DEMOGRAPHIC SUSTAINABILITY AND SPATIAL DEVELOPMENT IN PORTUGAL

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According to the conceptual-methodological model "SUSTENDEMO" which is based on the systems approach to sustainable development, demographic sustainability encompasses two basic dimensions - quantitative and qualitative. This model has been applied in the study of the Portuguese territory in order to establish a typology of municipalities, which was achieved through factor and cluster analyses.

It was concluded that, according to the last Population Census in 2011, in 40% of municipalities, mainly in the interior of Portugal, demographic sustainability is no longer provided neither quantitatively nor qualitatively. In the second group consisting of also 40% municipalities, which are mostly located in the coastal zone and in the interior of the country, sustainability is guaranteed either by the natural, or by the migration component of the quantitative dimension, although the level of development of human capital in these municipalities is very weak. On the other hand, most of the human capital of the whole country is concentrated in the remaining fifth of the municipalities, with medium-size cities or located in the metropolitan areas, both on the coast and in the interior, so that these municipalities are demographically sustainable, particularly in terms of its qualitative dimension.

Keywords: *demographic sustainability, typology, spatial development, factor analysis, cluster analysis.*

INTRODUCTION

Scientific researchers and decision makers in the field of spatial development most commonly apply the systemic approach to sustainability. Under this approach, sustainability is equated with long-term equilibrium system consisting of interacting environmental, economic and social subsystems. However, in this approach demographic sustainability is interpreted in a very limited way (Thomson & Snadden 2002), that is as just one dimension of social sustainability. Since population is essential for the functioning of society and economy of any geographic area, demographic sustainability should also be considered one of the subsystems in the sustainability system (Lutz et al 2002: 6).

However, demographic sustainability is often conceived in a quite reduced manner, i.e., only in terms of population growth and the age and sex structure. In this regard, various authors (e.g.: Sleebos 2003, Mamolo & Billar 2003) define demographic sustainability as keeping constant the size of the population that can guarantee at least simple reproduction.

Other authors reduce the concept of demographic sustainability to the relationship between the working-age and post-active population, or as a numerical balance between sexes. However, as stress Lutz et al (2002: 6), demographic sustainability should include the socio-economic characteristics of the population as well.

CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

In this paper, a conceptual and methodological model - SUSTENDEMO to study the demographic sustainability (Roca 2011; Roca & Leitão 2006) is proposed. It consists of two equally important dimensions - quantitative and qualitative (Figure 1). The quantitative dimension consists of two components (natural increase and migration) of the total growth, and of the age and sex composition of the population. According to this model, a particular territory is demographically sustainable in quantitative terms if there is an optimal relation between the size and growth of age and sex groups.

The qualitative dimension reflects the socio-economic characteristics of the population, namely, education, professional qualifications and activity. This dimension is based on the assumption that people constitute the totality of the human capital of a territory, i.e., the knowledge, skills, abilities and other attributes embodied in each person (OECD 2001). In this sense, a certain geographical area is demographically sustainable in qualitative terms when the socio-economic structure of its population is balanced.

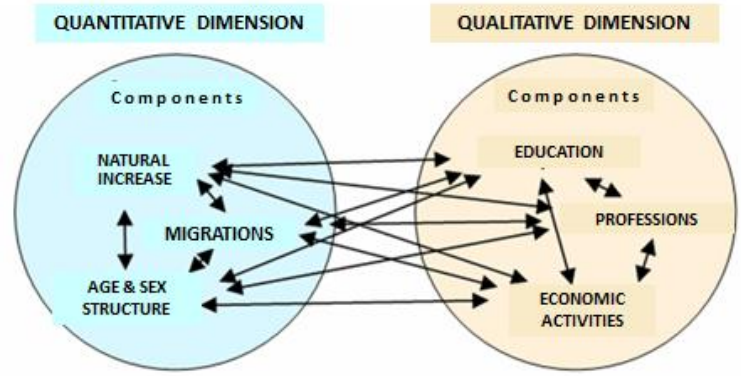

Fig.1 The demographic sustainability subsystem

The components of both dimensions of the demographic sustainability subsystem are in interaction. For example, lower birth rates and increasing life expectancy affect the relationship between age groups by increasing the number of elderly in the total population. On the other hand, an aging population, decrease fertility levels and thus increasingly aggravates the demographic decline. As for the qualitative dimension, low level of education contributes, for example, to the maintenance of low skills levels of the population.

The qualitative dimension components affect the quantitative dimension components and vice versa. For example, people with higher qualifications are more likely to migrate.

On the other hand, migration tends to increase the skilled labour in the area of destination, while at the same time cause increase in the share of the unskilled or semi-skilled workforce in the area of origin. It should also be noted that in the long run one component of the demographic sustainability cannot compensate for the other, that is, to provide a balance of that subsystem. For example, immigration can only in short and medium term increase the low fertility levels of the native population because immigrants tend to adopt long-term patterns of reproductive behaviour of native population in a given country (Rosa et al 2004; Lutz et al 2002).

The SUSTENDEMO Model was applied to the Portuguese territory with the aim to establish a typology of municipalities according to demographic sustainability, which could be used in the design of sustainable spatial development based on the use of endogenous human resources.

The analysis refers to the 278 municipalities of Continental Portugal in the last intercensal period, i.e., from 2001 to 2011. In such a relatively short period, certain demographic factors, such as, for example, migration affecting the growth and the relationship between age groups could be stronger than the other factors, which in turn could cause compensation effects. Also, the socio-economic context of the first decade of this century, especially its second half that was marked by exponential growth of unemployment, stagnation of employment and the strong increase of emigration, could adversely affect the formation and use of human capital and, consequently, the qualitative dimension of demographic sustainability.

The variables "natural growth", "migration", "sex", "age", "country of birth" and "spatial distribution of the population" were selected to represent the quantitative dimension of demographic sustainability. The socio-economic variables "educational attainment", "economic activity" "employment status", "socio-economic group", "occupation" and "number of hours worked per week" were used to characterize the qualitative dimension.

For each of these variables 35 indicators were determined that characterize both the state and dynamics of the quantitative and qualitative dimensions of demographic sustainability. The statistical models used for determining the spatial typology were factor and cluster analyses (Maroco 2003; Rencher 2002).

PORTUGUESE MUNICIPALITIES ACCORDING TO THE DIMENSIONS OF DEMOGRAPHIC SUSTAINABILITY

The main results of, first, the factor analysis, and then the cluster analysis are presented hereunder.

In factor 1 - "natural component of the quantitative dimension of demographic sustainability", in which 43.6% of the variance is concentrated, most indicators that have factor loadings equal to or greater than 0.5 refer to the natural growth, and to the composition and relationship between age groups. Other indicators refer to the socio-economic characteristics of the population that are closely correlated with the age composition, such as, for example, the illiteracy rate and the activity rate. The indicators that make up this factor are polarized, given the fact that high factor loadings are both positive and negative. On the one hand, the share of the population in pre-active age, growth rate of the working-age population and the rate of renewal of the active population, as well as the overall rate of population growth and the total activity rate, have high positive values. On the other hand, the percentages of

elderly people, the aging index, the index of demographic dependency of the elderly, and illiteracy rates, also have high negative factor loadings.

In factor 2 - "migration component of the quantitative dimension of demographic sustainability", in which 16.4% of the variance is concentrated, almost all indicators with high positive values reflect the importance of these components, particularly immigration (proportion of the population that entered the country from abroad between 2006 and 2001; share of the population by nationality and country of birth). These indicators are positively correlated with indicators that reflect favourable demographic trends, such as the growth rate of the population 0 - 14 years old and net migration. On the other hand, the only indicator with high negative value is the share of return migrants who entered the country between 2006 and 2011 in the total number of arrivals in that period.

In the factor 3 - "qualitative dimension of demographic sustainability", which concentrates 10.6% of the variance, almost all indicators reflect the level of education and the use of human capital, which is reflected in the socio-economic characteristics of the population. High negative values were recorded in the following indicators: the percentage of the population aged 30-34 years with tertiary education, the share of intellectual (scientific and technical) occupations, the proportion of the total population with tertiary education, the share of the population with completed at least secondary education, and population density. On the other hand, high positive factor loadings are associated with high proportions of the population with completed basic education, but who no longer attend school (an indicator of early school leaving) and growth rate of the population who work less than 35 hours a week, but also with high rates of population growth registered in tertiary education and growing shares of the population in scientific, technical and intellectual occupations.

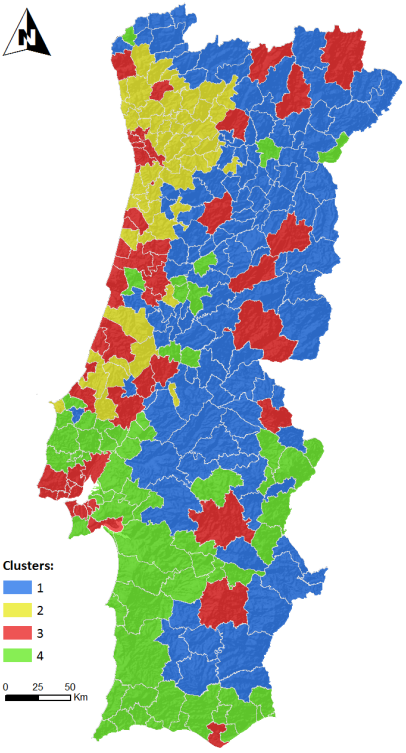

Fig 2 Clusters of municipalities

The resulting factor scores for municipalities were used as inputs for the cluster analysis. Four clusters of municipalities were obtained (Figure 2), which reflect combinations of different states and dynamics of the qualitative and quantitative dimensions of demographic sustainability (Figure 3).

Cluster 1 consists of 115 municipalities, which are mostly in peripheral and/or mountainous areas of the interior of Portugal. This group has the weakest natural growth component of the quantitative dimension of the demographic sustainability. These are municipalities with a strong population decrease, aging and high illiteracy rates. In the earlier periods, the lack of employment opportunities, as well as the lack of educational and health services, caused

strong emigration/out-migration flows that eventually led to these negative demographic trends.

Cluster 2 consists of 52 semi-rural municipalities, which are overwhelmingly located in the coastal area or in its vicinity of the North (Minho-Lima, Cávado, Ave, Tamega, Entre Douro e Vouga) and Centre (Baixo Vouga-and Pinhal Litoral). They are characterized by a strong process of diffused industrialization and by the importance of agriculture as a secondary activity. They all have high positive scores in factor 1, which corresponds to a fairly strong natural growth component of the quantitative dimension. Furthermore, the qualitative dimension of demographic sustainability is at risk, at least in the short term, as indicated by high drop-out rates from school and the growth of part-time employment, although there has been a significant increase in the number of students attending college and in the population with high qualifications. These municipalities are the mostly marked by return migration flows.

Cluster 3 includes Porto and Lisbon, older suburban municipalities of their metropolitan areas, and municipalities with small and medium-sized cities with administrative, industrial or commercial functions and, as a rule, with university or other higher education institutions. This cluster is different from all others in that it has a strong qualitative dimension of demographic sustainability, i.e., a high level of human capital development.

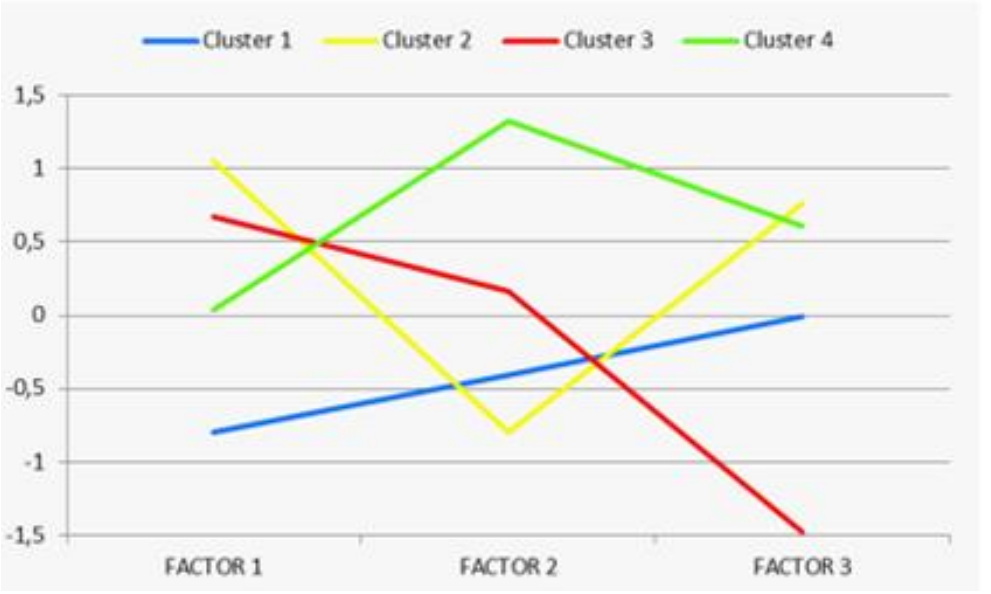

Fig. 3 Mean factor scores by clusters

In cluster 4 there are 60 municipalities, which are mainly in the peri-urban zones of the Metropolitan Area of Lisbon and in its area of influence, then in the southern regions of the Algarve and Alentejo Litoral, as well as in some areas of the Alentejo Interior. Municipalities in this cluster are characterized by a strong migration component of the quantitative dimension. The importance of this component is not only direct, but also indirect, since high

rates of growth of younger population are related to the fact that most immigrants belong to the most fertile age groups. However, the qualitative dimension is rather weak in this cluster.

In short, in 2011, in 40% of the Portuguese municipalities (cluster 1), located mainly in the interior, demographic sustainability is not ensured neither in quantitative nor qualitative terms. In the other 40% of municipalities (clusters 2 and 4), which are mostly in coastal areas, but also in the interior, sustainability is guaranteed by either the natural or migration component of the quantitative dimension. However, that sustainability can only last in the short and medium terms, because, as noted earlier, one demographic component cannot compensate for another in the long term. Furthermore, the level of development of human capital of these municipalities is weak. On the other hand, only 20% of the municipalities, with medium-sized towns or located in the metropolitan areas of Porto and Lisbon (cluster 3), concentrate most of the human capital of the country, and are demographically sustainable, particularly in terms of the qualitative dimension.

CONCLUDING REMARKS

Weak or non-existent demographic sustainability of most of the Portuguese municipalities threatens the sustainability of spatial development which should largely rely on the use of endogenous resources, especially human. These municipalities do not have sufficient critical demographic mass neither in quantitative nor in qualitative terms that would allow the development of economic activities and ensure the continuity of functioning of basic social and cultural services and infrastructure.

This demographic deficit and its consequences for the sustainability of spatial development will continually get worse if there is no harmonized action of local and external agents of the public and private sectors, and of the civil society. In that sense it is at the regional level that economic, social and environmental policies should be designed and implemented, based on the principle of complementary use of human resources, services and infrastructure, because the critical demographic mass at the regional level, and not just municipal, needs to be borne in mind. Productive investments should be encouraged while simultaneously guaranteeing the survival of social and physical infrastructures and environmental protection.

This would not only retain the local population, but would also create conditions to attract more educated and better qualified people, including the unemployed or partially employed in urban centres of the coastal regions of Portugal. The arrival of such population would also contribute to the increase of the regional demographic mass and, in particular, the strengthening of human capital.

In short, variables related to demographic sustainability should be integrated into the design of local and regional development policies, which in turn requires coordination at the national level since demographic sustainability should be the common goal of the entire Portuguese society.

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