the economic possibilities of households (Mori, 1998).

Considering that two-thirds of the land plots for construction were purchased from private landowners, who had a wide range of shapes and sizes, it turned out to be impossible to apply the principle

of equal distribution among individual developers (Sorensen, 2000). Annual deliveries to the real estate market of plots with a wide range of areas provided a wide front of construction throughout the country, which affected its volume and allowed to further expand this range as the standard of living of households rises.

The pre-war practice of Japanese housing construction focused on the construction of individual houses by small teams of carpenters. Large private construction companies mainly erected public buildings. Government subsidies for the construction of multi-apartment buildings have helped reduce investment risks for them. In the period from 1950 to 1970, the number of housing units built annually in construction began increased from **0,223 million** up to **1,565 million units**.

From 1948 to 1958, the housing stock increased by almost **4,26 million housing units**, or 30%, and in the period from 1958 to 1968 by **7,5 million**, or **40%**. Active growth revives the activities of Japanese architects. Architects Kenzo Tange and Uzo Nishiyama were appointed as planners for the master plan to design the infrastructure and facilities for Expo 1970 demonstrating the new possibilities of metal glass, reinforced concrete and plastics construction. Cofounder of Metabolism Architecture, Kisho Kurokawa shows the possibilities of living in small **10m^2** capsules attached to a reinforced concrete shaft. Architect Tadao Ando places a four-room house with an internal atrium inside a plot area **65m^2** concrete box, proving that a modern Japanese family can adapt to a small living space, provided the necessary isolation of the rooms and saturation with modern equipment.

In 1963, in the housing stock of Japan, more than half of detached and semi-detached houses were located on plots from **31,4m^2** to **229,7m^2** (JSB, 1966, tab. 293). After 15 years, the average size of a plot of such houses was **280m^2**, while the share of houses built on small plots of less than **75m^2** was **12,8%,** and for large plots of **500m^2** or more – **12,3%** (JSYB, 1983, tab. 15-17).

In addition to active construction, significant support in improving the country's living premises was provided by the volume of reconstruction and modernization of old dwellings, which were not only refurbished, but also completed, which also affected the size of the country's living quarters. Among all the buildings built in 1970, the share of such buildings in the new construction started increased to **10,4%,** compared with 1960, in which it was **8,5%.** The average area of living premises under construction during this period increased from **55,7m^2 to 66,9m^2.** The share of own dwellings in new construction decreased from **82,5%** to **41,6%,** however, its impact on the average wealth in the country remained, as the own dwellings construction had reacted faster to an increase in the area of living premises with an increase in well-being.

In 1950, the average floor area in the own started construction living premises was **57,9m2** and increased to **94,5 m^2** in 1970, while most dwellings built for rent during this period changed their floor area from **38,8m^2 to 43,3m^2** (JSYB, 1955/56, tab. 93; 1971, tab. 141).The gradual expansion of the area of cities has allowed to increase the area of the plot for a detached house, which also allowed to increase the size of the dwelling in new construction. The gradual expansion of the area of cities allowed for an increase in the area of land for a detached house, which also allowed for a gradual increase in the size of housing in new construction, which was below the national average, but made it possible to find rent or own housing for young families more quickly.

Thanks to the improvement and modernization of individual construction technology, their quality has become higher than in apartment buildings that corporations began to build. Living quarters in their own houses were made using more durable and high-quality materials and had a higher level of finish and improved engineering equipment. The detached single-family house ceased to be associated with the traditional rural dwelling, which served as the main spatial image in the reproduction of dwellings in the interwar period. Thanks to the use of modern technology and adherence to modern stylistic cues, the appearance of single-family houses could now compete with the multi-unit high-rise rental buildings that appeared in all major cities.

A significant part of the rental housing oriented to low-income households was built using state support from local authorities which their share from 1965 to 1970 increased slightly - from **5,7% to 6,7%.** The activities of the housing corporations in the country's housing construction began to gradually decreasing. In 1970 they achieved share to **14.3%** of all constructed housing units, having fulfilled its main mission in improving new construction technologies among private investors. Between 1965

and 1970, the share of wooden residential buildings construction decreased from **49% to 41**, while the share of metal structures increased from **18% to 28%,** without diminishing the role of the use of reinforced concrete technologies (JSYB, 1971, tab. 140). By the beginning of the 70s, the appearance of Japanese cities and dwellings had changed not only in appearance, but also inside changing the dimensions, shape and composition rooms of living premises rooms.

The desire for the construction of multi-apartment buildings equipped with modern equipment was also reflected in the improvement of the engineering infrastructure in low-rise building areas. Delivery of water inside the dwelling through water pipes was available in one in four out of five premises in Japan. Two-thirds of the living quarters were equipped with bathrooms. The number of housing units that had premises for commercial activities amounted to **19,5%** due to a decrease in the number of households employed in agriculture. The inventory has established a significant difference in the use of living premises of different properties. As a rule, larger households were located in their own living quarters. Owned dwellings were occupied by households with an average size of **4,4** people, while rental dwellings were occupied by households with an average size of **3,5** people. Self-employed households and business executives were located in rooms with an average area of **30,95-34,32 tatami** (**about 51 - 57m^2**), while among the periodically employed persons, the rooms area was **11.73 tatami** (**about 19m^2**) (JSYB, 1973/74, tab. 302). It seemed that the differences in living conditions would be gradually smoothed out as the volume of construction increased. However, the prospect of a close solution to the housing problem in Japan was held back by the oil crisis of 1973, which began on October 17, 1973.

Japan had achieved an average annual economic growth of **11,8%** in the second half of the 1960s thanks to industrial reconstruction efforts and active investment in new technologies. However, the international currency crisis of 1971, which was the result of global changes in the economy, and the oil crisis of 1973 led to a decline in GDP. It was possible to get out of the crisis quite quickly thanks to tax cuts and a change in the direction of industrial production to high technologies (lazarev, 2002).

The sharp rise in prices for energy carriers during the crisis did not change the orientation on the balanced development of residential premises in different geometric types of buildings, but withdrew public investment from the housing sector. The privatization of residential premises has deprived local authorities of the ability to regulate the cost of housing on the market with the help of low-budget construction, creating conditions for a rapid rise in prices, which has almost tripled from 1977 to 1988 (Matsumoto, 1988).

In the period from 1973 to 1974, the number of housing premises in housing units built annually in construction began decreased by **2,030 million to 1,472 million**. The average area of living premises under construction during this period increased from **75,1m^2** to **77,5m^2**. The share of own dwelling in new construction rose sharply from **40,2%** to **51,7**%. The sharp decline in construction volumes also intensified the volume of reconstruction of residential premises, which reached **13,5%** in 1974 (JSYB, 1976, tab. 143). State resources aimed at supporting the rental form of residence, compared with the growing influx of financial resources in own housing, might be reduced. Concerns about the reduction in construction volumes and its impact on housing supply have led to the need to evaluate living conditions according to the geometrical standard.

Comparison of indicators in 1968 and 1973 indicates a change in the geometric characteristics of residential premises. The growth rate of the number of living premises remained quite high. During the period from 1973 to 1983, their number increased by **10,9 million**, which was **35%** of the increase. However, rising property prices reduced the share of owners from 1968 to 1973 from **60,3%** to **58,1%,** which also affected the share of vacant dwellings, which was from **5,4% to 7,5%.**

Before the crisis in 1968, the average floor area of living premises was **73,86m^2**, which allowed us to assume that the size of the area of occupied residential premises was about **1787,3 million m^2**, increasing the average provision of living premises floor area for the population to **17,6m^2 per person**. Almost half of the area of the living premises was occupied by living rooms area, the average number of its increased to **3,84** rooms with the average area of one room was close to **10m^2** (JSYB, 1973/74, tab. 300). The proportion of living premises placed in the detached single-family dwellings in 1968 had consisted **66,5%** (JSYB, 1975, tab. 23, 308; 1995, tab. 17-3).

After the crisis in 1973, the size of the area of occupied living premises was about **2579,6 million м^2**, by increasing the average provision of living space for the population to **22,4m^2** per person. In the country, there were about **6,7%** of living premises with an area of less than **20m^2** and **3.6%** with an area of more than **200m^2**. At the same time, living premises with an area of living rooms up to **14.8m^2** accounted for **5,9%** and with an area of more than **99.2m^2** - **4%.** The distribution of living premises by the number of rooms had the same wide range of indicators. Living premises with one living room accounted for **5%** and with 7 or more rooms **17,3**%. By this year, only **15%** of housing units built before 1945 have survived in Japan, which suggested that the living premises with small areas and room size prevailed in pre-war buildings and more spacious living premises were in detached buildings, which proportion increased to **65,1%.** The plots with an area of less than **50m^2** where single-family houses were located were **5%** and more than **1500m^2** - **2%**. The living premises needed constructive improvement, since **3%** has solar insolation for an hour, **9%** needed an individual water supply and 17% a room with bath tube (JSYB, 1980, tab. 306; 1981, tab. 7, 314, 315; 1995, tab. 17-3).

Most methods for assessing the geometric quality of a dwelling are based on determining the necessary parameters of individual premises based on the living conditions of households of different demographic types. In the inventory of Japanese dwellings in 1978, two standards were used: the minimum, which reflects the area of the premises allowing the implementation of life processes depending on the age and gender of household members, and the average, which allows, in addition to the basic requirements, to implement additional processes related to equipment parameters. **The minimum standard** provided for the presence of bedrooms and a kitchen of **4,5 tatami** (**about 7,4m^2**) and **6,0 tatami** (**about 9,0m^2**) in size, with the condition of a certain placement of household members in them depending on gender and their age. **In the targeted standard,** the parameters of bedrooms and kitchens and places for eating have been expanded to **8 and 10 tatami**, along with a decrease in the age of children to allow them to be with others in the household **(**JSYB, 1980, tab. 312).

The 1978 census found that **9,5%** of living premises do not meet the minimum standard for the number of rooms and their area, and **32,9%** of the targeted standard. This meant that despite the fact that the average housing supply in the country demonstrated the possibility of each citizen settling in a separate small apartment, a significant part of the population experienced problems with living density (JSYB, 1980, tab. 312).

The second oil crisis in 1979 maintained real economic growth, however, in the second half of the 80s. in the period of export boom in the market value of financial assets of the population increased and they began using it for the sake of extracting purely speculative profits. Bank liquid funds were not directed to the development of new enterprises, but were used in real estate transactions (lazarev, 2002). Housing prices began to rise, which was reflected in a slowdown in the growth of population and housing units.

In 1989, housing units under construction reached **1,707 million** of which **63,6%** was financed from personal funds of which **28,5%** was for personal use of housing premises and the majority was channeled into rental dwelling investments. Households saw dwellings as more of a way to save money and increase income from future rent, so the area of private living premises in new housing unit constricted at the expense of private funds amounted to **68,2m^2**, while corporations, whose share in the total volume of new construction reached **30%**, began to produce expensive apartment with luxury living premises with an average area of **117m^2**. The share of state housing in new construction in Japan was about **1,5%,** and its influence was not enough to ensure the supply of cheap housing on the market when the price of real estate called the "Japanese price bubble" began to rise, which burst a three years later and the Japanese economy began to stagnate (JSYB, 1992, 6-49).

Before the start of a new economic crisis occurred in 1990, the pace of change in the geometric characteristics of the country's living premises began to slow down. The census recorded a population increase to the **122,783 million (**0,88 to 1989**)** people living in **37,595 million** households. The number of housing units was **42,007million (**0,58 to previous 5 year**)**, of which were occupied **37,413 million (**unoccupied **-10,9%)**. The average area of living premises was **89.29m^2** with an average number of rooms of **4,86**, which suggested that the area of occupied dwellings was about **3340,6**

million m², increasing the average living area provision of the population to **27,02m².** The proportion of own dwellings after slow housing construction, decreased to **61,3%** The proportion of detached single-family housing units decreased to **62,3%**, thanks to the growth of rental apartments in multi-family buildings (JSYB, 1991, tab. 2-1; 15-2 - 15-4). The proportion of households living in living premises with an average room floor area of less than **8,3m²** per household member remained high at **11,6**% (JSYB, 1991, tab. 15-11). The proportion of households living in dwellings below the standard continued to be **9.5%** and below the target standard in urban areas was **52%** and in rural areas was **71.3%** (JSYB, 1991, tab. 15-12). After the crises, household spending on payment for accommodation, furniture and equipment decreased by one and a half times. The costs of housing, medical care and recreation have become more significant.

The economic crises that arose in the period after the end of World War II had an impact on the development of housing in Japan, bringing a significant proportion of housing to the private sector. Initially, privatization ensured an increase in the housing supply of the population; however, after a decrease in the volume of public construction, rental forms of housing began to develop in the private sector, which returned the construction of housing to the system that developed at the beginning of the 20th century.

3.3. Towards to the own household living premises in the USA

Data on post-war housing in the United States were collected from the 1948 Housing Inventory and the 1950 Census. As with previous statistical surveys, the social and geometric characteristics of housing were collected and analyzed separately.

The casualties suffered by the United States in the Second World War amounted to about 1 million people (Chambers, 1999). Migration, economic recovery and pre-war government regulation of housing led to an increase in the population, which from 1940 to 1950 increased by **19,1 million people**, or **14,5%,** reaching **151,33** million people. Territorially, a significant part of the population moved to live in industrial areas of large cities in the south-western and south-eastern regions of the country.

During the war, American residential buildings did not suffer much. Only the volume of permanent construction among non-farm living premises almost halved reaching **0,142** million in 1944, and then it began to spread and achieve in 1950 to **1,396 million housing units** predominantly through the significant support of state-building (SAUS, 1951, tab.7, 849).

From 1940 to 1950 number of housing units increased from **37,325 to 45,875 million**. The number of occupied housing units changed from **34,855** to **42,520 million units** of which urban housing units increased from **59,1% to 65,9%.**

In 1940, in the United States, the share of homeowners was **43,6%** in 1950 rise to **55,0%**. In 1950, the city's share of homeowners in the country exceeded **50,5%** (SAUS, 1951, tab. 868). The growth of household incomes made it possible to actively acquire living premises in the property. Opportunities to invest in single-family houses have also increased.

The share of single-family houses in the whole country from 1940 to 1950 decreased from **63,6% to 62,5%** but increased in cities from **42,5% to 48,2%.** High employment in manufacturing, with more equalized incomes, has narrowed the range of rooms in a dwelling.

The median number of rooms in US living premises in 1947 was **4,85** with a median household size of **3,18** people.

In America at that time, households consisting of one person amounted to only **7,3%** and household with 7 or more people- **6,7%** The number of one-room apartments was - **1,8%** and with the number of eight or more rooms - **8,7%.** The structure of households differed significantly from the structure of rooms. The share of one-two-room apartments, as well as residential premises with 6 or more rooms, decreased by several percent in that two years, but it was enough for the average number of rooms in the housing stock to drop to **4,6** in 1950 (SAUS, 1949, tab. 936; 1952, tab. 868).

By 1950, the construction of smaller rooms increased the average income of a US resident to approximately **27,2m2** per person (SAUS, 1950, tab. 7, 895). Many countries of Eastern Europe (Poland, Latvia, Lithuania, Romania and Slovakia) will achieve such level of housing quality in 50 years later (Dol, Haffner, 2010). However, even at this level, America had **6%** of dwellings with more than **1,5 people** per room, **3%** of dwellings did not have modern kitchen equipment installed, **9%** lack of electrical lighting; almost half of living premises did not have central heating (SAUS, 1949, tab. 936; 1964, tab. 2).

In the first years after the war, the density of housing increased in all cities of the country, and the high birth rate, which peaked in 1955, provoked an acute shortage of housing. Growth in household income, coupled with compulsory loan insurance under The National Housing Act, The Veterans Health Administration and union requirements enshrined in The Davis-Bacon Act and Minimum Property Standards, have allowed a large number of families to become homeowners. Thanks to post-war prosperity that created the conditions for buying a new home, many American households were determined to get rid of their rental dwelling.

By 1958, about **5,3 million veterans** had received loans, of which **95%** went to expand housing. Thanks to these efforts, the share of owners of non-agricultural residential buildings from 1940 to 1970 rose from **41%** to **66%**.

In the current conditions of increasing household wealth, which allowed every American family to have their own car and the focus of housing policy on the development of single-family houses, urban areas expanded in proportion to the number of vehicles. In 1950, there were 3 people for every passenger car in the United States, and 2,500 people in Japan in that time. In the USSR, efforts were directed to the development of public transport, which influenced the formation of a unique post-war housing policy in these countries (Bunin, 1979).

Since 1940, the increase in the number of housing units in the next three decades was characterized by high growth (**17,8% - 26,4%),** providing an increase in the country's housing stock by 1.8 times, reaching in April 1, 1970 **68,043 million housing units**. Single-family housing units continued to be the most common geometric type of housing in the United States, reaching **69,1%** in 1970 (SAUS, 1982-1983, tab. 1349). By 1970, the average number of rooms in a US dwelling had grown to **5,0** (SAUS, 1980, tab. 1404).

In wartime, most homes were built using mass-production technology that was mastered during the war to create workers' dwellings that were densely located near defence industrial centres. In such a housing unit with an average floor area of **70m^2,** with equipped a built-in refrigerator, washing machine and TV, located on a small plot area around **500m^2**, it was possible to accommodate a family of workers or arrange temporary communal housing for individuals. After the war, they could be purchased into the property with a loan (Kelli, 1993).

For many residents, living in small houses built in the 40s has become unattractive compared to living in a multi-apartment, privately high-rise building located in the city centre. In addition to greater freedom of movement, which increased the chances of finding a job with higher earnings, children were more likely to receive a better education, so the surge of housing in the suburbs soon returned some of the population to the cities. The attitude towards multi-apartment housing depends not only on the price of an apartment or the possibility of acquiring it as property but is also determined by the way of life, which keeps the construction of multi-apartment buildings relevant for some modern households even today (Jansen, 2020).

In 1951, public construction reached **6,5%,** stimulating the construction of small single-family houses in the suburbs, whose share reached **82,5%** of all dwellings under construction annually. However, the financial capabilities of households increased, which contributed to the return of private investment companies to the construction of multi-apartment of higher quality, reducing the share of single-family houses in new construction in 1973 to **55,6%**. Public funds soon ceased to be used in housing construction, making it possible to bring higher quality single-family dwellings to the market at a higher cost.

The drastic change in the number of buildings under construction, caused in 1973 by the oil crisis, affected not only the automotive industry USA but also the properties of housing in new construction.

In 1972, there were **2,379 million** housing units in new started construction, but in 1975 their number dropped to **1,71 million** (SAUS, 1977, tab. 1325). After the crisis, new apartments and houses acquired a larger area, the number of rooms and equipment of engineering equipment, while maintaining the profitability of the construction sector, which greatly contributed to the financial preference for acquiring real estate as a reliable accumulation of funds.

The 1973 crisis gave birth to a new geometric type of living space, bringing its appearance closer to the urban villas of the beginning of the century. The average size of a dwelling in a single-family house under construction was **108,6m²** in 1955 and **157,5m²** in 1974. From 1970 to 1974, the share of houses with an area of more than **148,6m²** increased from **37%** to **47%**, and the share of dwellings with two bathrooms from **48%** to **61%,** with a garage from **58%** to **68%** (SAUS, 1955, tab.1213; 1975, tab. 1217). The home purchase policy has strengthened the urbanization process.

In 1920, half of the US population lived in cities, and in 1980, there was **73,5%**. The economic crisis also changed the attitude towards apartment buildings. Of all private investment this year (60,7 billion$), **82%** went to the construction of **2,084** million housing units, of which **42%** were multi-family buildings. It was confirmed that housing construction in a market economy during periods of economic crises focuses on the production of living premises of higher consumer qualities with a higher cost; therefore, the share of apartment buildings in private construction started in 1970, which amounted to **40,3%,** increased after the crisis to **44,5%** (SAUS, 2012, tab. 11).

Before the crisis, the construction activities of public organizations focused on the production of small apartment buildings with simplified engineering equipment, accounting for **96%** of all construction work started. After the crisis, government spending on the construction of such houses could not compete with single-family houses. Rising prices for apartments in high-rise buildings during this period increased the desire of most households to live in a separate building or to settle temporarily or permanently in mobile dwellings, the number of which in the United States increased from 1960 to 1979 from **0,767 to 3,770 million** units (SAUS, 1981, tab. 1372).

In the period 1950-1960, the growth rate of the housing stock was **1,27**. In the period of 1960-1970, due to crises, it decreased to **1,17**, in the period of 1970-1980 the rate recovered and amounted to an increase of **1,28** times, maintaining the figure until 1987. The stable growth of the housing stock allowed the wealthier part of the population to gradually acquire more spacious dwellings with improved engineering communications.

The share of own dwelling from 1960 to 1987 increased from **61,9%** to **63,9%** and the of detached single-family dwelling housing decreased from **77,3%** to **62,3%.** The average number of rooms in the housing stock of the US this period increased from **4,9** to **5,3** (SAUS, 1982-83, 1349; 1991, tab. 1282).

The average home area in 1987 was **153,5m²** (1653ft^2) among occupied housing units, and **75,9m²** (817ft^2) and **112m²** (1207ft^2), among seasonally occupied and vacant during the year housing units, the share of which increased to **11,5%,** indicating a gradual withdrawal of small area dwellings from the country's housing resources (SAUS, 1991, tab. 1182). The spatial image of the dwelling under construction was close to the existing one. In 1985 - 1989, the average area of built private single-family houses was **149-172m²** (1605 - 1850ft^2) which corresponded to the average five-room house located on a plot of **1578m²**, with three bedrooms, of which **87%** had more than two bathrooms.

In a fairly stable and wide structure of areas and the number of rooms that existed in the country's housing stock, the average household size, which decreased to **2,63** people in 1990, could purchase a dwelling of any size and number of rooms for which its budget allowed. By the end of 1990, the average living space of a US resident could be about **55m²** per person (SAUS, 1991, tab. 2, 61, 1182, 1281, 1282).

By 1990, the volume of sales of individual houses increased in relation to the sale of built ones by **3,5 times**, due to the active movement of households among the country's living premises, rising the

profitability of the market and growing the state budget. The success of the transfer of housing construction and operation to the private sector has demonstrated its economic preference, which has been reflected in the proliferation of privatization companies in other countries.

4. FEATURES OF THE LIVING PREMISES IN THE CONTEXT OF ECONOMIC GLOBALIZATION

4.1. The parameters of living premises in Russia during the period of privatization

The shortage of goods in the USSR grew along with an increase in the number of large state-owned enterprises, which, in the face of a changing lifestyle of the population, turned out to be incapable of rapid technological renewal and increased productivity. In the mid-1980s, in addition to a growing shortage of housing, the country experienced a lack of food, clothing, furniture, electronic appliances and household appliances. The undertaken social reforms in the distribution system of material resources led to the emergence of privileged social groups, causing discontent among the population, which manifested itself in the emergence of serious territorial conflicts, increased the desire of the leadership of regional centres for economic independence, which ended with the collapse of the USSR. At the end of 1991, on the territory of the former Russian Socialist Federative Soviet Republic, a new state was created with the name of the Russian Federation, which abandoned the centralized management of the economy and announced a return to the market, which involved the division of previously socialized real estate into separate private properties.

For these purposes, the Federal Agency for State Property Management was created in the country, which began a one-time voluntary and free legal execution of acts of transferring living r premises occupied by the population to private ones. During the first decade of the existence of the Russian Federation, almost half of the entire fund was privatized.

In the early years of privatization, a large number of small institutions, predominantly in the service sector, were almost completely privatized. Great difficulty was provided by the privatization of large real estate, represented by vast areas of agricultural, dacha and industrial lands, which were difficult to separate without destroying administrative ties. Nevertheless, already in the first years of privatization, part of the population acquired them as property. The funds of the first wealthy owners of small businesses were almost instantly used to improve their homes. Taking into account the unpreparedness of local authorities to issue land plots, the construction was concentrated on the reconstruction of dachas and apartments. Most communal apartments located in prestigious areas of large cities, after privatization, had been reconstructed into rental dwellings for new businessmen.

The growing demand for quality housing, driven by the need to accommodate numerous new domestic and foreign companies, was initially met through the refurbishment of apartments, and then through the construction of mid-rise residential buildings located in the centres of large cities. Soon, in the historical buildings of Moscow, in the area of the streets Ostozhenka, Bronnaya, Nikitskaya appeared housing in Western European style.

In the early years, the negative aspects of the privatization of industrial enterprises were revealed through the creation of joint-stock companies, which, in conditions of unprepared work in a market economy, led to their rapid bankruptcy. Given the high cost of building typical residential buildings, associated with high energy costs for their production, delivery and installation, they could hardly find a customer. In addition, the credit funds allocated by the state for their development, in the conditions of inflation in 2000%, turned out to be insufficient. Left without a state customer and the attention of foreign investors, most house-building plants and combines have lost their production function. The share of large construction companies (up to 50 people) decreased from **22437** to **17129** from 1990 to 1995, while the share of small ones increased from **48425** to **110660** (RSY, 1996, p. 436).

During the first years of privatization from 1990 to 1995, the number of housing units built annually decreased from **1,044 million** to **0,602 million**, with a simultaneous decrease in the area of living premises put into operation from **61,7 million m^2 to 41,0 million m^2**. The average living area in built apartments increased from **59,1m^2 to 68,2m^2**, mainly due to the increase in the construction of four-

room apartments with an average area of **99,7m²** built by individual developers (RSY, 1996, p. 236, p. 241, p. 458).

Privatization had a negative impact on the demographic situation of the country. From 1987 to 1993, the average population growth rate declined from **0,9% to 0,0%,** holding back the growth of the urban population. The number of births per 1,000 inhabitants of the country also decreased from **17,2 to 9,4**, while the number of deaths increased from **10, 7 to 14,5** (Rosstat, 1998, p. 33). At the beginning of the collapse of the USSR, the number of people who moved from the former republics rose to **408082** people and then began to gradually decline. The population leaving Russia reached **101506** in 1995 and then dropped in 2000 to **37411** (RSY, 1996, p.318, 319).

Due to the lack of data in the official statistical information of Russia describing the types of residential buildings, the number of floors, the number of apartments, it is possible to identify the impact of privatization on the geometric parameters of living premises only in general terms, which demonstrate an increase in the total area of living premises in the period from the 1991 - 1995 years from **2425 million m² to 2649 million m²**, despite the decline in construction production.

Table 2. Key characteristics of Russian living premises after World War II (RSY: 1996 - 2021)

	1990	1993	1995	1997	1998	1999	2000	2008	2010	2020
All living premises (million)	2425	2546	2649	2715	2745	2761	2787	3116	3331	3931
Resident population (million)	148,0	148,7	148,3	147,5	147,1	146,7	145,9	142,8	142,9	146,2
Average area of living premises (m^2/person)	16,38	17,13	17,86	18,4	18,9	19,1	19,2	21,82	23,31	26,9
Part of urban living premises (%)	70,93	72,1	72,29	72,44	72,53	72,47	72,48	72,21	72,2	74,26
Part of private living premises (%)	32,62	46,70	52,78	56,69	59,23	63,06	65,26	82,44	85,58	92,39
Part of private own living premises (%)	26,43	37,04	44,02	48,32	51,58	55,7	58,12	79,24	82,24	90,07
Constructed living premises (million)	1,044	0,682	0,602	0,430	0,388	0,390	0,373	0,768	0,717	1,122
Constructed living premises (million m^2)	61,7	41,8	41,0	32,7	30,7	32,0	30,3	64,1	58,4	82,2
Average area in constructed living premises (m^2/person)	59,1	61,3	68,2	75,9	79,1	82,1	81,1	83,4	81,5	73.3

Due to the lack of data in the official statistical information of Russia describing the types of residential buildings, the number of floors, the number of apartments, it is possible to identify the impact of privatization on the geometric parameters of living дl premises only in general terms, which demonstrate an increase in the total area of living premises in the period from the 1991 - 1995 years from **2425 million m²** to **2649 million m²**, despite the decline in construction production.

Significant changes have taken place in the country's ownership structure. Thanks to privatization, the share of private dwellings increased from **32,6% to 52,2**%, against the backdrop of a decrease in the share of public housing, which fell from **41,7% to 10,2%.** With the advent of the possibility of buying and selling apartments, the number of apartments sold to the population doubled, but their share of **0,4‰** of the total area of living premises in the country remained rather low and did not have a significant impact on the change in the ownership structure (RSY, 1996, p. 318, 319).

The desire to improve the quality of their own living premises, even in the conditions of the minimum funds of households, made it possible to increase their equipment in a short period. In 1995, the share of living areas with access to the water supply network increased to **71%**, sewerage to **66%**, bathrooms to **61%**, hot water supply to **55%** and modern electrical equipment for cooking up to **15%**. The engineering quality of living premises in the village has noticeably improved, where the provision of the water supply has increased to **35%**, sewerage - **24%**, bathrooms - **20%**, hot water supply - **12**% and modern kitchen equipment - **2%** (RSY, 1996, 236).

From 1990 to 1997, the number of construction companies increased from 70 thousand to **135 thousand**, of which **84%** were private. Poor equipment and a return to the economic method of construction led to a decrease in the volume of contract work in three times (RSY, 1996, 12.26-12.29). In 1990, **64,7 million m²** were produced in Russia, of which only **6%** of the produced area was built with the money of the population. In 1995, the number of built dwellings decreased to **32,1 million m²**, and the financial participation of the population in the construction of dwellings reached **22%**. The limits of the living premises, which for seventy years held back their size, were expanded. Only a part of the construction organizations that erected residential buildings for local governments and state-owned companies adhered to the geometric restrictions established by law in the design of dwellings. The freedom of redevelopment of apartments in old pre-revolutionary buildings and the reconstruction of temporary housing on former summer cottages stimulated their qualitative change but did not contribute to the growth of residential space, which almost halved from 1990 to 1995 compared to the previous five-year.

The economic crisis in 1998 that broke out in the country turned out to be another social shock. Economic problems in the country arose as a result of an inept credit policy aimed mainly at increasing government spending in the condition of artificially supporting the domestic currency. The decision of the Central Bank of Russia to switch to market regulation of the rouble exchange rate led to a new depreciation of the savings of the population. The economic situation of households had a negative impact on the decline in annual population growth, which decreased from 1997 to 2000 from **147,5 to 145,9 million** people, with a simultaneous decrease in the growth rate of the number of occupied residential premises in the country's housing stock, which, compared with 1990-1993, decreased by almost **1,7 times**. Table 2.

The crisis had a negative impact on the reconstruction of residential premises and the growth rate of the area of the housing stock, which by the beginning of 2000 had decreased from **30,3% to 13,0%**. A significant part of the enterprises lost orders for the construction of apartments in small buildings. The salvation of the companies was private orders for the construction of large residential complexes. Just as in New York the construction of the Empire State Building was able to level the negative impact of the Great Recession, so in Moscow, the emergence of large residential complexes: Scarlet Sails (48 floors, area 101 thousand m^2); House on Mosfilmovskaya street (52 floors, area about 60 thousand m^2); Triumph Palace (57 floors, an area of about 160 thousand m^2) were a means of overcoming the crisis. The construction of these complexes was focused on the wealthiest segment of the population, able to buy such apartments, so a third of the residential units built-in 2000 in Russia had an area around **120m²**.

After the 1998 crisis, housing construction gradually recovered and its volume for sale had increased. In the conditions of preserving the state geometric standards that were used in mass Soviet development, many of the surviving house-building enterprises returned to standard construction using Western European construction equipment. The exterior and interior decoration of residential premises has improved, but their geometric parameters have not changed significantly.

A decade later, the Russian Federation found itself in a global economic recession that engulfed world trade in 2008, which complicated the conditions for foreign investment, borrowing financial resources, led to the devaluation of the rouble and a decrease in construction activity. This crisis was also overcome by the construction of more costly facilities. In Moscow, such an object was a large residential complex of business class «Zilart» (area 1.5 million m^2. with an average number of storeys of buildings 15), which allowed the return of the principles of block development, rejected in the Soviet period.

After the 2008 crisis, the concentration of housing stock around the capital intensified. In 1990, almost every 12 housing units cconstructed in Russia were built in Moscow. In 2020, every sixth newly residential building appeared on its territory. The average indicator of specific housing provision in Moscow is **19,6 m²/person**, significantly yielding to the Central and North-Western regions with housing provision of **28,1 m²/person** and **29,0 m²/person** (RSY, 2021, tab. 6.30).

According to the All-Russian Population Census for 2002 and 2010, the proportion of households living in communal apartments, individual houses, in which the number of people in the household exceeded the number of rooms, increased from **34,5% to 43%.** At the same time, the proportion of densely occupied living premises (the number of rooms exceeded the number of people in its) decreased. It could be assumed that in the urban population having the largest volumes of housing construction, the situation should have been better but the census of 2010 revealed that in Moscow, the number of families living densely for the last 8 years increased from **1,6 million** to **2,2 million**, although the number of families living in more spacious apartments changed a little from **0,512million** to **0,531 million** (Census, 2002, 2010).

In 2020, the volume of year housing construction reached **81,5 million m²**, while the share of public construction decreased to **2,0%** and individual construction increased by **48,4%.** About **70%** of residential buildings are built in cities. Housing privatization has increased the dependence of construction activity on cyclical changes in the real estate market. As a result, the share of construction of one - and two-room living premises, which was **54%** in 1989, decreased to **49,0%** in 2000, and rose again to **72%** in 2020. The high cost of apartments has returned the urban housing construction of Russia to the production of small-room apartments in multi-housing units buildings again (RSY, 2021, tab. 18.8 - 18.11).

The area of all residential premises in Russia in 2020 reached **3931 million m²** in which the number of residential units located in the rural area decreased by **25,7%.** In 2020, the number of one-room and four-room apartments increased and their share is **25,36% and 8,30%.** Over the past twenty years, the average number of rooms in living premises in Russia has remained unchanged and is about **2,2 rooms**. With an average household size of **2.6** people, it can be argued that mass multi-apartment construction has not significantly changed the geometric parameters of dwellings in which the population is forced to settle (RSY, 2021, tab. 6.31).

Throughout the privatization process, the state sought to limit the geometric parameters of residential premises in new construction. Active unauthorized reconstruction of apartments in multi-storey buildings, which threatened the structural stability of the premises and a striking difference in the geometric characteristics of residential premises built by foreign investors, which appeared in the first years of privatization, caused negative reactions from the population. The construction legislation (SNIP MGSN 3.01-96) adopted by the Moscow government in 1996 made it possible to increase the area of 6-rooms apartment in new construction to **109m²**, regardless of the type of house. in state-building. Later editions of the building legislation retained the lower limits of the parameters of living rooms (Building Rules 54.13330.2016). By the beginning of the 30s of the new millennium, the construction legislation of Russia expanded the possibilities for transforming the spatial image by separating the design rules for single-family and multi-apartment buildings, as well as introducing a new type of residential premises defined as "rented houses" (Building Rules 466.1325800.2019), which is supposed to be used for the construction of rental premises of households intending to rent such premises for a period of 1-10 years with different living comfort, determined by the ratio of rooms and the number of household members. The new Housing Code of the Russian Federation, effective from January 1, 2022, also focuses on preserving the geometric qualities of a dwelling, considering it as a material value of a society seeking to preserve the image of an apartment building in the city and a second dwelling outside it.

Three decades of existence of market relations have not changed the focus on creating an apartment in an apartment building and a country cottage. The information provided on the geometric characteristics of residential buildings indicates the preservation of the spatial image of the Russian dwelling.

The absence of regulations establishing the accounting procedure for the housing stock does not allow us to establish the number of empty quarters or individuals who own several housing units, but the need for their accounting will appear at the next stage of a housing evolution associated with the emergence of private rental housing units in privatized buildings, half of which were built before 1970, which can intensify again the process of uncontrolled reconstruction and unauthorized rebuilding in the historical high-rise environment of the city.

4.2. Principal geometric characteristics of living premises in in Japan after the 1990

The desire of Japanese politicians to reduce the volume of state financing of housing construction, which followed the structural changes in the country's economic policy, which came after the oil embargo, caused a gradual increase in property prices. In the major cities of the country between 1986 and 1991, prices for apartments and houses increased several times. The easy accessibility of the population to loans, confidence in the stability of their income, led to the accumulation of financial assets in dubious investment projects. Correcting the situation with the help of a sharp increase in the interest rate of loans led to the massive closure of banks and the complication of conditions for obtaining them, which was immediately reflected in a decrease in housing construction activity (Koo, 2014).

Table 3. Key characteristics of Japan living premises after Japanese financial bubble (JSYB: 1991 - 2021)

	1988	1993	1998	2003	2008	2013	2018
All living premises in housing unit (million)	42,007	45,879	50,246	53,891	57,586	60,629	62,407
Area of all occupied living premises (million m^2)	3324,5	3730,0	4035,7	4482,1	4642,8	4919,5	4988,4
Unoccupied living premises (%)	10,94	11,13	12,59	13,04	13,87	14,06	14,09
Resident population (million)	122,745	124,938	126,472	127,694	128,084	127,414	126,443
Owner in occupied living premises (%)	61,3	59,8	60,3	61,2	61,1	61,7	61,2
Average person in all living premises	2,92	2,72	2,52	2,37	2,22	2,10	2,03
Average person on dwelling rooms in occupied living premises	0,66	0,62	0,59	0,56	0,55	0,53	0,53
Dwelling rooms in occupied living premises	4,86	4,85	4,79	4,77	4,67	4,59	4,42
Floor Area in occupied living premises (m^2)	89,29	91,92	92,43	94,85	94,13	94,42	93,04
Floor Area of dwelling rooms in occupied living premises (m^2)	50,60	51,92	52,52	54,04	54,05	54,17	54,40
Area of living premises per habitant (m^2/person)	27,09	29,86	31,9	35,1	36,25	38,61	39,45
Area of dwelling rooms per habitant(m^2/person)	15,79	17,21	18,58	20,12	21,20	22,38	23,32
Share of non-dwelling rooms in occupied living premises(%)	43,33	43,52	43,18	43,00	42,58	42,63	41,53
Detached housing unit in occupied living premises (%)	62,31	59,21	57,53	56,53	55,35	54,89	53,01
Site area per dwelling total/owned-rented (m^2)	-/ 293- 130	-/ 295- 130	-/ 301- 135	296/ 296- 138	285/ 285- 134	281/ 279- 139	267/ - -
Number of new housing unit in started in construction (million)	1,685	1,486	1,198	1,160	1,093	0,980	0,942
Share of owned living premises in newly housing construction(%)	30,20	35,70	35,98	32,16	29,19	36,22	30,04
Area of living premises in newly housing construction started (m^2)	79,84	88,62	93,29	89,68	83,04	88,99	79,95

The number of housing units built in Japan fell from **1,707 million** to **1,370 million** between 1990 and 1991, causing a sharp increase in the average area of housing in new construction from **80,5m^2 to 85,6m^2**. Construction companies, in order to maintain production, have concentrated their efforts on meeting the demand of the most affluent customers who prefer living in a traditional home of their own. During the crisis of 1990, called the Japanese financial bubble, the share of housing units intended for own residence increased from **28,5%** to **32,5%** (JSYB: 1991, tab.6-49; 1993/94, tab.7-48).

In the mid-80s, a situation developed in Japan when a significant part of households became sufficient financial savings, which they directed to the construction of rental apartments. After the crisis, the situation changed, the price of rental apartments decreased, causing a decrease in the proportion of dwellings occupied by owners. In 1988, the number of housing units in which their owners lived was **61,3%.** Five years later, the share of people living in their own dwellings decreased by a record value of -**1,5%.** Table 3.

A sharp decline in the financial activity of private investors in housing construction was observed in 1991, but two years later its role as the main source of financing quickly recovered and reached **70%** of all funds allocated to improve the country's living premises. In the pre-crisis period, the share of housing units built in 1988 for personal use was **30,2%**. After the crisis in 1993, it increased to **35,7%,** which led to an increase in the average area of living premises in new construction to **88,62m2**. Table 3. In new construction, the area of dwellings built for occupancy by owners changed from 1988 to 1993 from **131m^2 to 137m^2**, and for rent from **47m^2 to 50m^2** (JSYB: 1991, tab. 6-49; 1996, tab. 17-8).

The crisis has affected the change in the geometric characteristics of the country's housing, increasing the number of housing units from 1988 to 1993 by **8,4%** and the average area of housing by **2,86%**, mainly due to the construction of dwellings for wealthy households. The average area of dwellings intended for personal use increased in Japan during this period from **112,08m^2 to 118,45m^2**, and in dwellings occupied by tenants living in modern multi-apartment buildings equipped with all necessary equipment, it remained practically unchanged, amounting to **38,96m^2 – 39,07m^2**. Local authorities, whose construction was initially focused on providing low-income families with small-sized apartments, did not change the scale of their activities during the crisis, which amounted to **2-3%** of the volume of housing built. The average area of living premises built by them during the crisis rose to **74.5m^2**.

Prior to 1990, the five-year increase in housing stock in Japan was about **6 million** housing units. After the crisis, the number of residential buildings built began to decline. Only in a period of some improvement in the economic situation that occurred after 2010, it begins to increase again. The reduction of more than 2,5 times in the rate of five-year population growth, which occurred between the crisis of the 70s and 90s, levelled the fall in the growth of the average housing provision in the country, which in 1993 amounted to **29,86m^2**. Despite the fact that the volume of new construction has declined, however, the country's housing industry has been continued to supply the market housing units larger than required. If in the period 1984-1988 for each new inhabitant of the country about 3 new housing units were built with a total area of **86,94m^2** per person, then in the post-crisis period there were built six housing units with an average area of **97,41m^2** for one new habitant.

According to studies conducted in the late 1980s among the population living with different average indicators of housing provision, the ratio of households to an apartment may change when the average housing provision reaches to the area of the minimum apartment. The apartment is 70-100 sq. meters for an average household of 2-3 people can change the structure of the dwelling, creating the prerequisites for the return to the dwelling of some functions that were transferred to the public sphere in the 19th century (recreation, leisure, education and work) (Kartashova, 1984). Therefore, in countries approaching the level of provision close to **30 - 40m^2** per inhabitant, the share of vacant or second dwellings is increasing quickly. In the conditions of Japan, this hypothesis is confirmed by an increase in the number of empty residential premises during the year, the share of which increased from **10,94%** to **14,09%** during 1988-2018. In 1993, only **8,4%** of dwellings were used by households as a second dwelling that they visited periodically (JSYB, 1996, tab. 17-2).

The size and structure of Japan's living area were significantly affected by the new economic crisis of 2008, caused by imbalances in international trade and corporate governance abuses, which again led to high household debt as a result of unjustified financial policies. As in previous crises, the volume of residential construction decreased from 2008 to 2009 from **1,093 million to 0,788 million units**, and the average area of living premises built increased from **82,9m^2 to 86,7m^2**. The private sector has reduced its share of financing from **90% to 87,6%**, although it has begun to invest in larger one-family housing. Under these conditions, the Japanese Housing Corporation increased the volume of housing under construction from **3,7% to 5,1%,** suggesting more comfortable rented living premises to the market.

Among occupied dwellings in Japan in 2008, the average living space increased to **94,13m^2**, and the average number of rooms decreased **4,67**, reaching the average living area per inhabitant of the country close to **36,25m^2** per person (JSYB, 2012, tab. 18-3, 4). However, the increase in the average did not reflect the slight deterioration in housing quality caused by the crisis. From 2003 to 2008, the number of households living below the minimum standard increased from **1,954 million** to **3,314 million**. The number of households living below the target standard in the city increased from **9,486 million** to **12,395 million** (JSYB, 2008; 2012, tab. 18-12).

The consequences of the crisis continue to affect the country's social climate. From 2009 to 2019, the population of Japan decreased from **127,5 million** people up to **126,2 million** The annual number of housing units started in construction increased from **0,788 million units** up **to 0,905 million units**. The attempt to bring larger dwellings to market increased the number of vacant dwellings in the country's housing stock, which increased until 2019. Construction companies were forced to reduce the geometric parameters of residential premises in new construction from **86,7m^2 to 82,7m^2** (JSYB, 2021, tab. 2-1, 10-7, 18-2).

The number of living premises under construction and their area continue to increase constantly, outpacing the growth in the number of new residents. In a shrinking housing market, construction companies are managing to stay active, building better and more spacious living spaces, in the hope that demand for them will increase in the future.

According to the 2018 census, Japan's housing stock increased to **62,407 million** living premises. The share of houses with a living area of more than **700m^2** and less than **49m^2** is declining, which indicates the emergence of a trend towards the unification of the geometric parameters of housing for a significant part of the country's population. In addition, the average area per inhabitant of Japan has approached **39,45m^2**, assuming two rooms, indicating that the amount of living space available in the country allows households to choose a different strategy in choosing living conditions, creating a basis for the development of private rent, which is likely to lead in the near future to an increase in the number and proportion of housing units located in multi-apartment buildings.

In 2019 managed to get rid of the negative consequences of the crisis, by increasing the volume of private investment, which reached **88,6%,** squeezing out state, cooperative or municipal construction. At the same time, the share of participation in the construction of private investment companies increased to **46,3%.** The reform of the decentralization of the management of the economic development of territories, which began after the crisis of the 90s, aimed at strengthening the power of the regions and the implementation of social programs at the expense of their own resources, is gradually being implemented. The shareholding of the Japan Housing Finance and Municipal Development Agency in new housing construction decreased to **5,2%** and **1,1%,** respectively. However, their presence in the housing market remains in demand.

Owning a home remains a priority for many Japanese households, although the proportion of dwellings built is declining in favour of rental forms of dwelling, which are affecting the reduction in the area of housing units created. The area of living premises built for own purposes in 2019 decreased to **119,0m^2,** and rental premises **to 47,4m^2** (JSYB, 2021, tab. 8-10).

Despite the fact that residential premises located in detached buildings continue to dominate the housing stock in Japan and their share dropped to **53,6%,** their average area increased to **126,63m^2**. After the crisis, the share of households living in their own houses varied in the range from **61,7% - 61,2%,** responding to changes in the real estate market, which is heading towards the development

of private rent. The share of households renting from private owners among all rental dwellings increased to **80%**.

The spatial image of the Japanese dwelling remains quite stable. From 1988 to 2018, the share of the area in auxiliary rooms in the floor area of the average living premises in detached housing slightly decreased from **43,33% to 41,53%.** The fairly steady upward trend in the area of rooms in the Japanese home may be due to the small size of modern rooms and the growing trend towards increased activity taking place in them.

Wood remains the predominant construction material for Japanese dwellings, although its share has decreased to **56,9%.** The structural elements of living premises had double-glazed windows - **28,9%**, solar panels-**7,6%.** Half of the dwellings are adapted to accommodate the elderly, access to the apartment bypassing the steps had **11,5%** of housing units, and **23%** of housing buildings had an elevator (JSYB, 2021, tab. 12-1, 12-8).

There is also a tendency towards convergence of the parameters of the areas of single-family and multi-apartment buildings. From 2013 to 2018, their area ratio decreased from **2,63 to 2,48**. The convergence of the area is also observed in own dwellings of different types from **1,84 to 1,71** and rented dwellings from **2,03 to 1,98**.

By 2008, the decline in housing prices allowed for a slight redistribution of dwellings, which made it possible to reduce the proportion and number of households living below the minimum standard and target standard to **6,68%** (3,324 million) to **42,8%** (21,259 million) (JSYB, 2016, tab. 18-2). In 2018 number of households living below the minimum standard and target standard to **6,59%** (3,532million) to **39,55%** (21,207 million) (JSYB, 2021, tab. 21-9) It can be assumed that in the near future the number of housing units and the area of living premises will increase at a variable rate of development while maintaining the traditional spatial image of the Japanese dwelling, represented mainly by a detached housing unit located on the site area, which the average dimensions in 2018 were **267m^2** for own house and **132m^2** for rent.

4.3. Parameters of living premises in the United States in last 30 years

The increase in interest rates, caused by the desire of the authorities to inhibition inflation and rising real estate prices, marked the beginning of the crisis in the US credit industry in the early 90s. The collapse of the USSR, which led to the formation of new states that moved away from centralized economic management, contributed to the emergence of new markets, which to some extent reduced the negative impact of financial instability on US manufacturing activity and demographic situation. The active extraction of real estate by banks from debtors stimulated the increase in the supply of the living premises at the secondary housing market led to a decrease in their price. During this crisis, presumably, about half the value of the Americans' real estate has been lost.

Between 1980 and 1990, the US population growth rate dropped to **9,8%**. The influx of population into the United States from Eastern Europe stimulated an increase in population growth and the proportion of migrants, which reached **12%** of the population in 2009. From 1990 to 2000 the population reached **13,1%** and again decreased to **9,7%** by the end of 2010 (USS, 2012, tab. 14). In the last decade, population growth in the United States has declined to **6,7%,** showing a slowdown in demographic growth.

The dynamics of growth in the number of living premises not corresponds to demographic changes. The maximum increase in the housing stock in the amount of **28,7%** was observed in 1970-1980, during the period of the country's transition to full private construction and the development of the credit industry. Between 1980 and 1990, the US number of housing units growth rate dropped to **15,7%** and decreased to **13,3%** in the period 1990-2000. In 2020, the US housing stock has declined 10-year growth to **7,8%.** Like many other industrialized countries, the United States entered a period of slowing population growth and construction activity (USS, 2012, tab. 11).

The areas that have emerged around the centers of large cities continue to be attractive for housing construction. The share of housing units located in metropolitan areas reached **84,5%** in 2020. The definition of a city in the United States changed in the 1950s and 90s. The largest increase in the urban population was observed in the period 1950-1960 when for the urban population it increased from **64,0% to 69,9%.** In 1990, according to the old definition, **75,2**% of the US urban population belonged to the urban population, and **78,0%** were under the new definition. Despite the expanded definition of the city in territorial distribution, in recent decades there has been an increase in the growth of urban population, which from 1990 - 2000 was **78% - 79%,** and from 2010 - 2020 increased from **80,3% to 83,0%** (USS, 2012, tab. 10).

In a developed system of financial institutions, the acquisition of real estate for many American households with a steady income is not difficult. The high area of the site and the living area of the single-family house built on it allowed for greater credit efficiency of banks, which stimulated their investment in housing construction of detached housing units, most of which were located in the suburbs. By 1987, **63,5%** of all US housing units were owned. During the economic crisis, the share of own housing increased to **64,20%** due to the increase in the share of single-family houses in new construction, which amounted to **82,84%** in 1991. As in previous crises, the increase in the lending interest rate in the 1990s caused a decrease in the overall volume of housing construction and forced construction companies to look for ways to increase the profitability of production. Between 1987 and 1991, housing unit construction started to decrease from **1,620 million** to **1,014 million**. Table 4.

Before crisis time the living premises in new housing construction increased in all key characteristics. From 1980 to 1987 in new privately owned one family housing the average number of rooms increases to **5,3** the average area increases to **163,9m^2** (1755ft^2) the share of floor area from **2400ft^2** and more increased from **27% to 37**%; four or more bedrooms from **20%-23%**; two or more bathroom from **73% to 83%.** Number of housing with two or more stores increased in that time from **31% to 46%;** with parking from **69% to 79%** with central air conditioning from **63% to 71**%, with traditional fireplace from **56% - 62%** (SAUS, 1989, tab. 1231).

The availability of easy credit made it possible to leave less-quality dwellings and buy better new ones. The proportion of vacant dwellings in housing stock in the USA in1987 rose to **11,46%** of which periodically or seasonally occupied dwellings were about **2,8%**. The average number of rooms in the housing stock reached **5,3** rooms with an area of **153m^2** (1653ft^2). The proportion of housing units with two or more bathrooms was **30,2%** (SAUS, 1990, tab. 1273).

In 1991, in new privately owned one family housing construction, the average number of rooms increases to **5,3** the average area increases to **175,6m^2** (1890ft2) and the floor area from 2400 ft^2 to **45%**; four or more bedrooms to **27%**; two or more bathrooms from to **87%**. Number of housing two or more stores increased in that time from to **53%**; with parking from **84%** with central air conditioning from to **75%**, with traditional fireplace from **63%** (SAUS, 1992, tab. 1231).

Given the high proportion of detached single-family homes and their average age, which in 2009 was 25 years, it can be assumed that the average residential unit in the United States, located in single-family and multi-family residential buildings during this period might be at least **150m^2**. If we take into account that the specific number of residents per dwelling in these years was **2,75**, we can assume that at the end of the first decade of the new century, the average housing provision in the United States could be **55 - 60m^2** per person. Such an average provision of a resident the US living area was almost one and a half times higher than in Japan and almost twice in Russia.

The 1991 housing stock responded by increasing the proportion and number of mobile dwellings, which reached **5,630 million** in 1991, or **6,0%** of all occupied dwellings (SAUS, 1993, tab. 1221). The relocation of part of the population to mobile dwellings reduced the proportion of vacant dwellings, which dropped to **10,75%** in 1995. Empty or temporarily occupied dwellings for the owner can represent one of the ways to improve the quality of living when they are used as a second home. They can also serve as additional rental income or be one of the ways the household accumulates material resources.

For the housing market, in which there is no participation of socialized or state property, empty dwellings also play the role of a price regulator. Sales of vacation homes or work-homes or rentals have

so far remained negligible in the US. It was only during the pandemic that the demand for temporary homes became noticeable. The growth in the number of second dwellings in household holdings contributes to an increase in the global mobility of the population, and is also one of the ways to solve the housing problem, in which the necessary change of dwellings caused by the life cycle can also be solved by regulating the number of own housing units.

After the crisis of 1991, the focus on the construction of single-family houses was accompanied by an increase in the share of own housing. The low density of development of the territory of the United States did not serve as an obstacle to the rather rapid expansion of the urban area and the gradual increase in the average area of plots for detached single-family houses.

By 2005, the share of living premises owned by citizens increased to **69,5%.** Growth in purchasing power and demands on the quality of dwellings has increased the proportion of temporarily unoccupied dwellings. Nevertheless, an analysis of living conditions in 2005 USA dwellings demonstrated the need to improve the quality of construction and design. Water leakage during the year was experienced by **8%** of living premises, and the presence of cracks in them was **5%**. Lack of public transport in the area of residence was experienced by **44%** of households. Noise in the street from traffic had disturbed **23%** of residents. A dangerous criminal situation was noted by **17%** of the surveyed families (SAUS, 2009, tab. 957).

Focusing on the desire of households to increase capital by investing in larger homes, the average living space in USA in 2007 year was **167,8m^2** (1807ft^2), and the average size of the plot on which they were located did not exceed **1457m^2** (0,36acres). The share of residential premises located in houses with more than 20 apartments, which usually have a common communication room, was only **6,8%** (SAUS, 2012, tab. 988, 990).

Table 4. Key characteristics of the USA living premises in the period 1987-2019 (SAUS: 1991 - 2021)
[1)] 2004; [2)] 2008

	1987	**1991**	**1995**	**1999**	**2001**	**2003**	**2007**	**2009**	**2019**
All living premises(million)	102,6	104,6	109,5	115,3	119,1	120,8	128,2	130,1	139.7
Unoccupied living premises (%)	11,46	10,94	10,75	10,80	10,79	12,35	13,6	12,46	12,1
Resident population (million)	242,3	253,0	266,3	279,0	285,0	290,3	301,5	307,0	328,2
Average person on occupied /on all living premises	2,67/ 2,36	2,71 2,42	2,73 2,43	2,71 2,42	2,68 2,39	2,74 2,40	2,72 2,35	2,75 2,36	2,94/ 2,34
Median number of rooms occupied	5,3	5,4	5,5	5,5	5,5	5,6	5,6	5,6	5,5
Median plot of occupied detached and attached unit Acr^2/m^2	0,39/ 1578	-	0,43 1740	0,38 1537	0,36 1457	0,36 1457	0,36 1457	0,27 1092	~0,2 ~772
Median floor area of occupied detached and mobile unit ft^2/m^2	1604/ 149,0	-	1732/ 160,9	1730/ 160,7	1737/ 161,4	1756/ 163,1	1807/ 167,8	1800/ 198,3	2301/ 213,8
Owner in occupied living premises (%)	63,5	64,2	65,0	66,9	68,0	68,25	68,34	68,4	64,1
Only detached unit/ detached, attached and mobile unit (%)	60,2	61,7/ 73,6	62,2	62,8	63,17	64,0 70,49	64..	65,36	61,3. 73.3
Number of new private owned housing unit started (million)	1,621	1,014	1,354	1,641	1,603	1,848	1,355	0,597	0,974
Detached living premises in new private owned housing unit started (%)	70,74	82,84	79,4	79,34	79,41	81,12	77,20	75,6	69,3
Median of floor area one family unit completed ft^2/m^2	1755/ 163,9	1890/175,6	1920/ 178,4	2030/ 188,6	2103/ 195,4	2137/ 198,5	2219[1)]/ 206,1	2135[2)]/ 198,3	2261/ 210,0

In 2007 newly built dwellings, **92%** had more than 2 bathrooms, **34%** contained more than **4** bedrooms, and **84%** had a garage or parking in front of the house. The country's living premises had water supply and sewerage in **98,9%** and it was equipped with electric stoves and ovens **58,2%** (SAUS, 2011, tab. 996). In addition to a wide stylistic diversity of appearance, the spatial image of the American cottage was enriched by a greater number of open and semi-open spaces: - **85%** of housing units had a balcony, patio or veranda; - **63%** had a garage or parking next to the dwelling. Almost half of the housing units had a dining room separate from the kitchen and common room (SAUS, 2011, tab. 997).

In 2008, the global economy experienced a downturn, causing unemployment to rise and credit to be cut off and banks to fail. Prior to this crisis, the number of new private dwellings under construction had been gradually increasing, reaching **1.355 million** housing units in 2007, two years later the number had dropped to **0,597 million** (SAUS, 2011, tab. 967).

As in the previous crisis, construction companies have seen their salvation in the supply of more spacious and better-equipped premises to the market, satisfying the need to increase the financial security of households. From 2007 to 2009, among all living premises increased from **128,2 to 130,1 million**, the share of unoccupied units dropped from **13,6% to 12,49**% of the total housing resources, of which **3,5%** were temporary using. Of the vacant dwellings, **57,9**% were owner-occupied and **27,9%** were waiting to be rented out by tenants. Typically, such premises had 3 or fewer rooms in a smaller area (SAUS, 2011, tab. 977, 979, 985).

Official US statistics initially focused on the description of the geometric characteristics of detached single-family cottages. Apartments in multi-apartment buildings, due to their small volume of construction and significant planning diversity, remained less illuminated, which makes it impossible to determine the total area of living premises in the country. The number of completed apartments in multi-family buildings decreased by 1.5 times, and their share with an apartment area exceeding **110m^2** decreased from **43% to 30%** from 2008 to 2015 (USD, 2015). The crisis also affected the number of single-family houses under construction. Preliminary data show that in October 2021, the share of single-family houses in housing stock in the USA increased and amounted to **81,14%**, and the share of one-story achieved up to **50%**.

The high share of construction of single-family houses has changed the structure of the country's housing stock. In 2009, among permanently occupied housing units, **65,36%** were located in detached buildings. If we add to this group also semi-detached houses or mobile dwellings, which also allow entry into the house from the owner's site, which distinguishes them significantly from multi-family buildings with internal collective communications, their share in the total number of housing units will reach **76,8%**.

After the economic recessions and period of recovery in construction activity among single-family homes began. Since 1981, the volume of housing construction of single-family houses has increased every 10 years from **9,792**; **10,984**; **11,842 million** units, but in 2011 - 2020 it's decreased to **7,451 million** units. The smaller number of new housing construction was offset by their larger area, which had increased the average area of living premises in the US housing stock in 2009 -2019 from **198,3m^2 - 213m^2** (median 2135ft^2 - 2301ft^2).

After the 2008 housing crisis, a significant proportion of Americans moved into rental housing. Of the **139,7 million** housing units that were available in the United States in 2019, the share of single-family homes fell to **61,3%** due to a decrease in the share of homeowners. In addition, many have begun to improve existing dwellings. The increase in the share of own single-family dwellings contributed to the intensification of the reconstruction of dwellings. In 2010, the conversion of a garage into a room took place in **1,1%** of living premises, the refurbishment of a kitchen – **3,7%,** a bathroom – **3,1%,** a change in the number of rooms – **2,57%** (SAUS, 2012, tab. 1003). The problem of finding new geometric types of residential premises has again become relevant (McGill, 2016; Schwartz, Tsenkova, 2022).

During the coronavirus pandemic, three out of five households restored and remodelled their living quarters (Renter, 2020). The reconstruction contributed to the improvement of the consumer qualities

of residential premises and increased the sales market. Among the **6,5 million** residential properties sold in 2020, only **0,103 million** were new.

As of April 1, 2020, the US Statistics Office has set the population at **331,449,281 million** and the country's housing stock at **140,266 or 141,183** (depending on the quarter**) million** living premises. Given the emerging trend towards convergence in the growth rates of the average residential space in the housing stock and new construction, which in the near future will stabilize and reach **230m^2**with an average number of residents of **2,3** people, it can be assumed that the average housing supply in the United States will soon reach indicator **90 - 100m^2 per person.**

Most living premises in the United States are well-appointed spaces. In 2019, only **0,4%** of housing units were not fully equipped with sewerage and running water, more than **50%** of housing units continued to be heated by gas and **40%** by electricity. The use of solar energy is carried out among **0,2%** of housing units. However, the average high floor area of living premises or sophisticated technical equipment of the American rooms does not represent the contemporary housing problem.

Today official statistics of the USA do not give a detailed picture of who occupies what premises and how many it has. It is known that in 2019 in the United States, **3,3% of households haven't a separate room for habitant**, proving the position that averages do not reflect the full diversity of reality. It is quite possible that a significant part of the housing provision of the population is close to the average and does not indicate an increase in polar differences characteristic of it at the end of the 19th century. Although the retentions in the USA housing stock of **5,3%** of one- and two-room in living premises and **11%** of 5 rooms or more are indicated of the existing problem of its quality today (USB, 2019).

The high level of housing provision in modern America creates the prerequisites for the formation of a trend leading to the fragmentation of private property, once represented by single living premises, into several separate real estate objects with various forms of their use. The transfer of production and consumption of housing to private ownership, which occurred in the second half of the last century in the United States, created the prerequisites for the appearance of a second home in the possession of households, which over time should be lead to a changing the geometrical characteristics of countries' housing premises.

Over the past four years, **40,5%** of American households have changed the location of living place. Only **11,8%** of households remained living in their homes in that time. It remains unknown how often the average American changes his place of permanent residence during his lifetime and how often he stays in temporary housing or retains his former home in his possessions in different places and countries (USB, 2019).

The reasons for the sharp increase in the area of residential premises observed in the last 5 years in new buildings with a large amount of engineering equipment, which significantly changed the geometric characteristics of the country's residential premises, remain insufficiently clear. However, the growing need for expansion of housing possessions by the population is undeniable, which requires a more accurate study of the relationship of their social and geometric parameters in future population censuses and inventories of dwellings. Compared to the American landscape two centuries ago, represented by large multi-room living premises, located in two-story solid stone buildings evenly scattered among large green rural plantations and k industrial enterprises, the modern US landscape is four-fifths represented by relatively small detached wooden houses which have been surrounding by a wide dense ring around the centre of the metropolis, in which the rest of living premises are densely snuggled to the high vertical communications of skyscrapers located inside huge city blocks. This direction of development, associated with the increasing of the diversity of geometric shapes of the dwelling while maintaining the traditional geometric image of the living premises in the near future, will be preserved in all the studied countries, despite the fact that their average area, size of the premises equipped with more sophisticated equipment will be rise.

5. CONCLUSIONS

A brief review of the collected information, presented by the results of censuses of the population and dwellings of Russia, Japan and the United States, made it possible to establish both common and special features in the development of their dwellings, namely:
- the geometric image of a dwelling that has developed over a long territorial and historical development has been preserved in each of the studied countries with characteristic features, which will continue to form the basis for the search for new local forms of housing units and housing possessions;
- the growth rate of housing provision caused by the technology of industrial construction that arose in the 19th century expanded the participation of all types of property in increasing the average housing provision of the population and ensuring a return to private homeownership that presumes increasing the number and area of the living premises in new housing construction on these countries in near future;
- expanding the diversity of the socio-economic situation of households in the context of declining demographic growth and growing average housing provision will increase the territorial mobility of the population, stimulate the need for information about the specific conditions of use of housing units, which create the basis for purposeful stable transformation of living premises in future.

6. DISCUSSION

Despite the amazing ability of the population to adapt to living in rooms with different geometric parameters, the development of industrial forms of housing has made it possible to increase the area, the number of rooms and engineering equipment of my modern living quarters. However, the mass reproduction of the existing geometric image of living premises in the context of expanding the purchasing power of the population did not allow solving the problem of balanced housing development. Neither America with high housing supply and mass production of large single-family buildings, Japan seeking to preserve single-family construction in dense urban areas, nor in Russia with the idea of mass production of small apartments in apartment buildings could solve the problem of quality improvement living conditions of the population.

In Europe, where the geometric characteristics of a dwelling are characterized by an extraordinary richness of forms and a broad socio-economic status of the population, the problem of eliminating overcrowding remains relevant. According to the housing statistics of the European Community, the average housing supply of the population in various countries is increasing High density of living in some reaches half of the housing stock, while in others it is ten times less. Even in a country like the United Kingdom, whose households are least at risk of poverty around **6%** of the population lives in conditions close to the housing deprivation. Every tenth European household spends more than **40%** of its budget on housing maintenance (Housing statistics EU, data extracted 2019). It is impossible to solve this problem without the constant improvement of statistical research methods aimed at a holistic and more detailed description of a dwelling understood as an inseparable unity of their geometric and social characteristics.

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