

APPLICATION OF MULTIVARIATE ANALYSIS TO AREAS UNDERGOING TRANSFORMATION: THE PERIPHERY OF THE LARGEST BUILT-UP URBAN AREAS IN ANDALUSIA

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I. AIM OF THE RESEARCH

The objective of this study is to apply factor analysis, an instrument traditionally applied to specifically urban environments, to areas undergoing transformation, namely Andalusian suburban areas, in order to verify the degree of transformation of the areas located on the periphery of the built-up urban areas of Andalusia. The 2001 Census was used as a source of information.

II. SAMPLE

As the study shows, we chose the population of the 624 census sections of the four main Andalusian built-up urban areas: Bahía de Cádiz, Vega de Granada, Malaga and Seville. These urban areas were delimited on a strictly operational basis using geographic criteria. After defining the operational limits of these areas into smaller units regarding which there exists statistical data in Spain, namely the census tracts, these were grouped in units having homogeneous geographical features in order to detect differences and characterise each one of these areas in accordance with the results of an exploratory factor analysis.

III. VARIABLES

In our theoretical proposal we have considered variables that indicate that we are dealing with areas subject to urban development that is exogenous or induced from the metropolis. For this purpose we have used demographic variables (population under the age of 15 and heads of family aged 30 to 44) identified with the population of urban origin, the newcomers

who in principle are the protagonists of suburbanisation. We have compared this population to people aged 65 or over, associated to the autochthonous and rural population that did not participate in the suburbanisation process.

The social variables include variables connected to the level of qualifications and to professions. Our hypothesis is based on the thesis that the population that takes part in exogenous urbanisation or suburban residential processes has a certain academic level and professions that require medium, if not high, qualifications. For this reason we chose secondary and university studies as a variable, together with professions linked to executive, technical and administrative staff jobs. Here again, we have considered the population that did not participate in these processes, in other words the rural and autochthonous population that remains outside suburban developments, including as variables retirees and pensioners, as well as the population engaged in agriculture and construction, generally associated to the figure of a worker-farmer.

We also selected variables of mobility, as in our hypothesis we consider the population of urban origin to have a high degree of mobility for work reasons, or commuting, as compared to the rural and autochthonous population amongst which sedentary jobs prevail, in particular in the first phases of suburbanisation in Andalusia.

On the other hand, given the importance of spatial mobility in areas subject to residential suburban development, we chose the variable of recent immigrants (between 1991 and 2001) and immigration by origin, taking into account the population from the metropolis or central city as well as the population from other places, including foreign immigrants.

Lastly, we included variables linked to housing, namely recent housing and secondary housing, the latter being traditionally associated to suburban areas.

FACTOR ANALYSIS

Principal components analysis was computed, followed by the Scree test which selected four factors. Principal factors were computed and four factors were rotated to simple structure using Varimax Rotation.

COMMENTS

On the basis of the matrix of the rotated components, the labels of each factor can be inferred depending on its correlations with the variables used.

- Factor 1. It shows high positive factor loadings for the variables of children under the age of 5, adolescents under the age of 15 and heads of family 30 to 44 years of age. It shows a negative correlation with the variables heads of family 65 years of age or older and with retirees and pensioners. Lastly, it shows a positive correlation with recent housing. In consequence, we can label this factor as «youth and recent urban expansion».
- Factor 2. It shows high positive factor loadings for the variable illiterate population with no schooling and population occupied in agriculture and construction, unemployed and unskilled workers. It shows high negative factor loadings for secondary and university studies and for white-collar occupations. We have called this factor «traditional agrarian society».

Table 1
FACTOR LOADING MATRIX AFTER VARIMAX ROTATION

Variables	1	2	3	4	Initial Communalities
Illiterate population with no schooling	-0.35	0.667		-0,3	(0.675)
Secondary and university studies	0.269	-0.77	0.307	0.364	(0.903)
Recent immigrants (post 1991)	0.412		0.669	0.524	(0.946)
Immigrants from the city (neo-rural immigrants)	0.467	-0.26	0.753	0.258	(0.892)
Foreign immigrants				0.872	(0.920)
Other immigrants	0.278		0.465	0.747	(0.790)
Children under the age of 5	0.858				(0.735)
Adolescents (under the age of 15)	0.922				(0.822)
Heads of family 30 to 44 years old	0.917				(0.901)
Heads of family 65 years of age or older	-0.8	0.27			(0.792)
Occupied in agriculture		0.615			(0.329)
Unskilled		0.802			(0.632)
Occupied in construction		0.657	-0.31	-0.4	(0.600)
Executives and technical experts		-0.7		0.379	(0.721)
Administrative personnel		-0.79			(0.798)
Neo-rural immigrants working in the cities	0.281	-0.31	0.815		(0.866)
Sedentary workers			-0.89		(0.749)
Unemployed		0.579	-0.35		(0.396)
Retirees and pensioners	-0.69	0.443			(0.752)
Recent housing (post 1991)	0.682		0.311		(0.587)
Secondary housing				0.731	(0.535)
Eigenvalue	9.007	3.007	2.249	1.429	

(*) Factor loadings below 0.25 have been omitted.

- Factor 3. It shows high positive loadings for the variables recent immigrants (from 1991 to 2001) and immigrants from the city (newcomers), and for newcomers who work in the city. On the other hand, it shows high negative loadings for sedentary workers, which is why we labelled this factor as «newcomers».
- Factor 4. It shows high positive loadings for foreign immigrants and other origins (excluding immigrants from the city) and for secondary housing, so we labelled this factor as having a «recreational residential function».

In order to analyse the results we prepared the factor score location indices. These location indices were obtained taking into account not only the number of census tracts, but also the inhabitants of the tracts grouped into geographic areas.

CONCLUSIONS

Exploratory factor analysis has allowed us to confirm the heterogeneous nature of Andalusian suburban areas. We have established a series of categories for said areas that confirm that they entail a territory which, far from being homogeneous, is characterised by great diversity and subject to residential suburbanisation of varying degrees of intensity. We believe this model constitutes an interesting contribution to factor analysis applied to suburban areas undergoing transformation, as it provides information regarding diverse situations and the different degrees of intensity reached by suburbanisation in Andalusia (Spain).

In conclusion, we believe that in the future these areas, of an essentially dynamic nature, could evolve towards a greater degree of functional autonomy with respect to the metropolises, similar to what has happened in other metropolitan areas in Spain that are in more advanced phases of development than the ones in Andalusia.