

SPATIAL ANALYSIS OF THE CHOSEN SOCIO-ECONOMIC DETERMINANTS OF CRIME IN POMERANIAN VOIVODESHIP IN 2015

Bartosz KORINTH *

University of Gdańsk, Faculty of Oceanography and Geography, Poland
e-mail: bartosz.korinth@dzielo.pl

Oskar SKOMSKI

University of Gdańsk, Faculty of Oceanography and Geography, Poland
e-mail: oskomski@gmail.com

Tamara RUTKOWSKA

University of Gdańsk, Faculty of Philology, Poland
e-mail: tamara.rutkowska@op.pl

Abstract: The main assumption of the study conducted by the authors was to analyse the chosen determinants of crime in pomeranian voivodeship in 2015 with particular focus on their spatial variability. The collected data was intercorrelated using the method of signboard. One can notice a particular division of this administrative unit of Poland, where the dominant role in the crime phenomenon is played by social (e.g. in slupski district) or economic (e.g. in chojnicki district) factors. The results of the study provide a new outlook on the geography of crime, particularly the one covering the regions of Poland.

Key words: determinants of crime, geography of crime, Poland, pomeranian voivodeship, socio-economic analysis

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INTRODUCTION

The paper's aim is to survey and analyse the chosen socio-economic determinants of crime in pomeranian voivodeship, aggregated on the level of districts, in 2015. Using the open-access data provided by the Central Statistical Office, the authors selected such independent variables as: unemployment rate, the amount of remuneration, urbanisation level, the number of divorces per 1000 population, the number of women per 100 men and population density. Those were then intercorrelated and put in the form of spatial presentation of data using a signboard (Ilieș et al., 2017; Herman et al., 2016; Parysek and Wojtasiewicz, 1979). With this method, the authors tested in which regions the above mentioned variables' have a greater or lesser impact on the crime phenomenon.

The growth of crime and its negative effects (Sztaudynger and Sztaudynger, 2003) constitutes the main reason for using the scientific advances of the geography of crime in order to

* Corresponding Author

conduct strictly criminological analyses. Simultaneously, it extends the range of knowledge regarding crime prevention, which aim is to develop measures to pre-empt crime (Kuc, 2015). Both in Gdańsk, Poland and in the whole Europe, the geography of crime is not a widely-known discipline of study (Wendt, 2001), despite the fact that it provides us with the proper tools to delineate crime in space and the criminology's analyses conducted by the adequate units.

LITERATURE REVIEW

According to the encyclopaedic definition, crime can be described as a blamed on a man deed which is harmful to a high degree. It is a well-defined phenomenon subjected to penalty by operation of criminal law. When studying crime to learn about its mechanisms, many criminologists focus on the fundamental causes of the phenomenon (Laub and Sampson, 1993), more or less directly basing the study on the data provided by the research conducted in the environment of the person blamed for the prohibited act and his or her mental experience (Gottfredson and Hirschi, 1990). Consequently, by paying a particular attention to the research trying to describe the cause and effect relationship in crime, many papers highlight the importance of socioeconomic determinants.

The analysis of literature concerned with chosen causes of crime, which was conducted by the authors, revealed that the sets of variables are often selected by the researchers in an arbitrary way. Therefore, they ambiguously show whether a given factor is more or less connected to the phenomenon of crime. The crime rate is then possibly dependant on many factors (often problematic to measure), which in turn makes it questionable whether or not one can consider them to be criminogenic. For instance, the mechanism of making rational, economic decisions with regard to losses and gains constitutes a problem (Becker, 1968), as well as ethical standards and priorities one adheres to, and it should also be included in the studies.

Nevertheless, there are many factors strongly connected to the crime rate, which can be presented as measurable points included in statistical data of various kind. A well-known American economist, sociologist and demographer, G. S. Becker, claims such factors as gender, age, level of education or wealth to be criminogenic (Becker, 1968). Therefore, he suggests the more individual and unitary approach to every of the subjects undergoing research. I. Ehrlich takes a slightly different stand regarding this matter, as in one of his papers he introduces the econometric model of crime, taking into consideration the strong correlation between crime rate and the number of men per 100 women, median household income of a given community, unemployment rate and other factors of socioeconomic nature (Ehrlich, 1973). Other researchers, including sociologists and psychologists, suggest mental condition of the subjects to be criminogenic, as according to them some people are far better predisposed to commit a prohibited act.

One can easily notice the ambiguity in the causes of crime suggested by the authors. The situation has been changing as well under the influence of new phenomena appearing and becoming dominant in the given communities. For instance, the researchers more and more frequently indicate on the role of urbanisation and population density to be crucial for the increasing crime rate of a given region (Wendt, 2004; Kadziolka, 2016). Therefore, they imply that with the increase of population density, the access to potential crime victims is easier. The cities, in turn, offer more pecuniary advantages and less likelihood of recognising and arresting (Glaeser, et al., 1996).

Some researchers also consider the factor of a broken home to be the source of social disorganization (Groves and Sampson, 1989). Furthermore, the feminisation rate is often suggested to be a significant determinant of crime, as there is a comparatively higher number of men in the country's prisons.

It is worth noting, however, that the criminogenic factor will be of dissimilar significance in the case of cybercrime, where the most prominent factors would be the computerisation rate or public crime with causes explained by analysing the number of fires or car accidents (Michalski, 2012).

METODOLOGY

The authors of the paper attempted to identify the relationship between the intensity of the phenomenon of crime and the given explanatory factors of social nature, that is: the number of divorces per 1000 population, the number of men per 100 women and population density as well as the factors of economic nature, such as: unemployment rate, the amount of remuneration and the level of urbanisation. In order to adopt a completely new approach to the phenomenon in study, the authors had chosen those of the factors which, according to them, may have the strongest influence on the crime rate nowadays.

Those were chosen taking into consideration the method of signboard, the purpose of which is to classify data matrices according to class division. The initial phase of study included defining those data matrices as well as calculating their median. Furthermore, the remaining numbers were compared to it. When the value of a given factor was higher than the median, the authors put a plus sign; when it was lower, they put a minus sign. Consequently, in a spatial presentation of the data there is a visible division of the pomeranian voivodeship's districts into eight groups:

- group 1: the areas with a very high influence of the determinant, where for all of the factors $x_i \geq Me$;
- group 2, 3 and 5: the areas with a high influence of the determinant, where two out of three factors equal $x_i \geq Me$;
- group 4 and 7: the areas with a low influence of the determinant, where one of the given factors equals $x_i \geq Me$;
- group 8: the areas with no influence of the determinant, where none of the factors equals $x_i \geq Me$.

The classification above is based on the formula presented in the following table (table 1).

Table 1. The formula used in spatial analysis using the method of signboard
(Data source: Runge, 2006)

Class	The factors' signs		
	1	2	3
1	+	+	+
2	+	+	
3	+	-	+
4	+	-	-
5	-	+	+
6	-	+	-
7	-	-	+
8	-	-	-

The final phase of research included the analysis of the gathered material and presenting its characteristics in the form of spatial variability, simultaneously maintaining the division of factors into social and economic. As a consequence, the fragmentation of pomeranian voivodeship into two sets was achieved.

RESEARCH RESULTS AND DISCUSSION

Economic determinants

When analysing the data presented in the table 2, one can notice the division of pomeranian voivodeship into districts, where the majority of chosen by the authors variables have a strong influence on the crime rate, as well as the districts, in which the influence of economic determinants cannot be observed.

The median of the first variable equals 11.65%, therefore it is noticeable that there are districts with the percentage significantly higher, as it fluctuates between 18-23% in the case of czluchowski (18.8%), malborski (19.5%) and nowodorski (23.4%) districts.

Table 2. The characteristics of variability of economic factors in pomeranian voivodeship’s districts in 2015 – the method of signboard

(Data source: own elaboration based on the distributed materials)

The name of the district	Unemployment rate (%)	The amount of remuneration (zł pre-tax)	The level of urbanisation (%)
bytowski	17.6 (+)	3447.30 (+)	35 (-)
chojnicki	14.4 (+)	3133.05 (+)	57 (+)
czluchowski	18.8 (+)	3384.44 (+)	44 (-)
gdanski	6.1 (-)	3806.02 (-)	27 (-)
krtuski	5.4 (-)	3275.79 (+)	17 (-)
koscierski	10.5 (-)	3117.95 (-)	33 (-)
kwidzynski	9.1 (-)	3771.88 (-)	57 (+)
leborski	14.7 (+)	3554.76 (-)	59 (+)
malborski	19.5 (+)	3408.03 (+)	67 (+)
nowodworski	23.4 (+)	3422.12 (+)	31 (-)
pucki	12.0 (+)	3584.09 (-)	35 (-)
slupski	15.4 (+)	3497.25 (-)	20 (-)
starogardzki	11.4 (-)	3560.38 (-)	48 (-)
sztumski	16.3 (+)	3455.74 (+)	37 (-)
tczewski	9.1 (-)	3821.28 (-)	65 (+)
wejherowski	11.9 (+)	3441.57 (+)	58 (+)
The city of Gdansk	4.0 (-)	4992.14 (-)	100 (+)
The city of Gdynia	4.9 (-)	4566.82 (-)	100 (+)
The city of Slupsk	7.9 (-)	3478.22 (+)	100 (+)
The city of Sopot	3.4 (-)	4836.93 (-)	100 (+)
The median	11.65	3487.74	52.5

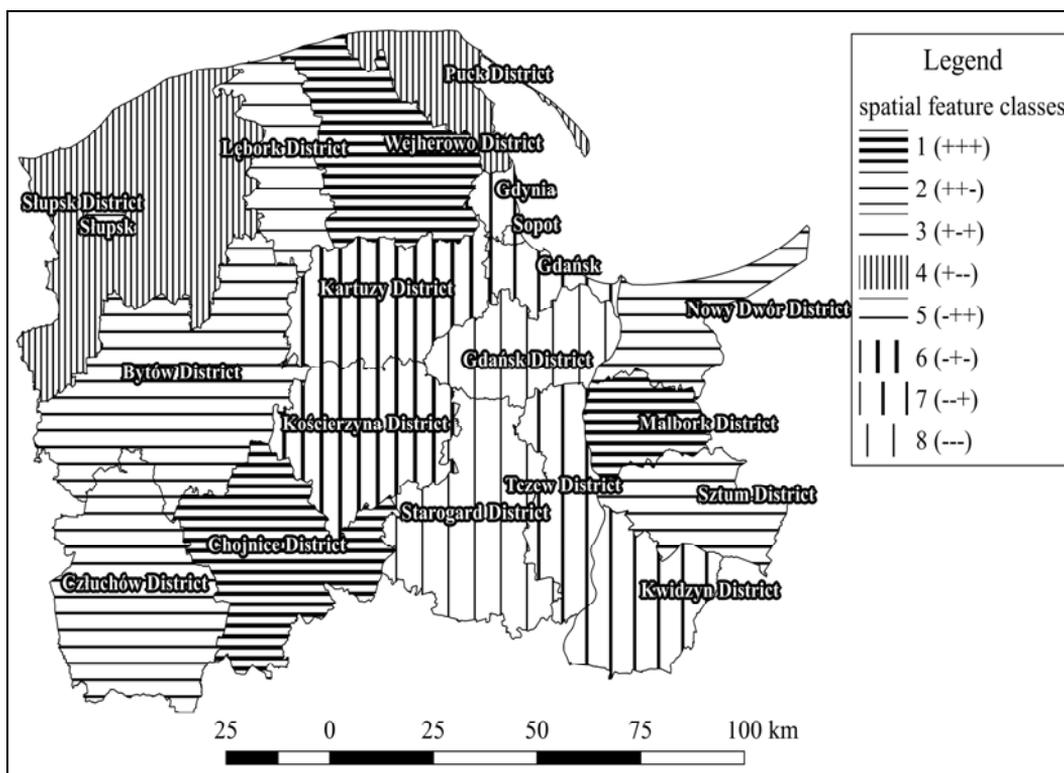


Figure 1. Spatial variability of the economic determinants of crime in pomeranian voivodeship in 2015 – the method of signboard

(Source: own elaboration based on the open-access materials)

The majority of the cities of pomeranian voivodeship are in the opposite situation, including the cities of Gdansk, Gdynia and Sopot, where the unemployment rate is significantly lower and fluctuates between 3-8%.

One can also notice the visible differences in terms of the amount of remuneration, the median of which equals 3487.74 zł pre-tax. The presented data allow to observe that especially chojnicki (3133.05 zł), kartuski (3275.79 zł) and koscierski (3117.95 zł) districts are marked by this determinant of crime. The amount of remuneration should not, in turn, influence the crime rate in the county towns: Gdansk, Gdynia and Sopot, as in those places it is significantly higher than the median.

The last of the economic determinants, prominent according to the authors of the paper in terms of its possibly strong influence on the crime rate in pomeranian voivodeship, is the level of urbanisation. According to the papers referred to before, the number of prohibited acts caused by this determinant should be the highest in the cities of Gdansk, Gdynia, Sopot and Slupsk, where it equals 100%. The kartuskie (17%) and slupskie (20%) districts constitute the least urbanised areas.

As the method of signboard had been applied in the previous analysis, the division of the districts into eight classes was formed and presented on the cartogram above. The spatial variability of pomeranian voivodeship is, therefore, easy to notice. One can observe the analogical situation of the determinants in the case of the districts in the southern part of the voivodeship, namely the nowodworski, malborski and sztumski districts, which are marked by the relatively high influence of the determinants of crime chosen by the authors.

The similar situation is noticeable in the central part of the administrative unit in study, that is in kartuski, koscierski, gdanski, tczewski and starogardzki districts, as well as in the cities of Gdansk, Gdynia and Sopot. One can presume to observe a comparatively low influence of economic determinants on the phenomenon of crime in those regions. The low unemployment rate and favourable amount of remuneration in the majority of listed areas most probably do not correlate with the phenomenon of crime present there, especially while one takes into consideration the situation in starogardzki district, where all three factors are relatively highly influential.

Social determinants

The table 3 presents the variability of the districts in terms of social determinants, namely: the number of divorces per 1000 population, the number of women per 10 men and the population density, which can have, according to the subjective opinion of the authors, a particularly strong influence on the crime rate of the given areas. The chojnicki district constitutes the region which is marked by its most positive situation among other districts in terms of the study analysis, as it notes three determinants with a relatively low influence on the occurrences of prohibited acts. The least positive situation as far as the analysis of the data is concerned (table 3) can be observed in wejherowski district, where all of the listed variables influence the crime rate.

The internal disproportion of the pomeranian voivodeship's districts is noticeable in the case of all of the listed above factors. The number of divorces per 1000 population can constitute a criminogenic factor in gdanski, kwidzynski, slupski, tczewski and wejherowski districts, as well as in all of the district's cities except Sopot (in which the number of divorces per 1000 population fluctuates between 0.25-0.26).

Furthermore, the internal variability of the particular districts and cities is noticeable when analysing the number of women per 100 men. In the case of the cities, the number of women is significantly higher than the number of men, which can affect the lower influence of this factor on the occurrences of prohibited acts. The entirely dissimilar situation can be noted in the case of population density, where high rates observed in the cities naturally can affect the development of the phenomenon of crime.

Comparing the data presented above with the data of the previous cartogram (figure 2), one can notice an analogous convergence concerning the administrative division of pomeranian voivodeship.

Table 3. The characteristics of variability of the given social determinants in the pomeranian voivodeship's districts in 2015 – the method of signboard
(Data source: own elaboration based on the open-access materials)

The name of the district	The number of divorces per 1000 population	The number of women per 100 men	The population density (km2)
bytowski	0.14 (-)	101 (+)	36 (-)
chojnicki	0.18 (-)	103 (-)	71 (-)
czluchowski	0,15 (-)	102 (+)	36 (-)
gdanski	0.20 (+)	103 (-)	138 (+)
kartuski	0.13 (-)	100 (+)	115 (+)
koscierski	0.16 (-)	100 (+)	61 (-)
kwidzynski	0.20 (+)	101 (+)	100 (-)
leborski	0.19 (+)	103 (-)	94 (-)
malborski	0.18 (-)	104 (-)	130 (+)
nowodworski	0.18 (-)	102 (+)	54 (-)
pucki	0.14 (-)	102 (+)	145 (+)
slupski	0.21 (+)	100 (+)	43 (-)
starogardzki	0.18 (-)	103 (-)	95 (-)
sztumski	0.15 (-)	101 (+)	58 (-)
tczewski	0.20 (+)	103 (-)	166 (+)
wejherowski	0.20 (+)	102 (+)	163 (+)
The city of Gdansk	0.26 (+)	111 (-)	1765 (+)
The city of Gdynia	0.26 (+)	111 (-)	1831 (+)
The city of Slupsk	0.25 (+)	112 (-)	2144 (+)
The city of Sopot	0.19 (+)	116 (-)	2155 (+)
The median	0.19	102.5	107.5

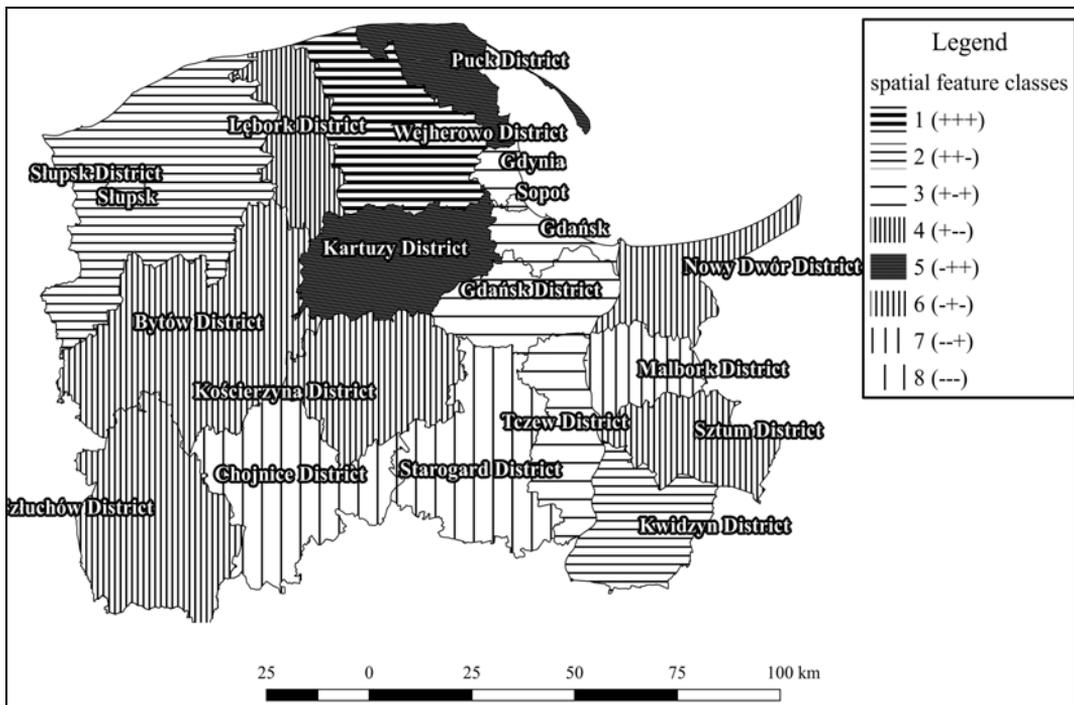


Figure 2. Spatial variability of social determinants in the crime rate of pomeranian voivodeship in 2015 – the method of signboard
(Source: own elaboration based on the open-access materials)

Once again there is a visible division into its eastern, central and western part. The districts analysed in terms of their social determinants are marked by the different ratios, however, than it was in the case of economic determinants, which were discussed above.

The study concerned with the eastern part of the region, namely sztumski, malborski and nowodworski districts, revealed the relatively low influence of such social determinants as the number of divorces per 1000 population, the number of women per 100 men and population density. The data presented on the map analysed by the authors determine, that only one of the three chosen variables can affect the occurrences of prohibited acts.

The opposite situation was observed in the area covering almost all bigger cities of the pomeranian voivodeship's districts, that is Gdansk, Gdynia and Sopot, where the authors noted the higher influence of those of the determinants, in which two out of three ratios are marked by a negative connotation. Simultaneously, it is worth noting that there is a considerable difference between those cities and other districts in terms of population density, as in the cities it frequently exceeds the previously calculated median. Similar numbers can be observed in the case of Slupsk, located on the western outskirts of pomeranian voivodeship.

Furthermore, the situation of chojnicki district is also noticeably different, as although the area was strongly affected by economic determinants, the social ones are not as influent and they should not alter the crime rate of the district.

CONCLUSIONS

The geography of crime's role should become more prominent in the future, both in the case of scientific studies and crime prevention policy. By using this particular discipline of geoscience, state authorities can effectively minimize the phenomenon of crime in a given area. The authors of this paper attempted to merely outline the processes for the interest of adequate institutions, reducing the main theme of the study to a question: what moves should we make in order to enhance the safety level of the citizens of a given country or administrative unit?

The authors had chosen only determinants of crime out of all socioeconomic ones suggested in various papers, leaving all the remaining ones for a further analysis. The results of the study provided by the paper allow to suggest a direction of changes leading to minimising the crime rate of the analysed districts. Furthermore, the division into social and economic determinants and their role in the phenomenon of crime should be taken into account.

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