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Housing, Climate and Economy – The Regional Influences on the European Housing Space Standards

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Abstract

The paper studies the dwelling space patterns which are used as basic sources the housing standards and regulations. Research concentrates on the housing architecture of Europe. There are examined the dwelling standards of 31 European countries and 7 regions. The selected countries are grouped consequently according to climate and economy criteria as Northern, Central and South European countries, and as High Income, Upper-middle Income and Lower-middle Income countries. The study focuses on the growth of the minimal area of apartment and its connection with the climate and income. Research continues with the analysis of the minimal area of the habitable rooms. The climate and economical conditions directly influence to the overall size of the dwelling. On the level of room, there is influence to the size of the rooms, where the social activities are performed. The size of the living room, kitchen and integrate living space varies, meanwhile the double and single bedroom remains stable.

Keywords:	European housing; Dwelling standard; Climate, Economy, Regional influence
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1. Introduction

For every single society space standards may be different in size and by importance, which is given to one or several factors, such as the density of the dwelling occupation, cultural regulations, sanitary and health standards, economical and technological efficiency, sustainability and climatic conditions. Amos Rappoport stated, that in general on the level of the whole society the house form is not a result of an individualistic desire of a person, but it is a product of the common goals and values [1]. The averaged and socially approved house becomes the formalized mechanism of a social control of the lifestyle of the individual. The dwelling process is very conservative, and basic physiological living needs are not changing, or changing slowly.

According to Crowdhury, space standards can be expressed in a certain units and forms of measurements, such as sizes of a dwelling and a single room, room proportions and minimal width, relation of the size of dwelling and the number of habitable rooms to the number of inhabitants [2]. The level of comfort of dwelling or its overcrowding are measured consequently by lack or exceed of the extra space. The norms are different in each region and express the level of national wealth. Despite that the standards are the direct product of representation of basic human needs, in different cultures people may require different levels of privacy, different arrangements of rooms, insulation, heating and ventilation conditions.

The main method of the research is the analysis and evaluation of the set of legislation documents regulating the process of project and construction of dwelling in Europe. The paper deals with the general information on the housing design methods, which is established as a set of rules and guidelines on the level of the government of each country. Research aims to find the general trends of the minimal space standards in Europe and to identify the influence of the climate and economical conditions to the dwelling space.

2. Dwelling space and the living activities

There are several theoretical pre-assumptions regarding to the minimal size of the room. For the mono-functional place the attempt to define it was done in 1950 by Le Corbusier. He proposed a living unit with dimensions 2.26x2.26x2.26m, which hold only one function – bed, table, kitchen etc. Those containers could be attached to each other in order to create infinite number of layouts [3]. According to B. Leupen minimal dimensions for the social space in house are 4x4 m [4]. Bernard Leupen proposes 6 basic activities: working, sleeping, eating, cooking, bathing and getting together. Each of these functions requires a specific space and also has different importance for the human life.

In the "Timeless Way of Building" Christopher Alexander explains, that the quality of the place depends on the pattern of events that can happen there [5]. In house the room is an agent of the living pattern. The quality of building depends on the usual everyday activities, and the more events can happen, the more livable the place becomes.

For the present research there are selected 4 basic living actions – Cooking, Getting Together, Dining and Sleeping. The analysis of the dwelling standards proceeds towards the study on the minimal size of the apartment and continues with the analysis of the habitable spaces – rooms.

3. Selection of documents

Research aims to study the dwelling space patterns using as basic sources of information the housing standards and regulations. The building codes define the minimal standard of dwelling, which guaranties the minimal level of comfort and composition of habitable spaces in dwelling.

Research is based on the housing standards of 31 European countries and regions. For each document it is extracted the general information, such as region, the minimal size of the apartment according to the number of inhabitants, the minimal size of the kitchen, double and single bedroom, living room and integrated living space.

By the type of economy the selected countries are grouped according to the World Bank's Annual World Development Report, 2012 [6]. The classification is based on the gross national income (GNI) per capita (Figure 1). Within the selected countries there are three income groups:

- High-income economies – Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland
- Upper-middle-income economies - Belorussia, Bulgaria, Bosnia and Herzegovina, Macedonia, Russia, Serbia
- Lower-middle-income economies – Moldova, Ukraine

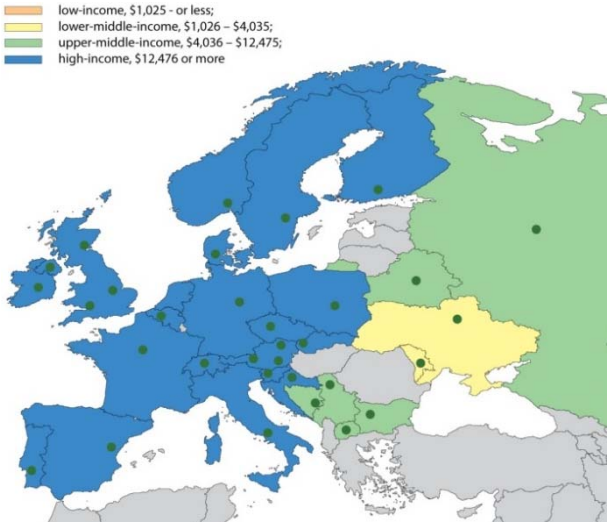

Figure 1. Classification of the economies of selected European countries according to the World Bank's Annual World Development Report, 2012

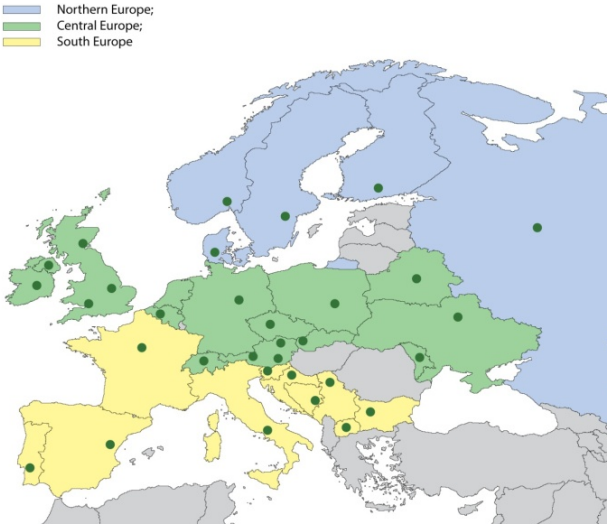

Figure 2. Classification of the climate of selected European countries according to the World Climate Maps Annual Average Temperature, 2007

By the type of climate countries are grouped according to the World Climate Maps Annual Average Temperature, 2007 [7]. The classification is based on the

annual average temperature prevailing on the territory (Figure 2). Within the selected countries there are three climate groups:

- Northern Europe – Denmark, Finland, Norway, Russia, Sweden
- Central Europe – Austria, Belgium, Belorussia, Czech Republic, Germany, Great Britain, Ireland, Moldova, Netherlands, Poland, Slovakia, Switzerland, Ukraine
- South Europe – Bulgaria, Bosnia and Herzegovina, Croatia, France, Italy, Macedonia, Portugal, Serbia, Slovenia, Spain

4. Minimal size of dwelling in European regions

On this level dwelling is analyzed as a single unit without any particular accentuation to its spaces and functions. The method is based on the consequent comparison of the growth of the dwelling size with the increase of the number of inhabitants. It is assumed, that the number of the habitable rooms is equal to the number of inhabitants. The variety of dwellings is ranged from 1-room till 6-room apartments.

The comparison between different climatic groups shows the consequent influence of the climate to the size of dwelling (Figure 3). The average minimal size of

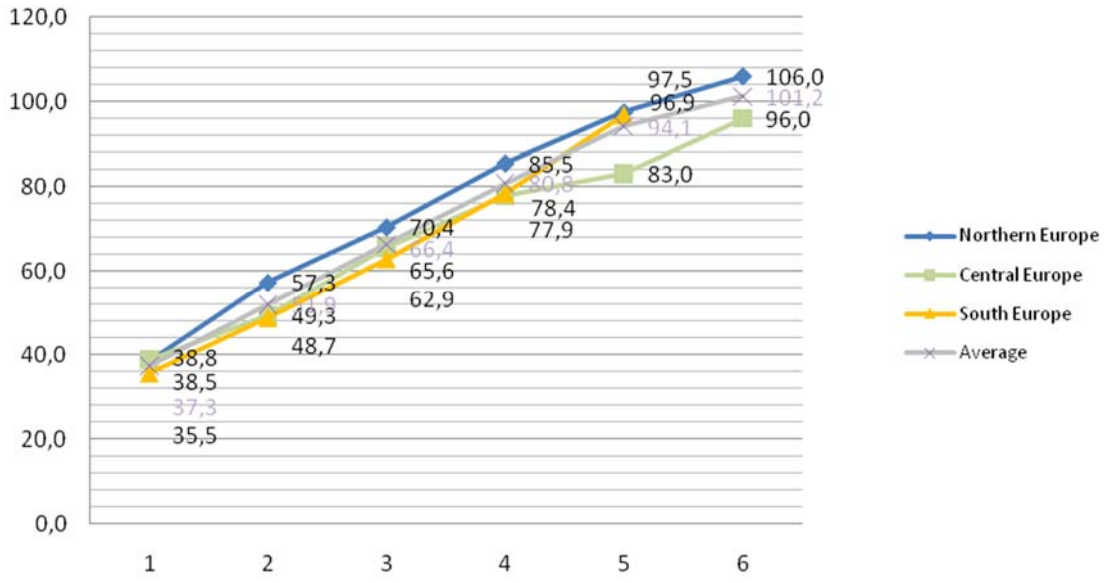

Figure 3. Average dwelling size (sq.m) for the different climatic conditions

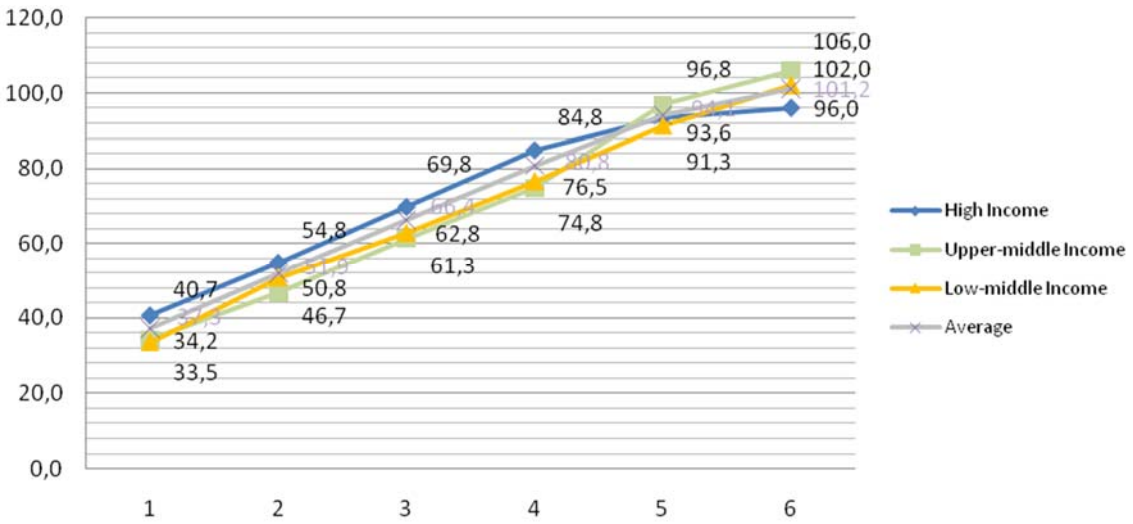

Figure 4. Average dwelling size (sq.m) for the different income groups

dwelling is significantly bigger in North European countries. The area of 1-room apartment is almost the same in all cases, but with the increase of the number of rooms the difference in total area of apartments is growing. The difference in size represents the influence of the climatic factors to dwelling and proves the pre-assumption given by A. Rappoport, that the climatical scale is a useful concept for defining the need in dwelling (Rapoport, 1969). The extreme cold climatic conditions mean, that people would stay more time indoors, therefore they may need more space in comparison with dwelling build in more soft conditions. The average difference in size between the apartments of Northern and Central Europe is 5-8 sq.m, between ones in Central and South Europe – 0.5-3.7 sq.m.

The average minimal size of dwelling defined by housing standards is significantly bigger in European countries with high income and the difference reaches 6.5-10 sq.m (Figure 4). The difference between two groups with upper and low-middle income is smaller – 0.7-4 sq.m. The area of 1-room apartment is bigger in the group with high income, which means, that the initial dwelling conditions of the smallest apartment in this group are better.

5. Minimal size of the habitable room in in European regions

This part aims to define the minimal area of the rooms, which are typical for every standard – kitchen, living room, single and double bedroom and "aggregate living space" – the combination of living room, dining and kitchen.

Size of the kitchen as separate space is defined in 15 standards. The data is presented for the one-inhabitant kitchen (Figure 5).

The kitchen area is significantly bigger in Northern Europe, which corresponds with hypothesis of A. Rappoport about the extra space, which is needed for the dwelling in sever climatic conditions. In the second group of analysis the size of the kitchen is growing with the decrease of income. The average area of the kitchen is 6.2 sq.m.

As functional space living room is mentioned in 26 housing standards, and in 13 it is given different minimal area of the living room for one and two inhabitants (Figure 6).

That the size of the living room for one inhabitant is 1 sq.m smaller in average, than for two. The living room for two inhabitants in Northern Europe is 1.5 sq.m bigger, than in South Europe, and 2.8 sq.m – than in Central. There is no evident consequences between the size of the living room and the level of income. The average size of living room for one inhabitant is 15.4 sq.m and for two – 16.4 sq.m.

Bedrooms are evaluated according to the number of users – for one (single and minor bedroom) (Figure 7) or for two (double and major bedroom) inhabitants (Figure 8). As functional space double bedroom is mentioned in 30 housing standards, and single – in 32.

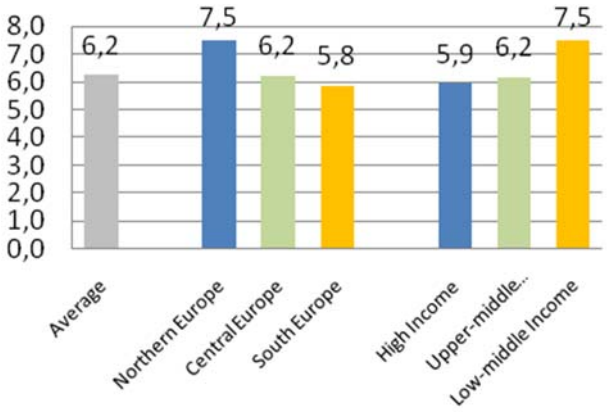

Figure 5. Comparison between the minimal area of the kitchen space for one inhabitant for the different income groups and for the different climatic conditions with the average European size, sq.m

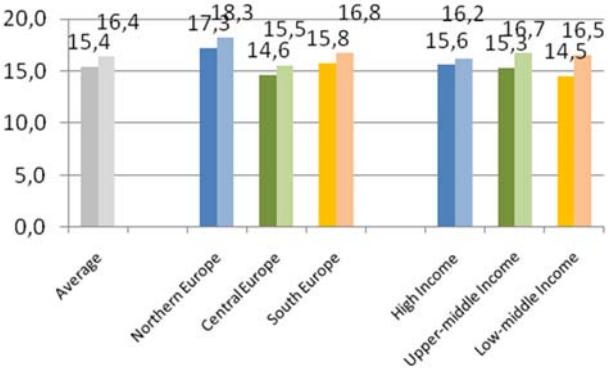

Figure 6. Comparison between the minimal area of the living room for one and two inhabitants for the different income groups and for the different climatic conditions with the average European size, sq.m

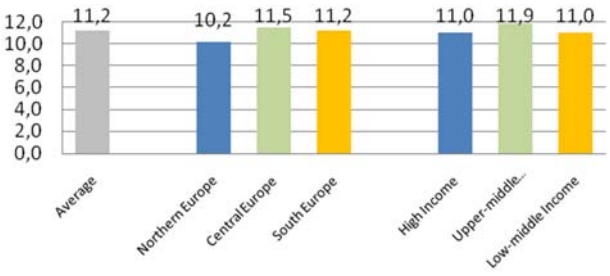

Figure 7. Comparison between the minimal area of the double bedroom for the different income groups and for the different climatic conditions with the average size in Europe, sq.m

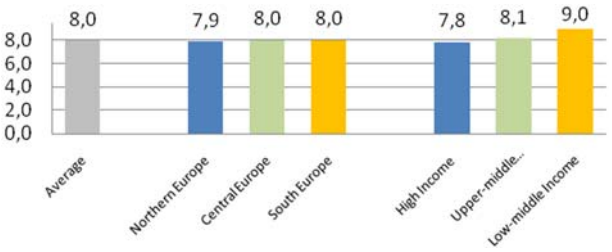

Figure 8. Comparison between the minimal area of the single bedroom for the different income groups and for the different climatic conditions with the average size in Europe, sq.m

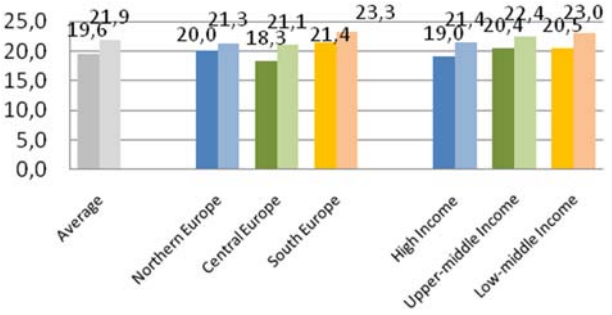

Figure 9. Comparison between the minimal area of the aggregate living space for one and two inhabitants for the different income groups and for the different climatic conditions with the average size in Europe, sq.m

From the presented figures it may be derived the conclusion, that climatic and economic conditions doesn't influence to the size of bedroom. That is connected with the fact, that bedroom as a space is projected in order to accommodate the fixed set of furniture (bed, wardrobe, chest of drawers). There is evident difference in sizes between double and single bedroom, which reaches 2-3.8 sq.m. The average size of a single bedroom is 8 sq.m and of double bedroom – 11.2 sq.m.

Size of the aggregate living space is defined in 24 dwelling standards. In 16 it is given different minimal area of it for one and two inhabitants (Figure 9).

The extreme climate conditions influence to the size of the integrated living space. Both the size of it in North and South Europe is bigger, than in Central. The influence of the level of income is different. The integrate living space in Northern countries is smaller. The difference in area of the space for one and two inhabitants is 1.3-2.5 sq.m. The average size of aggregate living space for one person is 19.6 sq.m and for two – 21.9 sq.m.

6. Conclusion

Within the comparative analysis of 31 state European 7 regional building codes standards there were distinguished the following regularities. On the level of dwelling among 38 European standards 15 established constraint regarding the minimal size of dwelling. The pattern of dwelling sizes is shaped by the range between the minimal 1-2 room apartments and maximal 1-6 room apartments. There is an influence of the climate conditions to the minimal size of dwelling: the area of apartments in Northern Europe is bigger, than in Central and South. There is an influence of the country income to the minimal size of dwelling: the area of apartments in countries with high income is bigger, than in countries with upper-middle and low-middle income.

In 36 European building regulations there are provided minimum dimensions for the particular rooms. 26 countries defined the minimal size of the living room, within them 13 established different sizes according to the different number of inhabitants. The average size of the living room in Northern Europe is bigger, than in Central and South Europe. 30 European countries defined the minimal size of the bedroom, within them 30 established separately different sizes of the main bedroom and second bedroom. There is no significant change in size of the double and single bedroom in different climatic conditions and income groups. 15 countries defined the minimal size of the kitchen, which area is bigger in the countries of Northern Europe. In the countries of high income group the size of the kitchen is smaller. 24 countries established the standard for the multifunctional "aggregate living space" – combination of kitchen, dining and living room. The area of the aggregate living space is growing together with lowering of the country income. The aggregate living space in Central Europe is smaller, than one in Northern and South Europe.

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