

A methodological proposal for a social and multivariate analysis in peri-urban areas during the 'golden age' of suburbanisation in Andalusia (Spain)¹

Abstract

We apply social area analysis, traditionally used for intra-urban areas of cities, to a space in transformation: the peri-urban fringes of Andalusia (Spain). We also show that multivariate analysis (both exploratory factorial analysis and cluster analysis) is highly adaptable for use in peri-urban areas in the region. The suitability of exploratory factor analysis is confirmed, as it allows an optimal factorial structure for the spatial microanalysis of urban sections, which are the smallest units with official statistical information in Spain. This is done in order to reduce a large number of indicators to four factors: youth and recent urban expansion, traditional rural society, suburban society and residential recreational function. On the other hand, the last step, the cluster analysis, identifies that the phenomenon of suburbanisation was relevant in the region but was not the majority in the whole of the peri-urban fringes at the beginning of the millennium. From the factorial score of these clusters, it is possible to know the level of intensity of suburbanisation at one of the moments when suburbanisation was at its peak in Andalusia (Spain), just before the Great Recession.

Keywords: social areas analysis, factor analysis, cluster analysis, suburbanisation, historical urbanism, Andalusia, Spain

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Introduction

Social area analysis designates the intra-urban differentiation of social areas in according with a theoretical model that has proved to be valid at an operative level in several cities in developed countries. D. Timms¹ compiled a list of studies that use the E. Shevky & W. Bell model of social area analysis¹ and in a basic work on urban geography highlighted that:

The urban community is neither an undifferentiated mass, nor a haphazard grouping of persons and buildings, but similar populations that group together and come to characterise the areas in which they settle forming an urban mosaic, relating residential differentiation with social differentiation¹.

According to D. Timms:

In the modern Western city, most of the particular differences between the populations of the various neighbourhood units can be explained by no more than three or four fundamental axes of differentiation: social rank, family status, ethnic status and mobility/urbanism. The ecological structure of the city is configured by the interaction of these properties on the choice of place of residence by the urban population and on the choice of place to build by the city's builders.²

He went on quoting:

In our current state of knowledge, it is unlikely that an integrated theory of residential differentiation can be established with any degree

of consistency. However, it is possible to point out some general lines that this general theory will have to take into account. Residential differentiation has two aspects: the overall structure of society and the decision-making activity of family units. Any attempt to analyse the resulting urban structure must therefore take into account macro-sociological issues, as well as aspects of social psychology. The choice of a particular residential location is the product of a complicated series of aspirations, research and evaluation. This decision is fundamentally influenced by family preferences regarding life-styles, ethnic groups and social rank.

Finally, he concluded his work on the following way:

Human society is an urban phenomenon. The city is becoming the main place where human behaviour takes place. If we try to understand this behaviour or plan its control, it is absolutely necessary to understand the characteristics of urban settlements. It is not possible to have a deep knowledge of the community or the individual without knowing anything about the other. The city not only shapes human behaviour, but it itself is the result of human behaviour. The urban mosaic is the matrix of urban society³.

In addition to Timms' work that compiled the applications of Shevky & Bell's social area analysis (Shevky & William 1949, and Bell 1955), there are other works that have applied social area analysis to Spanish cities, the results of which have been carried over to urban cartography, such as the application of social area analysis to the city of Malaga² and to the ten largest cities in Andalusia.³ Social area analysis has also been applied in other Spanish cities. This was the case, to name but a few examples: M.J. Aguilera's doctoral thesis on Alcorcon town⁴ or E. Cutillas' work on the city of Valencia whose results have shown the suitability of the model at intra-urban scale. Although it should be mentioned that it has been applied to peripheral areas,⁵ at present, social area analysis has not been used for peri-urban areas in Andalusia yet, which provides the opportunity to adapt this model to the differences existing between consolidated urban areas and peri-urban fringes (Table 1),⁶ which may be identified as:

³Timms: 432.

¹This work will take the proposal delimitation by Junta de Andalusia in 1994 (Autonomous Government of Andalusia) before the approval of the previous Ley de Ordenación del Territorio de Andalucía 1/1994 (Andalusian Territory Planning Law) whose aim was to prepare a Plan for Andalusian Territory that it would serve as reference for the design of different Sub-regional Plans for 9 urban conurbations in Andalusia conceived as 9 regional centres. A new Law 7/2021, of 1 December, repeales the previous Law 1/1994, of 11 January, on Territorial Planning of the Autonomous Community of Andalusia.

²Timms: 428.

Table 1 Location coefficients⁶ in socio-economic status

Socio-economic status	Low	Medium-low	Medium-high	High
Northern Bay of Cadiz	-	0.93	1.13	1.62
Centre Bay of Cadiz	0.75	0.94	1.21	0.45
Southern Bay of Cadiz	2.36	1.15	0.72	0.35
Northern Vega of Granada	-	1.41	0.82	0.29
Southern Vega of Granada	-	0.7	1.61	0.54
Central Vega of Granada	2.7	1.58	0.23	-
Valley of Guadalhorce	2.48	1.44	0.42	-
Western Coast of Malaga	0.2	0.86	1.48	-
Mountains of Malaga	9.42	0.82	-	-
Eastern Coast of Malaga	-	0.68	1.54	1.05
Central Scarp of Aljarafe Platform	0.16	0.7	1.16	2.77
Southern Scarp of Aljarafe Platform	3.55	1.15	0.53	0.35
Northern Scarp of Aljarafe Platform	1.5	0.98	0.51	3.28
Los Alcores Platform	1.07	0.95	0.95	1.54
Vega of Seville	2.58	1.73	0.07	-

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

[...] spaces that are close to main urban areas, where the use of land and ways of life of the country and the city mix together, and where morphological, functional and populational changes are swift. In the peri-urban areas, next to agricultural and forest land, there arise areas occupied by transport, urban and industrial installations, and services. Villages become different types of residential suburbs and satellites, the former have functional dependence on the city, and the latter enjoy functional autonomy.⁷

On the other hand, the application of multivariate analysis (exploratory factor and cluster analysis)^{8,9} has not traditionally been used for peri-urban areas as they constitute a changing environment due to their exposure to urban diffusion, although they participate in the existence of social heterogeneity. This was brought to light in a questionnaire formulated for a doctoral thesis¹⁰ in which the author showed that the 'metamorphosis' caused when peri-urban areas receive urban influences in form of flows from an accessible major city that broke down the homogeneity of these areas, replacing it with a heterogeneity that results in a territory with different characteristics that we can consider a 'suburban mosaic'. However, it should be turned into account that peri-urban areas are ephemeral areas which change with such speed that it becomes increasingly difficult to distinguish what H. Clout considered as visual components of countryside.¹¹

A basic aim of this paper in which we achieved using multivariate analysis, we obtain 4 factors: 'youth/recent urban expansion' (factor 1), 'traditional rural society' (factor 2), 'suburban population' (factor 3) and 'residential recreational function' (factor 4).

Analysing the degree of intensity of suburbanisation, we selected factor 3, as it is clearly related with such a model of urbanisation and with K-means clustering analysis, which has allowed us to differentiate degrees of intensity of suburbanisation in peri-urban areas of Andalusia (Spain) during what we can consider it was the 'golden age' of Spanish post-modern urbanism⁴.

⁴Górgolas named this period as the prodigious decade of Spanish urbanism (1997-2007). In Górgolas, P. (2019). La burbuja inmobiliaria de la "década prodigiosa" en España (1997-2007): políticas neoliberales, consecuencias territoriales e inmunodeficiencia social. Reflexiones para evitar su reproducción. *Eure*, 45(136): 163-182.

M.A. Zárata & M.T. Rubio refer the term of suburbanisation with the following way⁷:

[...] the process of strong residential growth of urban peripheries in post-industrial cities, always at a higher pace than that of central areas. There is also a simultaneous growth of demographic forces and economic activities in medium-sized cities, above all when the cities are located in attractive natural environments, with a good climate and in areas that have good accessibility within the metropolitan areas.

This implied a new phase in the urbanisation of Spanish territory, which according to O. Nel'lo has known two phases.¹²

Concentration and dispersion have been the two stages of the process of urbanisation in Spain over the last 50 years.

These two phases have their beginning with the period of 'Spanish Autarchy (1939-1959)' that ended with the 'Stabilisation Plan (1959)', which meant the openness or Franco's dictatorship, with consequences in the economy and population of Spain that turned a rural Spain into an urban Spain through rural exodus by young people that not only left their rural activities, but also they emigrated from rural to urban areas, with the consequently decline and ageing of wide surfaces in the country, because of the demand of new jobs opportunities in cities that produced a change from an economy based on primary activities (farming, livestock, fishing, etc.) to an economy based on urban activities (industry and tertiary activities) that turned a developing country into a developed country in few decades, but with great costs for Spanish countryside: the decline of vast surfaces in Spanish inland (it was a particularly intense phenomenon in mountainous areas that were nearly or totally depopulated) and a considerable population and economic growth, though it was mainly concentrated in the Spanish periphery: industrial regions, metropolitan areas and in those coasts specialised in tourism along the Mediterranean coast, besides Balearic and Canary archipelagos.

At the same time, it was necessary to build new neighbourhoods in these cities for workers in the urban fringe that differ from the neighbourhoods that firstly appeared in the suburban ring of major cities to satisfy a demand of dwellings for people belonging to a middle-class form from those homes that had migrated from

countryside to Spanish cities. The former rural population had low qualification and low incomes, in contrast to middle and high-level qualification and higher incomes that it characterised the second phase of Spanish urbanisation from the 1980s, which it was based on a disperse urban model that differed from the early compact urban model, so those Spanish suburban areas with a good dwelling offer and a good accessibility with the main city of a metropolitan area where suburban workers drove through a daily commuting for labour reasons from the 1980s until the burst of the housing bubble in 2008.

Social area analysis applied to peri-urban areas of Andalusia. A methodological proposal

Urban society is so far from homogeneous. The series of studies conducted on the subject of the city throughout the 20th century gave rise to social area analysis.⁶ Social area analysis is one of several theories about urban structure⁵.

The studies of Shevky and Williams on social differentiation in Los Angeles (1949) and of Shevky and Bell on San Francisco (1955), led to a macro-social theory that associates residential differentiation with what are considered the three great axes of social structure: 'economic status', 'family status' and 'ethnic status'.¹³ The city has traditionally been a place where inequality in social areas is reproduced following the Shevky & Bell model of 'social status', 'family/life-cycle status' and 'ethnic status' to which McElrath (1968) added 'migratory status' as axis of social differentiation (Figure 1).¹³

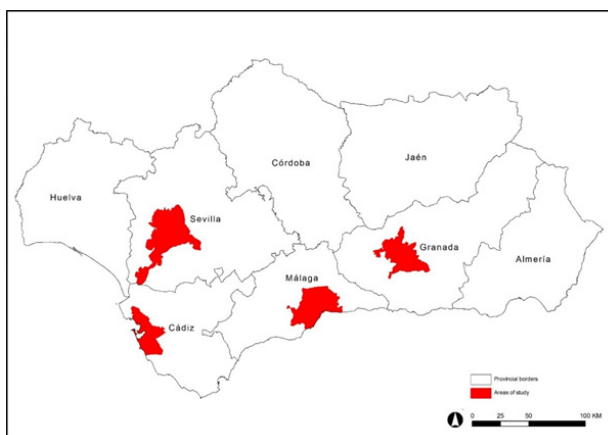


Figure 1 Subject of study: a selection of Andalusian urban conurbations.

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

Regarding peri-urban areas, 'post-fordist city'⁶ exploded towards

⁵The urban structure of cities is divided into large areas: the centre, residential areas, industrial areas and peri-urban fringes.

⁶This term derives from Henry Ford and mentions the industrial production system used for the first time in Ford's Detroit car factories at the start of the 20th century. It is used to describe the production system that was characteristic of a 2nd Industrial Revolution, the period that opened at the beginning of the 20th century and it came to an end during the 1960s. Post-fordism is referred to a subsequent stage, one of a decentralised production, when the great factories of the cities were dismantled and the productive system was divided into different spatial scales known as industrial delocalisation that benefited the localization of a dispersed industry in peri-urban fringes and developing countries. There was also a movement from an industrial economy to a highly specialised services economy, typical of a 3rd Industrial Revolution, which is the reason it might be considered equivalent to post-industrial period. The 4th Industrial Revolution is currently in its beginnings and their effects on cities

outer urban fringe, generating a suburbanisation that was socially heterogeneous and was characterised by being at a given stage of family status through an urban diffusion from a main city in a residential, demographic and a functional point of view, and in some cases due to the presence of a peri-urban industry.

Methodology

Our first exploratory model takes a characteristic of fertility: children under the age of five years, and a characteristic of urbanisation: dwellings built after 1991, as identifiers of the recent nature of suburbanisation in Andalusia. For the second model, we selected two correlated variables: young homes that have to care their children and recently built single-family dwellings as they have more elements that are significant to the hypothesis, we are trying to validate the existence of a change in residence due to being at a given stage in a family status characterised by life cycle based on household generation.

Represented in a scatter plot, the two dimensions or axes show a better goodness-of-fit in the 2nd model than with the 1st one (Figure 1) (Figure 2). The 1st model, both in terms of concentration of the scatter of the cases included in the first social diagram and in terms of a higher coefficient of determination, is less representative than the 2nd one. This corresponds with the last model, whose scatter plot shows greater dispersion and a structure of the axes, social and family, that is less correlated with a coefficient of determination closer to 0. In other words, a proposal with variables that have little dependence on each other, a condition that should be taken into account so that the factorial ecology analysis provides satisfactory results.¹⁴

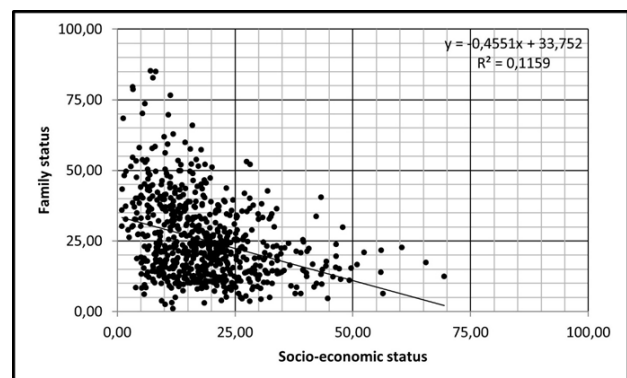


Figure 2 Diagram of social areas. Hypothesis 1.

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

In E. Shevky & W. Bell model, the final classification of areas uses the migratory status variable introduced by McElrath, giving a profile of types that results from a combination of the two previous categories. This use is reasonable because the characteristic of social rank may frequently provide an identification with migratory or ethnic status. Thus, a high social rank coincides with a low ethnic or migratory status. However, this is not so in our case, on the contrary: a high social rank coincides chiefly with a higher migratory status due to the coincidence of the arrival of middle to high social status immigrants, in this instance, the suburban's population who come from urban areas and have a very different consideration than the immigrants of 'rural exodus' that took place in Spain between the 1960s and 1980s.

should lead them being more sustainable in order to avoid the environmental impact of a model of urban sprawl that a too high environmental and economic cost.

The typology of areas comes from a combined consideration of indexes I and II (economic status and family status) that give rise to the 16 basic types, which they break down to 32, if we take into account migratory status. Each of these indexes is established by simple average of the score of each variable. To standardise the scale in the variables, a points system of 0 to 100 was applied.

The result social areas diagram is as follows: the columns order the different intervals of the indexes of social rank (0-24, 25-49, 50-74, and 75-100), which are numbered from 1 to 4 in increasing order. The rows show the different intervals of family status from top to bottom, in decreasing order (75 to 100, 50 to 74, 25 to 49, and 0 to 24).

In this new social areas model for peri-urban areas in Andalusia, our starting point was considering that post-modern society has changed since the model was initially conceived: from an industrial to a post-industrial economy in which mobility from countryside to cities has become in a mobility from a main city to its hinterland that diffused a model based on a disperse city to outer urban fringes, commonly mentioned as suburbanisation. In this process, it has taken place a residential mobility in which lower classes haven't played such a large role as middle and upper-middle classes due to the economic cost of labour commuting from a different place where they live and they work that is not accessible for population with fewer incomes than these middle-class workers. Nor they can afford the significant cost of residence-workplace mobility, since, to a large extent, middle and upper-class populations maintain the jobs that they had in their previous residence, with the consequent cost in time and money of a daily commuting.

This is the origin of a residential mobility that was caused by dwelling more considered as a wish before as a need. In this instance, there is a free choice: a desire to live in a certain sort of dwelling, in exclusive gated communities¹⁵ of a single-family type, suitable for many homes with dependent children. It does not answer a migration due to the first phase of the family cycle, such as emancipation from family home before establishing a new home for a new family. The limited nature of emancipation, above all because younger don't have enough and regular incomes to leave their parents' home, what it means that the process of suburbanisation take place when a family is formed with minors in his care—children and teenagers, rather than new-born children in our hypothesis—, and after a professional consolidation but both members of couple, even some adults sons, have to work to cost the high economic price of a daily commuting. *It is, therefore, a residential mobility whose main characters are the middle and upper classes, and whose incomes come more from professional sources rather than from property.*¹⁶ The causes for looking for a home in the outer urban fringes of Andalusian cities are not clear at all; at times it is the result of a need (young family status) but in other is the result of a free choice (mature family status), a residential reason in which prices of dwellings isn't an obstacle, but it'd rather its quality and type of dwelling that is offered. They usually choose a housing development consisting of single-family or even gated blocks of dwellings to preserve their privacy.

The concept of increasing scale is essential in the Shevky-Bell theory. The idea was inspired by Colin Clarke and the scale of a society can be defined as the number of people who are interrelated and the intensity of these relations. Increase of scale produces an increase in the heterogeneity of the population such that any large-scale society presents profound economic, regional and demographic alterations, with the consequent alterations in social relationships.¹⁴

J. Estébanez criticises E. Shevky & W. Bell for their hypothesis that economic developing countries have a smaller scale that differ

from economic developed countries that have a higher social scale. Even so, it is clear that in addition to the concept of social scale, the degree of modernisation of a society must be taken into account, and we consider that as the heterogeneity of the population increases social polarisation to levels that become unsustainable. Thus, in an advanced society, in those neighbourhoods that are not far from each other in the same city, it is possible to find pockets of poverty and 'ghettoisation'¹⁷ near streets with a very high level of social segregation. This happens both in the most economic developed countries and in those economic developing countries because the degree of economic development is not a determining factor to social heterogeneity; but rather it is conditioned by economic ideology that is diffused at a global level with the pretext of economic crisis produced by the contradictions of capitalism system. The economic neoliberalism that was responsible for the severe economic crisis of Great Recession has diluted the importance of social status in the concept of social scale, and it has highlighted social differences wherever it has been imposed under the pretext of austerity and with a unique valid economic model to overcome the socio-economic crisis, in opposition to other criteria that are no less important at social level, such as social equity.

He points out another criticism of social area analysis: that a series of variables included in the coefficient only has meaning within the North American cultural context (single-family dwellings, female employment) or the coefficient of ethnic segregation. This is not the case, because cultural globalisation has homogenised models of reproduction and consumption on a world-wide scale, and women have joined as labour force, overcoming a traditional dependency on the work of men, to such an extent that at present, the highest levels of incomes belong to single women with high education.

Therefore, despite the criticisms, we consider this method to be useful because of its simplicity and operability, and provided that the appropriate independent variables are used, it simplifies a complex social reality, as well as give us a vision of the peri-urban areas of Andalusia in an advanced phase of post-industrial urbanisation (Figures 2–7) (Table 2) (Table 3).

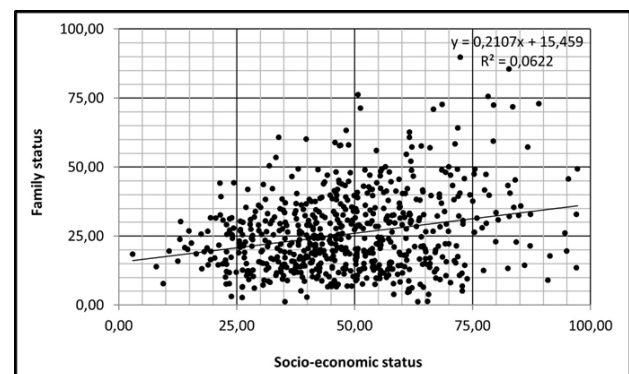


Figure 3 Diagram of social areas. Hypothesis 2.

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

¹⁷According to M.A. Zárte, this term is used to describe the process of material and social degradation that it happens in consolidated areas of cities due to phenomena of functional and social invasion-succession. Firstly, in the transition neighbourhoods in USA and, later on, in European outer urban fringes of cities. Consequently, many homes with dependent children moved to suburban ring searching a place with better living conditions than the main city of an urban conurbation [...] the social mix was accentuated and the vacuum left by the former tenants began to be occupied by immigrants and ethnic minorities (Zárte 2012: 337).

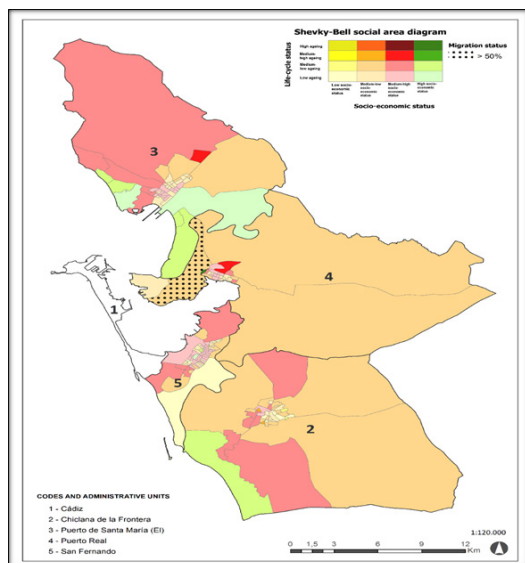


Figure 4 Social areas in Bay of Cadiz urban conurbation.

Source: Own elaboration

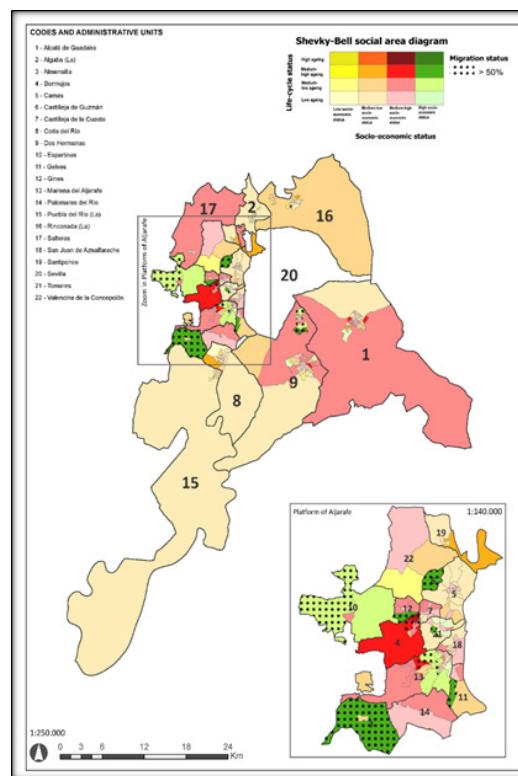


Figure 7 Social areas in Seville urban conurbation.

Source: Own elaboration

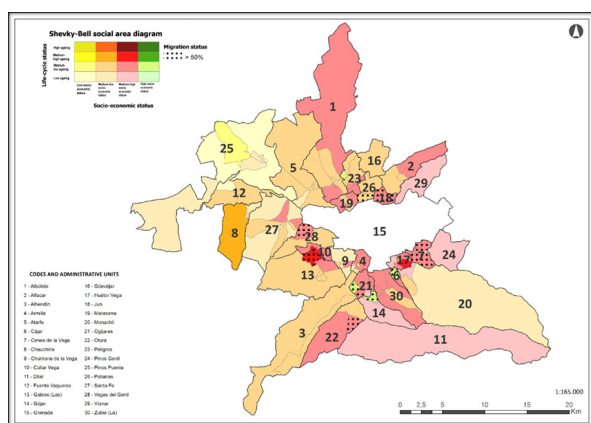


Figure 5 Social areas in Granada urban conurbation

Source: Own elaboration

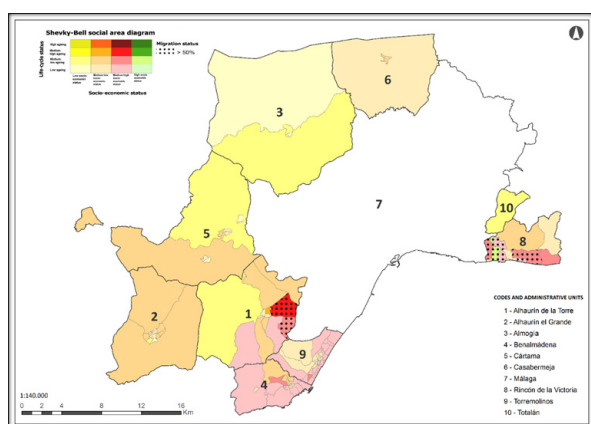


Figure 6 Social areas in Malaga urban conurbation.

Source: Own elaboration

Table 2 Location coefficients in family status

Family status	Low	Medium-low	Medium-high	High
Northern Bay of Cadiz	-	0.58	0.76	1.27
Centre Bay of Cadiz	1.47	0.17	0.68	1.37
Southern Bay of Cadiz	-	0.77	1.49	0.59
Northern Vega of Granada	-	-	1.91	0.28
Southern Vega of Granada	-	1.39	1.58	0.44
Central Vega of Granada	-	0.93	0.92	1.09
Valley of Guadalhorce	-	1.64	1.14	0.82
Western Coast of Malaga	-	-	0.21	1.84
Mountains of Malaga	-	-	1.24	0.9
Eastern Coast of Malaga	-	-	1.22	0.92
Central Scarp of Aljarafe Platform	1.95	1.93	0.72	1.14
Southern Scarp of Aljarafe Platform	-	1.29	1	0.99
Northern Scarp of Aljarafe Platform	-	3.08	1.11	0.7
Los Alcores Platform	2.44	1.04	0.98	1
Vega of Seville	4.55	2.07	0.99	0.85

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e07

Table 3 Stages for a proposal of change in Shevly's Social Areas Model

Postulates related to industrial society	Statistical trends in industrial society	Statistical trends in post-industrial society	Changes in the structure of a given social system	Categories	Measures and indicators of the categories
Order and intensity of the relations	Change in task distribution: manual production decrease and supervision and control increase	Change in task distribution: manual production operations decrease whilst highly qualified ones related to highly-specialised services increase		Social status	Population with secondary and tertiary level education.
Differentiation of functions			Change in the range of highly-specialised tertiary occupations. Increase of suburban population with middle and upper-middle social class in peri-urban areas		Population employed in qualified services
	Change of productive structure: decrease in primary activities whilst centralised activities in cities increase. Decrease of a family as an economic unit	Change of productive structure: decrease in cities. Increase in peri-urban areas. Different households homes appear	Life-cycle based on household homes: Suburban homes establish in suburban areas	Family status	Young couples and mature homes with dependent children.
Complexity of organization	Increasing mobility of population: changes in Population structure	Increasing social and spatial mobility of the population in peri-urban contexts. Segregation of old native neighbourhoods from new suburban neighbourhoods		Migration status	Single-family dwellings
			Spatial redistribution, anonymity, isolation and segregation in peri-urban context: old neighbourhoods where native population lives coexist with residential housing estates where suburban population lives		Native population live in different neighbourhoods that neighbourhoods for suburban population

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

Application of factor analysis to suburban rings in a selection of urban conurbations in Andalusia (Spain)¹⁰

Aim of the research

The aim is to use factor analysis to verify the level of transformation of the zones of several Andalusian urban areas in order to obtain factors that allow to distinguish the characteristics of their different peri-urban fringes.

Sample

We selected the population of the Spanish census sections of four suburban rings in four urban conurbations in Andalusia: Bay of Cadiz, Granada, Malaga and Seville. These urban conurbations were delimited using criteria of geographical homogeneity. After defining the geographical limits of these areas, we used the smallest units whose information is available in Spanish official statistics, i.e. census sections that we've grouped into units with homogeneous

geographical characteristics to detect differences and characterise each of the census sections according to the results of an exploratory factor analysis.

Indicators

In our theoretical proposal we considered different indicators for the four suburban rings that are subject of this study. We used demographic indicators (population younger than 15 years, and people of a family between 30 to 44 years old) in relation with their place of origin, because they usually take part in suburbanisation processes. We compared this population with people of 65 years and older who keeps relation with native or local population who didn't take part in suburbanisation process.

Social indicators included those one related to the level of qualification and employments. Our hypothesis is based on the principle that people who participate in processes of suburbanisation has a certain level of studies that is highly correlative with a certain degree of qualification and a level of income, and these kinds of

employments only require secondary studies, and even studies university. This is the reason because we selected secondary and Studies University as a unique variable, besides those employees with related to directive, technical and administrative employments. In the same way as before, we considered that population who didn't participate in this kind of urbanisation, i.e. local or native population who doesn't usually take part in suburbanisation, at least due to urban diffusion. Finally, we included as indicators retiree people and those ones employed in farming and building that usually are associated with the figure of part-time-farmer in peri-urban areas.

We also selected indicators of mobility, because our hypothesis we consider that population with urban origin has a high degree of mobility for working or are daily commuters in comparison with local population for whom sedentary jobs are the predominant ones, particularly in the first stage of suburbanisation in Andalusia at the end of the 20th century.

On the other hand, we must take into account the importance of spatial mobility in these suburban areas that suffered from suburban residential development, so we selected one variable of immigrants (those ones who arrived at a suburban destination from 1991 to 2001), and migration by origin in which we considered the population of a city that is a capital of a province at the same time, and other origins for migration population in which we have included foreign immigrants.

Finally, we included with indicators related with dwelling, i.e. recent dwellings and secondary homes, traditionally related to these areas with residential suburbanisation.

Factor analysis

Analysis of main components was used. The main factors were calculated and four of them were rotated into a simple structure using the Varimax rotation.

Conclusion

Based on the matrix of the rotated components, the labels for each factor can be inferred depending on their correlation with the indicators used.

- a) **Factor 1:** It shows a heavy loading of positive factors for the indicators of children younger than 5 years, adolescents younger than 15 years, and heads of family aged 30 to 44 years with a negative correlation with the variable heads of family (a man or a woman), 65 years old or older groups, and with retired and pensioners people. Finally, it shows a positive correlation with recent dwelling. Consequently, we label this factor as 'youth / recent urban growth'.
- b) **Factor 2:** It shows a heavy loading of positive factors in the variable of illiterate population or without education and the population occupied in farming and building and unemployed and unskilled employees. It shows a high loading of negative factors for people with middle and high education and white-collar labours. We have labelled this factor as 'traditional rural society'.
- c) **Factor 3:** It shows high positive loading for the indicators of immigrants (1991 to 2001), both immigrants who come from a central city, and immigrants who work in a central city. On the other hand, it shows high negative loading for sedentary workers that is the reason because we label this factor as 'suburban population'.

- d) **Factor 4:** It shows a high positive loading for foreign and immigrants from rest origins (excluded immigrants from a main city of a metropolitan area) and second homes, so we label this factor as 'residential recreational function' (Table 4).

Table 4 Factor loading matrix after the Varimax rotation

Indicators	1	2	3	4	Initial communalities
Illiterate People	-0.33	0.66		-0.29	-0.68
Middle and Higher Educational levels	0.26	-0.78	0.33	0.34	-0.91
Immigrants (from 1991 to 2000)	0.41		0.64	0.56	-0.95
Suburban immigrants	0.47		0.73	0.3	-0.9
Foreign immigrants				0.88	-0.8
Other immigrants	0.26		0.43	0.79	-0.91
Children with 5 years or a minor age	0.84				-0.75
Teenagers (younger than 15 years)	0.91				-0.84
Parents 30 to 44 years	0.91				-0.91
Parents ≥ 65 years	-0.8				-0.76
Farmers		0.53			-0.31
Unskilled workers		0.82			-0.71
Construction workers		0.6	-0.34	-0.44	-0.68
Manager and technical workers		-0.73	0.27	0.34	-0.72
Administrative employees		-0.76	0.27		-0.71
Migrants commuters from/ to a central city	0.29	-0.26	0.81		-0.83
Sedentary employees			-0.89		-0.83
Unemployed people		0.41	-0.49		-0.43
Retired people	-0.77	0.32			-0.74
Dwellings (from 1991 to 2000)	0.67		0.33		-0.58
Second homes				0.71	-0.54
Eigenvalues	8.82	3.14	2.24	1.42	

(*) Factor loadings lower than 0.25 have been omitted

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

Completing the previous analysis, we used cluster analysis to detect different grades of intensity in a suburbanisation induced from a central city to its suburban ring at the beginning of 21st century.

The exploratory factor analysis allows confirmation of the heterogeneity of peri-urban fringes in Andalusia. We have established a series of categories for these areas that confirm that these territories are characterised—further than a homogeneity—by a wide diversity and is mainly due to residential reasons in a suburbanisation with different degrees of intensity.

Cluster analysis applied to suburban rings in a selection of urban conurbations in Andalusia (Spain)

Introduction

Cluster analysis classifies objects in such a way that each object is very similar to those in the cluster with respect to some predetermined selection criteria (the three factors selected in our case). The resulting clusters of objects should show a high level of internal homogeneity (within the cluster) and a high level of external heterogeneity (between clusters). Therefore, if the classification is correct, the objects within the clusters will be very close when they are represented graphically and the different groups will be very far from each other.

It is the only multivariate statistical technique that does not estimate the theoretical value empirically, but it uses the theoretical value specified by a researcher. For this reason, it has also been called Q analysis, typology construction, classification analysis and numerical taxonomy. As such the fundamental value of Q analysis is based on the classification of the data, but in contrast to factorial analysis, Q analysis groups objects, whilst factorial analysis form indicators groups.

However, Q analysis can be characterised as descriptive, atheoretical, and non-inferential. It is based on a sample and is used primarily as an exploratory technique so the solutions are not unique, this is the great disadvantage of cluster analysis.

The aims of this multivariate statistical analysis technique are to define the structure of the data by placing the most similar observations in groups based on the similarity between these observations, simplification of the data is another aim: obtaining a simplified aggregation of observations. Finally, there is the identification of relationships. With the clusters defined and the underlying data structure represented in these clusters, we have a means of showing the relationships between observations that may not be possible with individual observations. This simplified structure represents relationships or similarities and differences not previously revealed. No matter how the similarity is measured, our intention is to group those observations that are most similar within a cluster.

The number of groups to be formed creates a dilemma for the researcher: the more groups he decides to establish in the analysis, the greater the homogeneity between the observations and vice versa, the fewer groups, the greater the heterogeneity. When the number of clusters decreases, the homogeneity within the clusters decreases at the same time. Therefore, a balance should be sought between the number of clusters to be chosen.

Table 6 Distances between the centres of final clusters

Cluster	1	2	3	4	5	6	7	8	9	10
1	—									
2	3.177	—								
3	1.56	1.853	—							
4	4.12	6.922	5.241	—						
5	1.494	2.972	2.035	5.439	—					
6	3.302	1.759	2.481	7.412	2.318	—				
7	3.332	3.597	2.848	6.783	2.861	2.835	—			
8	1.929	1.559	1.325	5.96	1.448	1.557	3.095	—		
9	3.096	3.199	3.037	7.06	1.672	1.662	2.573	2.15	—	
10	2.516	2.394	1.525	6.13	2.445	2.328	1.458	2.119	2.727	—

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

Methodology

Analysis procedures are mainly divided into two subgroups. In the first, we considered the number of clusters in ten groups using the K-Means method.

Firstly, we indicate that the number of the cluster we have asked for is 10, and that the initial centres of each are calculated using the data of the exploratory factor analysis. We use the Euclidean squared distance to measure the divergence between units. Likewise, we choose the cluster centres so that they are calculated after having classified all of the objects in each of the defined clusters.

The initial cluster centres are vectors whose variables are based on the factor solution, I mean, the factor solution we have called them as:

- i. Factor 1: Youth / Recent Urban Growth.
- ii. Factor 2: Traditional Rural Society.
- iii. Factor 3: Suburban Population.
- iv. Factor 4: Residential Recreational Function.

The observation units were the sections taken from 2001 *Census of Population and Dwellings* by National Statistics Institute [INE] (Spain). The municipalities that sections belong to, are included in Bay of Cadiz, Granada, Malaga and Seville urban conurbations in Andalusia (Spain).^{17,18}

Factor analysis allows each observation unit, each section receives a score in each of the three factors we selected, whose centres of the final clusters appear in the following table (Table 5) (Table 6).

Table 5 Centres of final clusters

Factor Cluster	Factor 1	Factor 2	Factor 3
1	-0.465	1.814	0.274
2	-1.13	-1.197	-0.491
3	-0.841	0.322	0.529
4	-2.094	5.213	1.937
5	0.593	1.222	-0.599
6	0.554	-1.064	-0.983
7	1.754	-0.355	1.486
8	-0.377	0.152	-0.7
9	1.744	0.094	-1.048
10	0.319	-0.377	1.229

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

We subsequently assigned categories depending on the value of the centres of the final clusters, that we obtained according to the following frequency intervals (Ocaña 1998) and they are shown in Table 7.

Table 7 Intervals of the variables of the final centres

Intervals of variables	
Very high score	Greater than or equal to 2 (≥ 2)
High score	From 1.5 to 2 (≥ 1.5 y < 2)
	From 1 to 1.5 (≥ 1 y < 1.5)
Medium score	From 0.5 to 1 (≥ 0.5 y < 1)
	From 0 to 0.5 (≥ 0 y < 0.5)
Low score	From 0 to -0.5 (≥ -0.5 y < 0)
	From -0.5 to -1 (≥ -1 y < -0.5)
	From -1 to -1.5 (≥ -1.5 y < -1)
Very low score	From -1.5 to -2 (≥ -2 y < -1.5)
	Less than or equal to -2 (≤ -2)

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

We show that the first cluster has a final centre for factor 1 with a low value (-0.465), a high score for factor 2 (1.814), and a medium value for factor 3 (0.274) (Table 5). The remaining clusters have a value depending on an interval of value for the final centres as are shown in Table 7. For each value corresponds an interpretation shown in Table 8.

Table 8 Variables of the final centres of clusters

Factor Cluster	Factor 1	Factor 2	Factor 3
1	Low	High	Medium
2	Very low	Very low	Low
3	Low	Medium	Medium
4	Very low	Very high	High
5	Medium	High	Low
6	Medium	Very low	Low
7	High	Low	High
8	Low	Medium	Low
9	High	Medium	Very low
10	Medium	Low	High

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

Results

The major distances between clusters are cluster 4, 5, 6, 7, 8, 9 and 10 with cluster 4. The least distances are cluster 8 with 3 and cluster 10 with 7. This can be understood according with the variables of the final centres of every cluster. Clusters 1, 4 and 5 have high score in factor 2: 'traditional rural society' due to a very high score in that factor (cluster 4). In contrast, clusters 2, 6, 7 and 10 have low or very low values in factor 2: 'traditional rural society', but they differ with other clusters in the fact that cluster 7 and cluster 10 have high scores in factor 3: 'suburban population' while cluster 2 and cluster 6 are for medium ageing and high ageing people, but with an urbanised society, as it corresponds to low and very low values for 'traditional rural society' (factor 2), but they don't have high values in 'suburban population' (factor 3), so they are related to societies that are highly urbanised with a high ageing population, in comparison

with low and middle values of ageing population in clusters 7 and 10. Consequently, clusters 2, 6, 7 and 10 belong to urban societies, whilst remaining clusters are related to rural societies with highly ageing population with exception of cluster 5: 'traditional rural society' with a middle ageing population. It is interesting to realise that despite a rural society is a traditional but with middle ageing society, cluster 1 and cluster 3 have a medium score in factor 3: 'suburban population' due to the importance of people that come from central cities (with an average score) that makes us hypothesise that is due to an initial process of 'rural sprawl', probably related to second homes from people who arrived in a central city but they turned their former permanent residence into secondary residence when they took part in a 'rural exodus' before, when they were younger (Table 9).

Table 9 Number of cases in each cluster

Clusters	
1	42
2	74
3	104
4	1
5	57
6	59
7	32
8	122
9	45
10	118
Valid cases	654
Lost cases	0

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

The result maps are Figures 5–8. Our method has proved to detect census sections affected by suburbanisation and it can distinguish grades of suburbanisation through the assigned scores by factor 3 in cluster 7 and 10 with a high or medium score in factor 1, and a low score in factor 2. The rest ones are not suburbanised census sections but they may be urbanised or rural areas which doesn't mean that they may not have undergone processes of initial urbanisations (the cluster 2 and cluster 6 have very low scores in factor 2), but this wouldn't be a result of an urban sprawl through an urban diffusion from a main city in an urban conurbation, considering the low scores pointed by factor 3. Highly and very highly urbanised areas are related to residential tourism which particularly stretches in the Western Costa del Sol in Malaga province (Andalusia, Spain). All these ones share a model based on a disperse, extent and of low population density urbanisation that has an undoubtedly impact in the landscape as a result of a privatisation and physical urbanisation of early rural areas whose derived product has been known under the term of 'privatopia'⁸.

In the Bay of Cadiz urban conurbation, 2001 Census of Western sections in Puerto Real stands out with a medium and high score because of processes of urban diffusion, not only of inhabitants, but also due to industrial activities in the industrial estates of Trocadero and Tres Caminos which emerged under the 'Industrial Development Pole'⁹ of Cadiz. The last one has a very good location within the

⁸ It's a 'privatised city', the antithesis of the city as an open, collective and public space. In Rufi, V. (2003: 93).

⁹To promote industry in economically underdeveloped regions, the so-called 'Development Poles' were created, with incentives for the creation of companies in these areas, including subsidies, credits, low prices for industrial land, etc. To decongest the large industrial areas, industrial decongestion parks

Bay of Cadiz industrial complex, with the capability to absorb the demand for land, not only from Puerto Real municipality, but also in the municipalities of the rest of the Bay of Cadiz, such as Cadiz, San Fernando and Chiclana de la Frontera municipalities¹⁰. Next to the industrial Park of Tres Caminos, the industrial Park of Trocadero stands out in the Western of Puerto Real as a model of suburbanisation due to a peri-urban industry with a total industrial surface of 68.5 hectares. If we put in relation information provided by social areas analysis with clustering analysis, we could be concluding that suburbanisation was due to emigrants from Cadiz city that become suburban immigrants in Puerto Real.¹⁹

In Malaga urban conurbation, it prevails a residential suburbanisation from the main metropolis in Guadalhorce Valley, standing out the municipality of Alhaurin de la Torre, with a very high level of suburbanisation with predominance of single-family housing estates (Los Tomillares), with high level of suburbanisation in the single-family housing estate of Pinos de Alhaurin. With a moderate level of suburbanisation, it appears the oldest urbanised areas belonging to the village of Alhaurin de la Torre, as it shows both clustering and factorial analysis. In the Eastern Coast of Malaga, it appears the most populated suburb for population with middle and upper-middle class, and low ageing besides low-medium ageing life-cycle in Malaga urban conurbation: the municipality of Rincon de la Victoria with a traditional relationship with the metropolis of Malaga capital as destination for second homes since the 1970s. With the improvement of accessibility through the ring road built in 1992, the housing estates turned second homes into permanent homes. The same scheme it was observed in Alhaurin de la Torre municipality is repeated in Rincon de la Victoria: residential suburbanisation through housing estates of detached or semi-detached houses and multi-homes buildings with green and leisure private areas in enclosed urbanisations in La Cala del Moral. Both the urban centre of La Cala del Moral population entity¹¹ and the urban centre of Rincon de la Victoria in Rincon de la Victoria population entity, which are the oldest urbanised and densely populated areas in the municipality of Rincon de la Victoria were receiving the impact of an urban renovation and its replacement from a traditional rural houses in urban buildings as part of residential suburbanisation with a moderate level of intensity. The exception we can find in the eastern of the population entity of Rincon de la Victoria, in Cotomar single-family housing and multi-homes

were created, encouraging the relocation of factories from saturated areas to centres close to them. The results did not meet expectations. Industry was concentrated in the centres that already had an industrial infrastructure as little was achieved in Development Poles Polos de Desarrollo in Spanish (in Seville, Cordoba, and Granada provinces). Other actions were the creation of Urgent Industrialization Zones (ZUR in Spanish), after the industrial reconversion of the mid-80's (Bay of Cadiz). The spatial consequences of the crisis and the subsequent reconversion led to deindustrialisation and a greater attraction of other areas previously considered peripheral and which became new poles of industrial attraction in rural and peri-urban areas.

¹⁰Basic local entity of the territorial organisation of the state in Spain. A representative political institution with autonomy for the administration of community interests and, consequently, with legal personality and full capability for the exercise of its functions. The attribution of municipal powers emanates from the legislation of the State and the Autonomous Communities. Territory, population and political-administrative organisation are the constitutive components of a municipality. The first is the jurisdiction of the municipality and is known as the municipal term. This generally has a grouped population centre that coincides with the capital and town hall of a municipality. In Zoido, F. et al (2020: 240).

¹¹A population entity is a demographic subdivision of a municipality. This concept doesn't belong to any administrative division, but to criteria of population census and nomenclature. In Zoido, F. et al (2020: 153).

real estates. Further on, it's located the population entity of Torre de Benagalbon. In these cases, they are characterised by a disperse but high densely urbanisation with a higher density of dwellings than an equal density of inhabitants) and they are composed of single-family dwellings, with a private garden and parking, being less frequent a private swimming-pool whose size depends on a property dimension. The suburbanisation in the Western Coast of Malaga is coming back to be highly densely, —both in inhabitants and dwellings—, after leaving Guadalhorce river mouth for commercial and transport functions with an International Airport, followed by the satellites towns of Benalmadena and Torremolinos, which are centres with a wide offer of hotels and second homes for foreigner tourists, some of them have turned into their second homes in permanent homes, so they've become 'climate immigrants' from EU, with high economic status and a high ageing life-cycle status. They don't take part into a suburbanisation from urban diffusion from a central city as it happens in the municipalities of Alhaurin de la Torre and Rincon de la Victoria, though they have in common with these cases in the fact that they are characterised by a highly density of population and real estates in the most recent areas with lower densities in real estates of semi-detached and detached-houses with an important physical impact in environment due to these estates were built through the conversion of farming land use into urban land use which is because this resources constitute the main attractiveness of the Costa del Sol since the 1960.

In Granada urban conurbation, the municipalities with a high level of suburbanisation are Albolote, with single-family estates in Cortijo del Aire, El Chaparral, Parque de Cubillas and El Arenal attached to a suburbanisation due to a peri-urban industry in Juncaril Industrial Park. Juncaril Industrial Park is located near the town of Albolote with large open spaces. It was well developed, and it was presenting details of landscaping. It was a large industrial park that had 209.45 hectares in the mid-90's. Its large surface and the characteristics of its urbanisation was ideal for the installation of large and medium-sized firms. In its neighbour municipality of Peligros, with La Unidad-Asegra Industrial Park, it stands out single-family urban estates next to Peligros town. The surface of this industrial estate was 52.9 hectares in the mid-90's. It consisted of warehouses or built plots. The enterprises that were installed there were mainly dedicated to storage and services. On the other hand, we would mention the geographical asymmetry in the southern edge of Granada plain which a suburbanisation based on residential mobiles rather than a peri-urban industry that is quite different to the northern edge of Granada Plain which stood out as example of suburbanisation due to industrial mobiles with the exception of municipality of Alfacer. The suburbanisation mainly due to residential mobiles is majority in the southern edge in Granada Plain, with processes of addition forming a conurbated area with the same typology of housing that we previously mentioned: single-family estates with medium-low ageing to medium-high ageing in life-cycle status and medium-high socioeconomic status, as it was shown through the social diagram for Shevky & Bell's model.

In Seville urban conurbation, the municipalities of Aljarafe Platform are suburban, but not so much those ones on the edge of the eastern sharp of this platform as those ones on the top of it. For this reason, the municipalities of Santiponce, San Juan de Aznalfarache and Camas have a moderate level of suburbanisation because of they are the oldest suburbanised areas in this platform, concretely from the 1960's. In the Platform of Los Alcores formed by Guadaira river, suburbanisation prevails due to a peri-urban industry in Dos Hermanas, and Alcala de Guadaira, with a moderate level of

suburbanisation, with an exception of Montequinto neighbourhood, next to the metropolis¹² of Seville. Montequinto neighbourhood is an attractive place for highly-skilled employees with a high economic rank. As an example of suburbanisation by industry, we can mention the Industrial Park of Carretera de la Isla with had a surface of 357.23 hectares in the mid of 90's and was located in the municipality of Dos Hermanas.

But the peri-urban industrial weight it also characterises a suburbanisation with moderate level of intensity in the municipality of Alcalá de Guadaíra with several industrial estates. These industrial parks are near Dos Hermanas city with a public, private and mixed promotion and they emerged as 'Industrial Poles' through 'Development Plans (1964-1975)' during Franco's dictatorship.²⁰⁻⁴¹

Conclusion

In conclusion, social area analysis should be considered as an operative model with great economy of means that it offers information from peri-urban social heterogeneity, although the culture context and the moment in which it was applied must be taken into account due to their ephemeral nature. Regarding clustering and factor analyses, both methods are highly suitable for peri-urban fringes in process of suburbanisation because of urban diffusion, as they allow us to obtain an optimal factorial structure and, by analysing the clusters, they are also suitable to show processes of suburbanisation with a high degree of detail through Spanish census sections, besides the intensity grades of suburbanisation in an intercensal period.

The cluster analysis delimited 150 suburban sections from a total 654 urban sections without lost cases (Table 8). This implies that suburbanisation despite its huge environmental impact had a relevant presence in the Andalusian territory at the beginning of the millennium, except in the case of the Aljarafe platform in Seville and Granada Plain. It thus represented 22.93% of the total number of census sections in peri-urban areas in Andalusia considered as suburbs which a population of 279,290 inhabitants (without considering 'floating population') and somewhat more than 26.73% of the population of a total of 1,045,002 inhabitants in the selection of urban conurbation in Andalusia. This is the reason why we conclude that whereas its demographic importance is considerable, its territorial impact is huge, it is based on an urbanisation of the country or dispersed urbanisation that destroys natural land, the countryside and subverts its public use through a privatisation of public land, which they were turned into artificial land.

According to his published doctoral thesis (Górgolas 2020), he establishes a delimitation of the Andalusian coastline subject to urban planning in 2014 which included a territorial universe of 74 municipalities between the Western extreme of the coastal fringe of Huelva and the Eastern extreme of the coastal fringe of Almería within the Andalusian territory, to evaluate the impact of urbanisation of the Andalusian coastline, the area covered by the study of Pedro Górgolas covered a total of 1,104,000 hectares that represented 12.65% of the Andalusian surface and a population of 3,491,570 inhabitants (Municipal Register of 2014), which represented 41.5% of the Andalusian population in that period without considering its 'floating population' (a geographical concept that includes number of residents plus non-resident population for reasons of working,

¹²This term has been applied to the city or territory base for human presence and colonisation of wider or external areas. The term is also applied to a major city, which is the centre of a region or state. In Zoido, F. et al (2020: 232).

studying or leisure or those ones who live at least a fortnight in a municipality every year). If we compare the artificialised surface in Andalusia, according to estimates calculated from data provided by the author (2020) and we relate it to the surface under urban planning, we can infer that 36.31% of the Andalusian coastline was turned into artificialised land use in the year 2016.

This urbanisation of Andalusian urban peripheries generated a huge transformation in the Andalusian environment and its importance can be quantified from a demographic and physical point of view. As it's mentioned by Josefina Cruz (2010: 59-67), it had gone from 141,010.35 hectares and 1.6% of land use in Andalusia between 1991 to 2007 with 263,264.17 hectares and 3% of the total land converted from natural into artificial land that had doubled in surface in just over 15 years, according to data obtained from the Ministry of the Environment. However, its consequences were more serious because it represented a process of loss of rural land use which implies a whole change and an unsustainable urbanisation of rural environment. It also changes the city, becoming more and more a 'machine' to inhabit rather than a 'place' to live according to A. Rubio (2003), producing an 'ecocide' with unforeseeable consequences in natural ecosystem in which human beings frequently forget that we are part of it.

It should also be taken into account that we are referring to a past situation at the beginning of the 21st century in which urbanisation of the peri-urban fringes took place at one of its peak and went on expanding until the Great Recession (2008). The Great Recession after the 'bursting of housing bubble' ended a period of suburban growth, which hasn't been overcome yet, due to different facts: first, a pandemic crisis that started worldwide in 2020, that it was followed by a crisis of a belic origin (Figures 8–11).

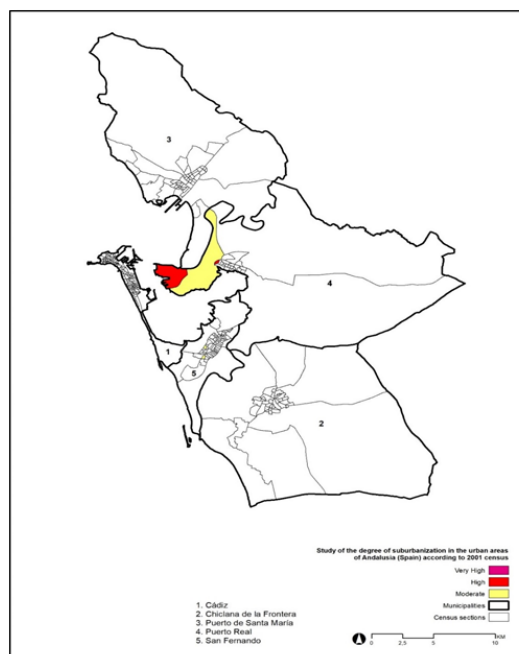


Figure 8 Spanish census sections by degree of suburbanisation. Bay of Cadiz urban conurbation.

Source: Montosa, Jesús C. & Reyes, Sergio. 2021. *Estudios Geográficos*, 82(291), e077

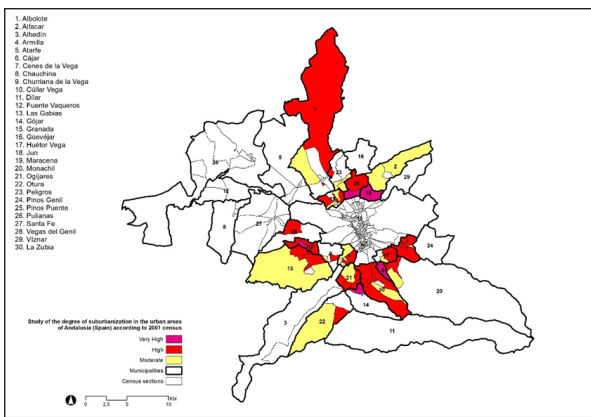


Figure 9 Spanish census sections by degree of suburbanisation. Granada urban conurbation.

Source: Montosa, Jesús C. & Reyes, Sergio (2021). *Estudios Geográficos*, 82(291), e077

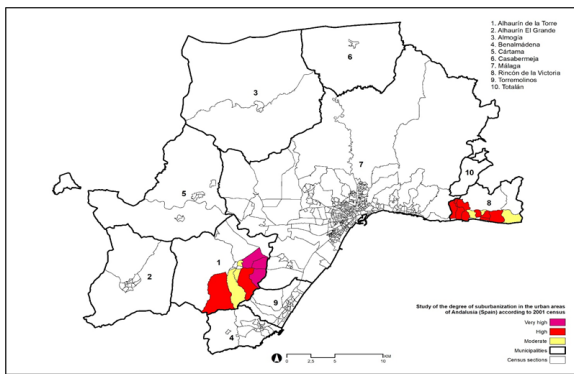


Figure 10 Spanish census sections by degree of suburbanisation. Malaga urban conurbation.

Source: Montosa, Jesús C. & Reyes, Sergio (2021). *Estudios Geográficos*, 82(291), e077

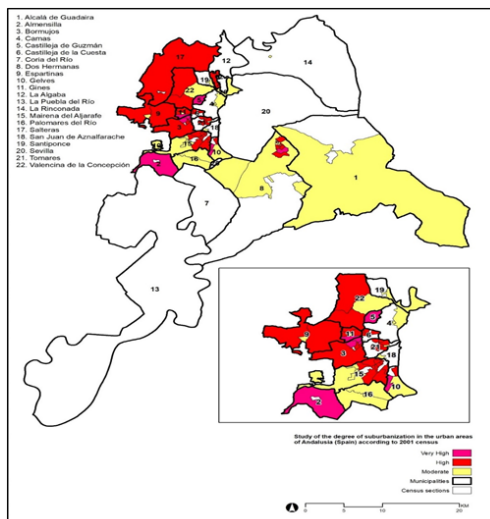


Figure 11 Spanish census sections by degree of suburbanisation. Seville urban conurbation.

Source: Montosa, Jesús C. & Reyes, Sergio (2021). *Estudios Geográficos*, 82(291), e077

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Conflicts of interest

The authors declare no conflict of interest in writing the manuscript.

References

1. Timms D. El mosaico urbano. Hacia una teoría de la diferenciación residencial [The Urban Mosaic. Towards a Theory of Residential Differentiation] Translated by S. Téllez. Colección Nuevo Urbanismo, 21. Madrid (Spain): Instituto de Estudios de Administración Local [Institute of Local Administration Studies]. 1976.
2. Ocaña C. Atlas social de la ciudad de Malaga. Malaga (Spain): Caja de Ahorros de Ronda and Universidad de Malaga [Savings Bank of Ronda & University of Malaga]. 1984.
3. Ocaña C. Análisis de las áreas sociales de las ciudades andaluzas. Sevilla (Spain): Junta de Andalucía. Instituto de Estadística de Andalucía. IEA [Junta de Andalucía. Institute of Statistics of Andalusia]. 2000.
4. Aguilera MJ. Alcorcón: estudio geográfico de un municipio del área metropolitana de Madrid. Unpublished Doctoral Thesis. Madrid (Spain): Universidad Nacional de Educación a Distancia, UNED [National University of Distance Education]. 1986.
5. Cutillas E. La diferenciación social en un espacio periférico: las ciudades de Villena, Yecla y Almansa. *Papeles de Geografía*. 2007:45–46.
6. Del Canto C, Carrera MC, Gutiérrez J, et al. Trabajos prácticos de Geografía Humana. [Second Reprint.] Madrid (Spain): Síntesis; 1998:240–242.
7. Zárata MA, Rubio MT. Conceptos y prácticas en Geografía Humana. 1st Reimpr. Madrid (Spain): Centro de Estudios Ramón Areces [Ramón Areces Research Centre]. 2010.
8. Kline P. An easy guide to factor analysis. New York (USA): Routledge; 2008.
9. Hair JF, Anderson RE, Tatham RL, et al. Análisis multivariante [Translated by Esme Prentice & Diego Cano]. [1st Reprint.] Madrid (Spain): Prentice Hall Iberia; 2001.
10. Montosa JC. Población y cambio social por suburbanización en las principales aglomeraciones urbanas andaluzas en las postrimerías del siglo XX. [Theses Awarded]. Sevilla (Spain): Junta de Andalucía. Instituto de Estadística y Cartografía de Andalucía [Junta de Andalucía. Institute of Statistics and Cartography of Andalusia]. 2013.
11. Clout H. Geografía rural. Collection: Elementos de Geografía. Barcelona (Spain): Oikos Tau; 1976.
12. Nel-lo O. ¿Cambio de siglo, cambio de ciclo? Las grandes ciudades españolas en el umbral del s. XXI. *Ciudad y Territorio. Estudios Territoriales*. 2004;36:141–142.
13. Zárata MA. Geografía Humana. Sociedad, Economía y Territorio. Madrid (Spain): Centro de Estudios Ramón Areces [Ramón Areces Research Centre]. 2010.
14. Chapter IV. Los espacios urbanos. In: Puyol R, Estébanez J, Méndez R, editors. *Geografía Humana*. Madrid (Spain): Cátedra; 1988:357–585.
15. Canosa E. Urbanizaciones cerradas en espacios metropolitanos: ínsulas para unos pocos. In: Feria JM, editor. La vivienda y el espacio residencial en las áreas metropolitanas. Sevilla (Spain): Centro de Estudios Andaluces; 2007:151–169.

16. Susino J. Determinantes sociales de la movilidad residencial. In: Feria JM, editor. La vivienda y el espacio residencial en las áreas metropolitanas. Sevilla (Spain): Junta de Andalucía. Centro de Estudios Andaluces [Junta de Andalusia. Centre for Andalusian Studies]. 2007.
17. Instituto Nacional de Estadística, INE [Spanish National Statistical Institute]. Censos de Población y Viviendas 2001 [Population and Housing Censuses 2001].
18. España en cifras 2019. [Spain in figures 2019].
19. Zoido F, de la Vega S, Piñeiro A, et al. Diccionario de Urbanismo. Geografía urbana y Ordenación del territorio. 3rd edn. Madrid (Spain): Cátedra. 2020.
20. Aguilera MJ, Borderías MP, González MP, et al. Ejercicios prácticos de Geografía Humana. 5th edn.. Madrid (Spain): Universidad Nacional de Educación a Distancia, UNED [National University of Distance Education]. 2004.
21. Geografía General II (Geografía Humana). 9th edn. Madrid (Spain): Universidad Nacional de Educación a Distancia, UNED [National University of Distance Education]. 2004.
22. Cocola A. Tourism gentrification. Loretta-Leeds with Martin-Phillips's edition. Handbook of Gentrification Studies. Collection Social and Political Science Subject 2018.
23. Cruz J. Transformaciones territoriales en Andalucía, Instituto de Estadística y Cartografía de Andalucía [Institute of Statistics and Cartography of Andalusia]: Información Estadística de Andalucía [Statistical Information of Andalusia], 2010;2(1):59–67.
24. Feria JM. Análisis prospectivo Andalucía 2020. Comportamiento del sistema urbano. Seville (Spain): Centro de Estudios Andaluces [Centre for Andalusian Studies. Junta de Andalusia]. 2007.
25. Garreau J. Edge city: life on the new frontier. New York (USA): Doubleday; 1991.
26. Górgolas P. El urbanismo en el litoral andaluz tras la última burbuja inmobiliaria. Cambio de ciclo o reincidencia. Valencia (Spain): Tirant humanidades; 2020.
27. Instituto de Fomento de Andalucía [IFA]. Catálogo de la Oferta de Suelo Industrial en Andalucía. Seville (Spain): Junta de Andalucía. Instituto de Fomento de Andalucía [Junta de Andalusia. Andalusian Development Institute]. 1995.
28. Kachigan SK. Multivariate statistical analysis. A conceptual introduction. 2nd edn. New York (USA): Radius Press; 1991.
29. Instituto de Estadística y Cartografía de Andalucía. Cartografía Censal de Andalucía: Mapas temáticos por secciones. Avance de resultados de los Censos de 2001. Sevilla (Spain): Junta de Andalucía. Instituto de Estadística y Cartografía de Andalucía [Junta de Andalusia. Institute of Statistics and Cartography of Andalusia]. 2004.
30. Méndez R. La dimensión urbana del desarrollo territorial: significado actual de las ciudades de tamaño intermedio y las periferias metropolitanas. In: Cornejo C, Morán J, Prada J, editors. Ciudad, territorio y paisaje: Reflexiones para un debate multidisciplinar: Consejo Superior de Investigaciones Científicas, CSIC [Spanish National Research Council]. 2010.
31. Aplicación del análisis multivariante a espacios en transformación: las periferias de las mayores aglomeraciones urbanas andaluzas. Boletín de la Asociación de Geógrafos Españoles, [Bulletin of the Association of Spanish Geographers], 2014. 65 p.
32. Montosa JC, Reyes S. Propuesta metodológica de análisis de áreas sociales y multivariante en franjas periurbanas de Andalucía (España) a comienzos del milenio. *Estudios Geográficos*. 2021;82(291):e077.
33. Sobre los factores de diferenciación de las áreas sociales. Paralelo 37, 1985:8–9.
34. Estructuras sociodemográficas y áreas sociales en la ciudad de Malaga. Seville (Spain): Junta de Andalucía. Consejería de Obras Públicas y Transportes. Dirección General de Urbanismo. [Junta de Andalusia. Council of Public Works and Transport General. Urban Planning Department]. 1988.
35. Areas sociales urbanas. Observaciones sobre las ciudades andaluzas. Malaga (Spain): Universidad de Malaga [University of Malaga]. 1988.
36. Microanálisis sociodemográfico de espacios urbanos. Boletín de la Asociación de Geógrafos Españoles, BAGE [Bulletin of the Association of Spanish Geographers], 2005. 40 p.
37. Regueira IE. La movilidad cotidiana en las regiones urbanas de Andalucía. La movilidad según tipos de poblamiento. Sevilla (Spain): Junta de Andalucía. Instituto de Estadística y Cartografía de Andalucía [Junta de Andalusia. Institute of Statistics and Cartography of Andalusia]. 2013.
38. Reyes R. Diccionario Crítico de Ciencias Sociales. Terminología Científico-Social. (Vol. 1). Madrid (Spain): Universidad Complutense de Madrid & Plaza y Valdés [University Complutense of Madrid & Plaza and Valdés]. 2009.
39. Rubio A. Malaga de ciudad a metrópolis. Metrópolis, 1970-2000. (Vol. 2). Malaga (Spain): Asociación Provincial de Constructores y Promotores de Malaga [Province Association of Builders and Promoters of Malaga]. 2002.
40. Vicente J. ¿Nuevas palabras, nuevas ciudades? *Revista de Geografía*. 2003;2:79–103.
41. Geografía Humana. Dinámicas locales, procesos globales. Madrid (Spain): Centro de Estudios Ramón Areces [Ramón Areces Research Centre]. 2012.