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Analysing spatial patterns of criminal behaviour in Kalamata: an interdisciplinary approach

Abstract

Crime refers to the violation of duly constituted social rules. Criminal behaviour has concerned sciences during the last centuries with approaches which focus on biological/positive, psychological and social substance of delinquency. However, there is no single theory accounting comprehensively for the respective actions. This paper approaches crime as a "social construction". Nowadays, geography of crime constitutes a milestone in the socio-spatial examination and the policy-related dimensions of this phenomenon, not only by spatial analysis but also by the optimization with the use of the GIS.

The article focuses on the spatial correlation between the crime phenomenon and some specific socio-economic characteristics in block level in a Greek city located in the south of the country, in the Peloponnese region, named Kalamata. At the same time, emphasis was given to the evolution of criminality during the last years both in national and local level, as aforementioned.

The methodology followed deals with the creation of maps which occur from the exploitation of confidential classified spatial data, offered for the needs of the research by the Hellenic Police's headquarters and the Hellenic Statistical Authority aiming to analyse the nature of the phenomenon in order to make its elimination easier.

The results of this survey show the streets with the highest crime rates in Kalamata for the years 2005, 2008, 2011, 2013 in comparison with their socio-economic profiles. Last but not least, these results could contribute to the understanding of the factors which are responsible for the spatial concentration of crime.

Key words: geography of crime, spatial analysis of criminality, Greek economic crisis, GIS

Introduction

Literature suffers from lack of research which relates criminal behaviour with the economic crisis in Greece (Spinellis 2016). The following paper[1], deals with the impacts of the Greek economic crisis on crime patterns in Kalamata.

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[1] The following work is part of Voulgaris (2017) research thesis at Department of Geography - University of the Aegean (Mytilene, Greece).

This research, correlates the economic crisis which started in Greece during 2008 with the crime rates in street level in the city of Kalamata. We start discussing some literature regarding the geography of crime as well as crime in the urban scale. We continue with the analysis of methodology and of data as well, and finally we present the results in order to reach the conclusion part.

Theoretical Background

According to the United Nations, crime exists in every country and everywhere (Newman 1999). Scholars discuss and debate the interaction between the individual, society and space (Smith, 2010; Wright, 1938; Maguire et. al. 2007; Giddens, 1989; Bernard et. al., 2010; Leaute, 1972; Hall, 1998; Zarafonitou, 2004). However, both physical and human[2] geographies of each area are different and as a result, the reason why different typologies as well as crime rates exist in different places – of course – varies.

Ceccato (2012: 4) in discussing the micro-geographical scale of crime, mentions some spatial typologies, such as *"types of buildings, facades, alleys, streets, bus stops and the types of human activities that they generate"*. She (op. cit.) also comments that *"Some of the explanations of differentiated levels of crime and fear are better associated with ecological characteristics of places, such as neighbourhoods, or qualities that can be aggregated, for instance, by census tracts."*

Today's space has taken its wider form from the commencement of urbanization and more specifically with the conversion of spaces from natural to urban or structured. This strong concentration of population in large urban centres has created a strong heterogeneity (both spatial and population[3]). This heterogeneity comes to provoke a change in personality[4] in the individual, leading to impersonal relationships that result in the feeling of loneliness and lawlessness and eventually create a deviation through alienation (Wirth 1938).

The spatial approaches of crime relate to the study of micro-geography, since emphasis is given to the place where the offense was committed and moreover on the homes of perpetrators and victims. The inclusion of these variables in research is of particular interest when it is compared with other variables of a larger scale (in city and blocks) where it is feasible to look at various factors - mainly social and economic. (Park, 1925)

The study of space in combination with deviant behaviour leads to an easier study of the dimensions of the phenomenon at a certain scale of space and time. The mapping of such phenomena in the geographical space is achieved through maps. Thus, an integral part of the study of space is its visualisation.

The science of geography – and in this paper human geography - acquires more interest in the representation of phenomena in two or three dimensions. This is achieved by cartography and geoinformatics.

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[2] Including every human activity described by social, cultural, historical etc. geography

[3] Of course, at the beginning of urbanization the population differentiation proceeds from the spatial one, since the human is the one who will build the space according to his needs.

[4] Human produces space for human. However, space shapes the human.

Case Study

Kalamata is the capital of the Prefecture of Messinia (according to the administrative division of Kapodistrias), located in the south-western Peloponnese. The last years, despite the financial crisis, is on the spotlight because of the creation and development of its infrastructure, as well as the increase of visitors. (Spanogianni, 2012)

According to the 2011 census, 54.100 citizens were living in the urban fabric of Kalamata. Despite the Greek depression which existed in the whole country during recent years, there are no high rates of unemployment. In detail, 8.78% of the population are unemployed, 10.39% are housemakers and 17.40% are employed and/or studying.

During the last years, the city is in the (Greek) public eye because of the both touristic and local development which are rapidly increasing. More specifically, as Drakakis et. al (2017) mentions, Messinia does not belong to the richest Greek areas (GDP per capita: 12.064 € in 2013) however, there is a significant participation in the primary and tourism (mainly during the summer period) sectors. Furthermore, the touristic development of the areas in not based on multinational companies, but on locals. The cooperation of local businesses with the local, state and international organisations, has played an important role in the transformation of the city into a touristic attraction. As a result, visitor rates at the local airport are constantly increasing, reaching rates higher than 70.

Data and Methodology

Data used for this research come from the Greek Police and the Greek National Statistics. Cartographic base maps in shape file format, come from the ELSTAT roads, blocks

In addition, we requested from the ELSTAT some statistical data from the 2011 census. More specifically, we asked for the following:
1. Permanent population groups by nationality (Greek, EU countries, European countries outside the EU, other countries) and state of affairs
2. Permanent population, stratified by sex and education level
3. Employed persons stratified by gender and job position, hours of habitual employment,
4. Dwellings by state of residence (occupied, vacant),

All of these data provided by city block, for the settlement of Kalamata, of the Municipality of Kalamata, of the Regional Unity of Messinia.

However, for the above data, the receipt process was difficult for us, as it was quite time-consuming and bureaucratic.

Last, but not least, we used Greek Police's crime records data for the city of Kalamata. Of course, this data set is the milestone of this research since they represent the main question of this work; the influence of economic crisis on criminality as well as the analysis of the criminal phenomenon in an urban level.

We requested Greek Police's crime records for the urban area of Kalamata for the years 2005, 2008, 2011, 2013 and 2014 in order to be capable of studying the evolution of criminality before and after the Greek economic crisis. This data provided in different tables for each year and they include the crime event recorded, street and number where the crime committed as well as the type of delinquency.

In this part it is important to mention that, as we are informed by the Headquarters of the Greek Police, because of the transition of the recording procedure from an old to a newer application during 2011, 2005 and 2008 data do not come from databases so they are fully recorded manually by users.

This is a problem because for the 2005, 2008 tables, the same street, in some cases, was coded in different ways. To make this clearer, lets focus on the example of Panagioti Kaisari street. This street, after 2011 is coded as: ΠΑΝΑΓΙΩΤΗ ΚΑΙΣΑΡΗ (in Greek). Before it was coded as: ΚΑΙΣΡΗ, ΠΑΝ. ΚΑΙΣΑΡΗ, Π. ΚΑΪΣΑΡΗ etc. We also, used the same names/code to the ELSTAT streets' attribute tables. For this reason, we had to follow a common coding changing some characters from the records as well as correcting some mistakes which were existing at the Greek Police data. We also, changed the coding at the attribute table of ELSTAT's streets' shape file in order to be able to join both tables and finally optimise the crime rates.

Last but not least, related to the crime data, in some cases there were some missing attributes which finally made us change our approach. More specifically, our initial research question was to optimise the crime hotspots in Kalamata. However, because of some missing attributes at the street's number variable, we decided to analyse crime in street level in order to avoid wrong results[5].

Having edited the above data, we tried to connect and correlate them. Using QGIS, we joined the crime data with the spatial street level data. As aforementioned, there were some missing attributes at the Police's data.

- Crime events which were located in a neighbourhood and smaller parts of neighbourhoods (*sunoikia*), finally located in road which are within the area (e.g. a street which crosses the area)
- Crime events which are located in areas without streets (such as squares) digitized as polygons. At the following maps, they appear as open spaces and include squares, parks as well as the city's cemetery.
- Crime events in corners, were digitised as well for two reasons. First, we couldn't allocate these events in one of the two streets of the corner and second, maybe through this approach, we will be able to have some more findings related to criminality at corners.

Moreover, because there is no available data which accurately maps these areas, we conducted fieldwork in order to identify them. In addition, software like Google Earth may not provide information for these areas, or they provide them wrong. This makes sense, since even locals weren't able to define the boundaries of these areas. In any case, we tried to reduce the error percentage.

We finally managed to connect the data and optimise them as well. However, because the projection of criminality in combination with the socio-economic characteristics in a block's level in a town level is futile since it does not allow us to correlate the variables in detail.

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[5] An alternative could be to allocate the events without a number at the middle of the streets. However, this approach could affect negatively and change the optimization of phenomenon, because in a street which crosses the whole city (and might be 2 km long) we can't randomly allocate the event.

For this reason, for each year there is a map of criminality in street level in Kalamata and following some streets or areas which appeared to have the highest crime records will be correlated with the data from the 2011 census[6].

Results

In this section the final results of the research are presented. The following map (map 1) optimises the streets with different rates of delinquency during the study years. Following a sample of maps (maps 2, 3 and for at the Appendix), correlating the hot spots of crime with the variables which mentioned at the data and methodology part[7].
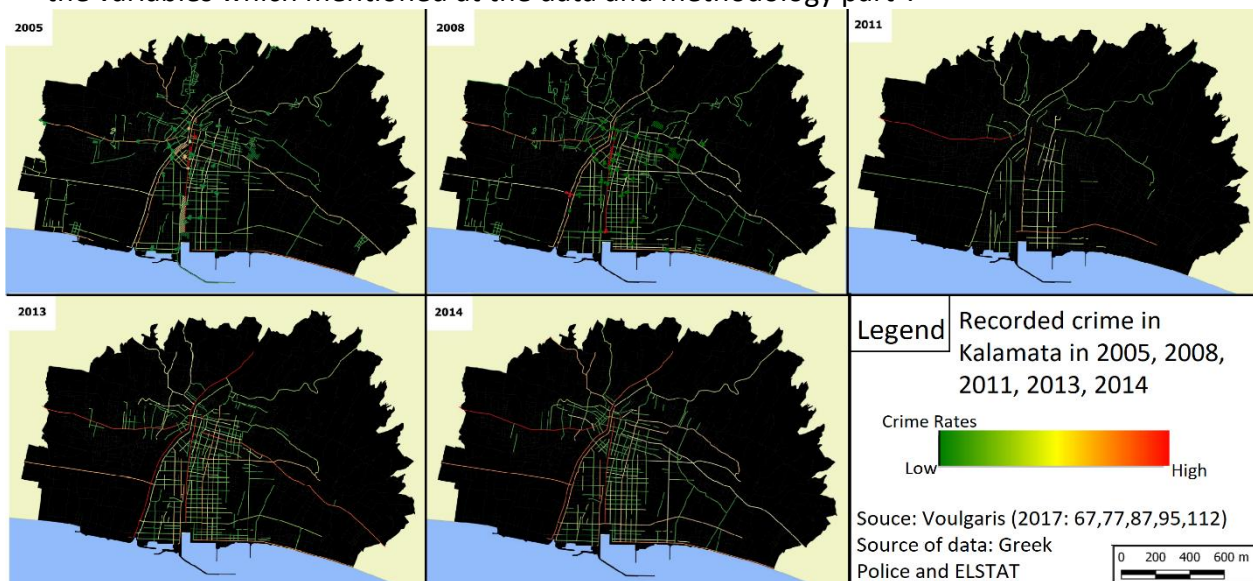
Map 1: Recorded crime in Kalamata in 2005, 2008, 2011, 2013, 2014. Map edited by the authors. Source : Voulgaris (2017: 67, 77, 87, 95, 112)

During 2005, 525 crime events of 24 different types were recorded by the Greek Police. The majority of them were thefts (236), counterfeit money circulation (172 - 94 of them at Aristomenous street) and 51 events related to drugs. Streets (and/or areas) with the highest crime rates were: Aristomenous (101), Sidirodromikou Sthatmou (19), Nauarinou (17), Vasileos Georgiou Square (17), Athinon (10) and Nedontos (10).

Whilst most of the delinquency was concentrated on the city centre, less crime events were recorded at the southern part. There is no criminality in the surroundings, except for some main roads which –most of them- end up at the city centre.

Correlating the areas with the highest rates of crime with the hours of habitual employment, we observed that the majority of the population which lives in these areas works 40-49 hours per week, compared to 30-39 and 50 and above hours per week, while the minority works 0-29 hours per week.

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[6] See Voulgaris (2017) for maps which optimise all the possible combinations of socio-economic data with high levels of crime.

[7] More maps and tables which are related with the analysis, are in Voulgaris, 2017: 62-122

Regarding dwellings around the streets with more than 10 crimes in 2005, most of them are occupied by permanent population. At the part of the city which is by the beach most of the dwellings are holiday homes as well as secondary houses.

Education level varies and there is no a common type observed in the streets we focus. At the areas close to Athinon street, the majority of the population had received across the range of less than 6 years to more than 12 years of education. On the other, at Naurinou street, most of the citizens have completed 12 years in education and some of them are Bachelor's and/or Master's degree holders.

In 2008 criminality in the city of Kalamata were recorded 392 events of 21 different types. 256 of them were related to thefts, 55 to drugs and only 32 are money forgery (140 less than 2005). Although in 2008 crime concentrated in the northwest part of the city, the city centre still (as in 2005) had lots of crime events. Aristomenous (19), Athinon (11) and Naurinou (10) –they were also streets with high crime rates in 2005, so they are already correlated with the 2011 census' data- streets gather the highest rates of crime.

2011, as aforementioned, is the year when the Greek Police performed the transition of the recording procedure from an old to a newer application. This might have affected the data we received and could be a possible explanation why the recorded crime reaches only 92 events. Although there is a risk of statistical error, 11 different types of deviant behaviour were recorded, 16 of them in Athinon street, 10 of them on Kritis street and the rest in other parts of the road network. Most of the events are about thefts and vehicles thefts as well. It is also observed a reduction of crime in the urban fabric of the city. Most of the events, were recorded in central or long streets which cross or end at the city centre. Regarding Kritis street (which hasn't been studied yet), city blocks are bigger in comparison with these areas that we have already analysed. Moreover, hours of habitual employment vary, however, the majority works more than 40 hours per week. In addition, most of the dwellings are occupied by permanent citizens and there is also observed a high amount of holiday and secondary residences. Regarding the education level, around Kritis street, most of the residents have completed at least twelve years of education, while enough are these who have graduated with bachelors or master's degree.

Three years later (2013), delinquency recorded by the police is 478 singe events. There were recorded 48 different types of delinquent behaviour and moreover, more than 10 events were recorded in 9 different streets; Artemindos (23), Athinon (20), Aristomenous (20), Lakonikis (18), Nauarinou (14), Iroon Polutechniou (13), Faron (13), Psaron (13), Vasileos Georgiou (11). After correlating the above streets with the variable of the hours of habitual employment, we found that at the southeast part of the junction between Lakonikis street and Faron street, there is a huge percentage of population working less than 10 hours per week.

Most of the dwellings are occupied by the permanent population, however, at the northern part of Aristomenous street and in the area between Aristomenous and Lakonikis street, there are many secondary dwellings.

The average education level is the twelve-year education, but the areas around the junction of Faron and Lakonikis, higher education level is observed from many residents.

Finally, during 2014, 464 crime events observed in Kalamata categorised in 58 different types. Most of them where recorded in the following streets: Athinon (40), Aristomenous (37), Artemidos (19), Iroon Polutechneiou (13), Naurinou (13), Psaroon (13), Nedontos (12), Leikon (11), Kallipateiras (10), Kritis (10), Mauromichali (10), Pamisou (10), Faron (10). Most of the events in these streets were: counterfeit money circulation, breach of a judgement, threat,

vehicles' theft, theft, aggravated cooperation on drugs, infringements in entertainment spaces (clubs, bars etc.).

The majority of population living in the areas around Kallipateiras, Mauromichali and Pamisou streets and in the southern part of the city centre, works 40-49 hours per week. At the west part of Kallipateiras street, there are observed mainly less than 19 or more than 50 hours of habitual employment.

As we have already mentioned, most of the houses in the areas with high crime rates, are occupied by permanent population. An exception is the area from Artemidos street to Mauromichali street where dwellings are both occupied by permanent residents, and secondary or rented dwellings.

Regarding the education level, in the part between the Artemidos street and Faron street as well as around Kallipateiras and Kritis streets, it is observed the highest rate of higher education graduates.

Conclusions

Crime is a complex and multidimensional phenomenon and we should never approach it unilaterally. A concurrent study which combines different factors may lead to more complete ideas about the causes that finally caused the phenomenon. A solution to multi-criteria analysis is GIS, through which we can identify the areas with the higher rates of delinquency and compare them with different attributes. Thus, the science of geography is an important field of study of the phenomenon of crime, as it enables us to study it in the light of different variables on different scales.

It is observed that there is a lack of literature which analyses the relation between the Greek economic crises and crime, while statistical approaches alone cannot lead us to scientifically correct conclusions.

In the city of Kalamata, it is observed a positive correlation between hours of habitual employment per week and the areas which are hotspots of deviant behaviour. Less important is the relation of the state of residence with criminality and moreover, there is no relation observed between the correlation of education level with crime.

Spatially, on all the years we focused, criminality gathers in central areas and in streets which cross the city centre. Moreover, the first years of the study, deviant behaviour was intense around the city centre, however this changed the last years as delinquency is recorded more in the city centre.

Finally, according to the Greek Police statistics, we conclude that the economic crisis did not directly affect the number of delinquency in the city. Thus, we would like to put emphasis on more research to link the Greek economic downturn to delinquency, while an analysis at the building block rather than the street level can lead us to a more complete picture of the exact characteristics of the regions.

Such surveys require as much as possible collected and recorded data and would be particularly beneficial for researchers if the various bodies collaborated with each other to create common fields in their databases.

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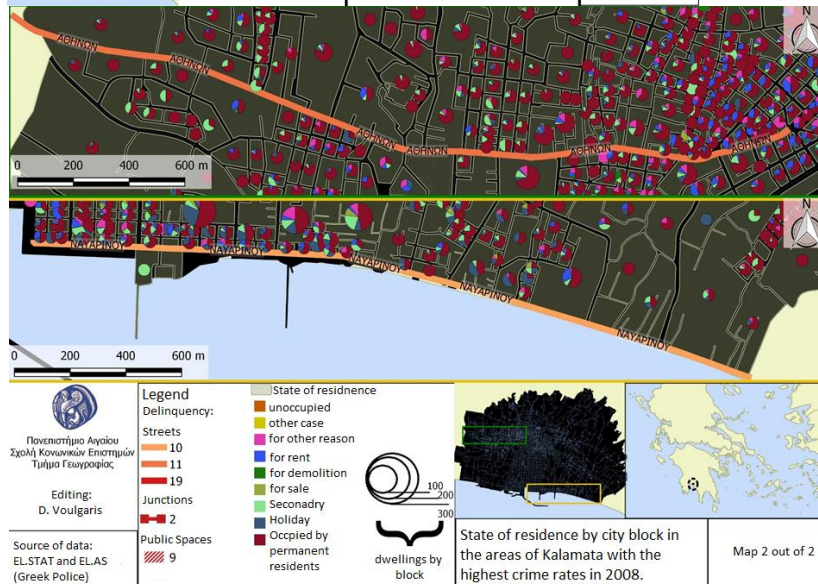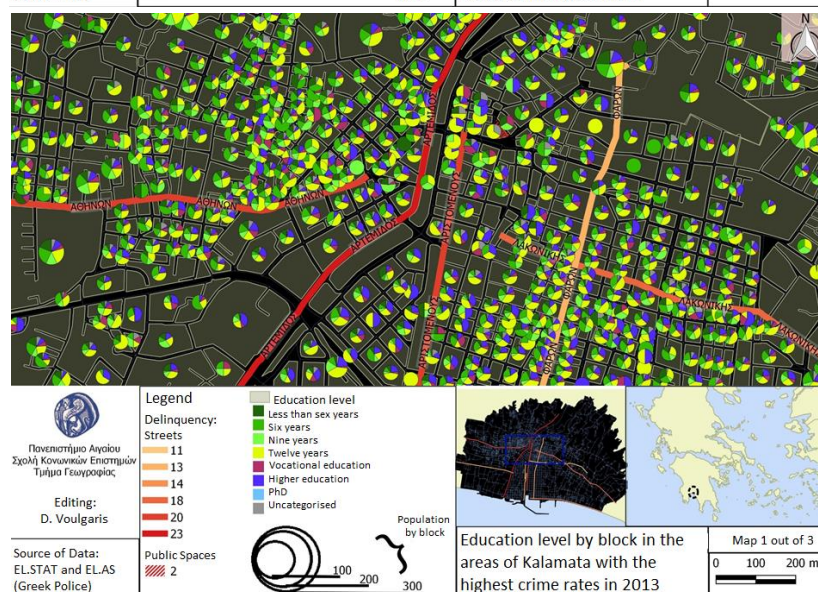
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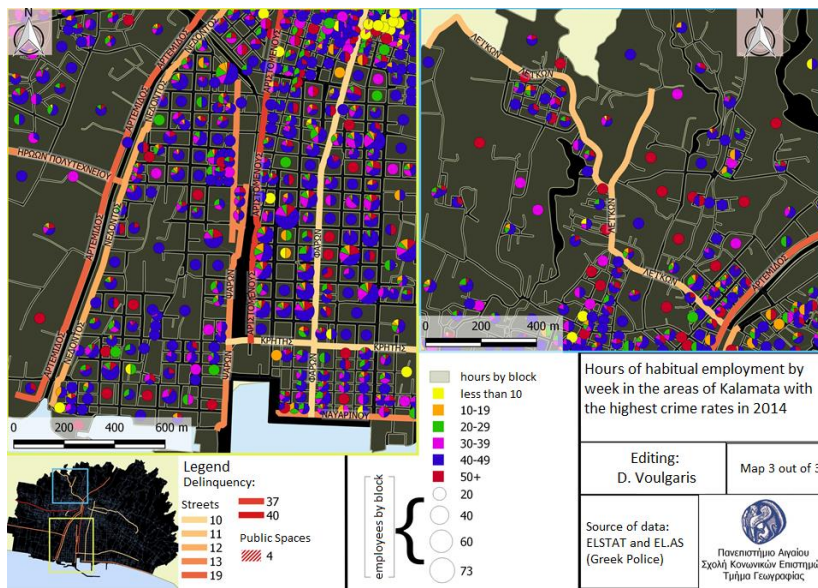
*M*ap 2: Hours of habitual employment by week in the areas of Kalamata with the highest crime rated in 2014.
Source: Voulgaris, 2017: 115, Translated by the authors

Map 3: State of residence by city block in the areas of Kalamata with the highest crime rates in 2008.
Source: Voulgaris, 2017: 81, Translated by the authors

Map 4: Education level by block in the areas of Kalamata with the highest crime rates in 2013. Source: Voulgaris, 2017: 104, Translated by the authors