

Creating Safer Cities through Urban Planning and Development

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crossref <http://dx.doi.org/10.5755/j01.ppaa.11.3.2498>

Abstract. *Crime has always been one of the major concerns of residents of many cities around the world. It is one of the fundamental threats faced at every level of society - individual, organizational, sub-national, national, international/global. The need to assure a high level of security for the city's inhabitants and visitors is one of the most important tasks of local government. It is clear that only a comprehensive strategy with different crime fighting methods can bring positive results. Although theories coming from social sciences dominate this field of research, the authors of the paper emphasize the role of other perspectives, especially those developed by urban planners. The second part of the paper describes the process and results of the empirical research conducted in Vilnius city which was aimed at identifying the most vulnerable to crime open public spaces of the city applying the space syntax theory. The analysis helped to identify several common tendencies and specific proposals for local governments aiming to achieve a higher level of security in their cities and a better quality of life for local population.*

Keywords: *urban development, crime, urban structure, space syntax.*

Raktažodžiai: *miestų vystymasis, nusikalstamumas, miesto struktūra, erdvės sintaksė.*

Introduction

In the era of intense global competition, successful cities have to offer a set of qualities, which increase their attractiveness to current and potential resources - different society groups, which guarantee its development: skilled, creative and active people, successful businesses and investors, regional and international visitors. These mobile resources appreciate different set of city's characteristics, however, different researches show that public safety and security is almost equally important to all the groups. Therefore, the assurance of a high level of security and safety in a city is one of the most pressing issues in urban managers' agendas and an important objective of public (urban) policy research.

As local governments are responsible for city development processes, city managers have to know different methods and measures to deal with the causes of

insecurity of city's population. They must seek for expert consultations representing different fields on methods to effectively deal with crime manifestations on city's territory and supervise their application when the need arises.

There are different perspectives towards the causes and solutions for crime prevention and control: sociologists propose to invest in socialization, to improve social construction of urban communities; criminologists associate crime with socio-demographic factors such as income, racial composition, youth concentration, level of education; urban planners relate crime to environmental design factors, such as orientation of entrances and windows, lighting, street accessibility, area visibility, and others.

Urban spatial structure plays an important role in understanding and prediction of human behaviour, yet it is worth noting that there have been few theoretical approaches that address the crime control issue from a spatial perspective.

This paper will report on findings of theoretical and empirical research conducted by a group of scholars of Kaunas University of Technology representing urban planning, public administration and management fields. In 2012, with the support of the Research Council of Lithuania, the group examined the relationship between urban space and its impact on crime in Vilnius city for the search of solutions to prevent occurrence of crime with architectural or urban planning tools. The research is based on the methods of space syntax, statistical data analysis, expert interview, document analysis. Results of the research help to identify and suggest corrections in previous urban planning, as well as to avoid them in future projects. This change should help to achieve a higher level of safety in Lithuanian cities and, respectively, higher level of their attractiveness and a more successful development.

Public Safety and Security as a Key Precondition of Urban Development

Decentralization of government competencies, responsibilities and resources, transfer of decision-making powers from national level to lower government levels give local communities more decision-making powers, as well as responsibility for the quality of life of community members. Different researchers [9, 3, 22] denote that nation-states transfer increasingly more powers and responsibilities to local level authorities in order to take advantages of globalization at the level, where their expression is most intense.

As different studies on urban attractiveness [12, 13, 2] show, different groups of society (investors, inhabitants, visitors, other) - in marketing terms called „city target groups“- look for a different set of city's characteristics: good accessibility, good employment opportunities, good quality of educational system, access to capital, diversity of culture and arts, etc. - just to name a few. It is important to note that members of each group name the public safety and security as one of the most important factor of city attractiveness. Therefore, assurance of high level of personal or corporate security remains among the most pressing issues on most urban managers' agenda and an important objective of research.

Crime has always been one of the major concerns of residents of many cities around the world. It is one of the fundamental threats faced at every level of society - individual, organizational, sub-national (cities, region), national, international/global:

Crime is directly related with the sense of personal safety - a basic need of every individual, which takes precedence and dominates behaviour, as the classical Maslow's [17] hierarchy of needs indicates. These safety and security needs include personal security, financial security, health and well-being, safety net against accidents/illness and their adverse impacts. High rates of crime in a city is a serious barrier for the city's development, as businesses will tend to move their operations to a safer place for human, capital, technological and other resources. As Cullen and Levitt [7] denote, crime has a powerful effect on residential decisions: individuals, who have a choice, will tend to move away from dangerous neighbourhoods to live, attend school, shop, work and recreate in safer places.

The same holds true for business. As customers and employers avoid areas with higher rates of crime, executive recruitment efforts suffer and business companies move to other places. Declining job opportunities influence cutting back on public services; this, in turn, leads to community deterioration and can create an inevitable spiral of social and economic decline [22].

Crime is a serious negative factor for another important development resource of a city - visitors. As the data of Global Study of Homicide of the United Nations Office on Drugs and Crime (UNODC) [21] and other international reports show, organized crime can endanger not only local, but also national democracy and security.

Crime and urban development are strongly interconnected, therefore local development policies cannot be successful if they do not integrate crime prevention strategies. Authors of the UNODC report [21] pay our attention to the fact that "there is a clear link between violent crime and development: crime hampers poor human and economic development; this, in turn, fosters crime. Improvements to social and economic conditions go hand in hand with the reduction of violent crime." Cook [6] points to the fact that „a reduced potential for crime would be a by-product of an increased investment in effective programs to enhance children's health and education; to provide good, licit employment options for young adults; to strengthen families and communities; and to foster justice.“ The World Bank [20] further emphasizes the negative impact of crime on development: "Crime constitutes a serious impediment to economic and social development globally. In many urban centres across the world, high crime and violence rates are undermining growth, threatening human welfare and impeding social development". Therefore, crime prevention and control must be one of the top priorities in urban policymaking.

Concept of Open Public Space

What particular measures does a city have for crime prevention and control in its area? If it is a serious threat to the city's development, yet major causes for crime are directly influenced by social, economic, cultural and other factors, which very often are outside of the city's control (due to national policies, allocation of resources,

other), what a city can do to influence the criminogenic situation on its territory? One of the answers is to assure maximum security and safety in the city's public spaces for its inhabitants and guests at any time. This is a duty and responsibility of every local government. Although the need for these measures is well understood, very often it is a problem to draw a clear line between "public" and "private" space.

Personal safety in a city first of all means personal safety in public spaces, especially in the open urban spaces, as precisely there the possibility of an individual to apply personal protection measures is particularly limited.

In order to find the most effective tools to deal with crime in these areas, it is important to specify the concept of the "open public space". There is sufficient literature providing a comprehensive definition of the *public space*; however, the authors of this research did not succeed in finding comprehensive discussions on *open public space* term and its content.

According to Carr, Francis, Rivlin, Stone [5], urban public space is one of the most important elements of urban structure, covering non-built (open), limited by buildings (closed) and green (changing) urban spaces. Additionally, contemporary perspectives suggest the need to add other elements of the public space, such as space above public and private buildings, as it creates the visual identity of a city.

Butkus [4] assigns streets, passages, embankments, squares, parks and cemeteries to typical public space elements. He also proposes to include other public spaces with different right of ownership, i.e. inner space of municipal buildings (offices of municipal administration, public library, hospital, theatre, art gallery, etc.), private space limited by public buildings or space inside the public buildings (airports, bus stations, concert halls, etc.) and bridges, viaducts, metro stations, tunnels as well as semi-private public spaces, expropriated public spaces, virtual urban space points.

In Lithuanian laws a public space is defined as a "common area: land plots, squares, and parks with provided equipment and other landscape greenery"[15]. From a wider perspective, it can be defined as a place where every citizen, regardless of his/her age, race, citizenship, sex or social class can enjoy the overall presence of other people, represent collective and general interest without overshadowing and destroying its diversity.

The concept of public space used in the Lithuanian courts' practice has some limitations. Fedosiuk [10] argues that a single and comprehensive definition of public space does not exist and that often this concept is explained through examples/legal cases. He proposes to refer to the Ruling of the Supreme Court of the Republic of Lithuania of October 8, 2002, which denotes that "a public place is the place where, during the moment of commitment of the offence, are present or have the right to be present other individuals. Activity is considered to be committed in a public place regardless of the presence or absence of anybody in this place. It is important that due to the free access to the place at any moment, other individuals can appear who, due to the actions of the causer, will experience uncomfortable situation". The same ruling states that "public order can be violated in usual places to visit: streets, roads, parks, stadiums, premises of companies and institutions, staircases of multi-apartment

blocks, public transport, also in places usually not visited by people, but where they have the right to be and can appear at any moment - forest, lake shore, etc.”.

This discussion shows two main types of public spaces: open (in the open air) and closed (inside buildings).

Authors of this paper analysed urban open public spaces sharing the following characteristics:

- it must be in the open space (not covered by roof and walls),
- any individual has a right for a free access at any time.

In general, spaces investigated during the research were: streets (including bus stops), squares, parks, river banks, beaches, cemeteries, passages, underground passages, bridges, fenceless parking lots of multi-apartment buildings.

Space Syntax method

Sustainable development is one of the most important issues of contemporary society, which calls for efficient use of natural resources - land in particular. From a perspective of compact urban space models, assurance of security of inhabitants in a densely populated area is of growing importance. Complex scientific perspective sees a city as a dynamic and a very complex system, where both socio-economic and spatial determinisms are present. This opens new possibilities to investigate and understand the impact of architectural solutions on processes taking place within a city. Researches, aiming to investigate the impact of spatial environment characteristics on crime, provide new possibilities to apply this still very fragmentarily used tool for achievement of a higher quality of life for city inhabitants.

Spatial determinism as a model is widely applied in studies analysing urban structures as fractals (Nikos A. Salingaros, M. Batty, P. Longley), using the concept of urban generators (K. Wejchert), applying space syntax (B. Hillier and J. Hanson) or in a less formal way assessing the impact of spatial solutions on other urban functions (J. Gehl, V. Filin, B. Lawson, others). Sociological researches aimed at investigating different aspects of crime are applied widely, yet the number of researches using both sociological and spatial research methods is very limited. This is one of the first researches in Lithuania aiming to relate urban safety and security with urban structure.

Space syntax is a method for describing and analysing the relationships between spaces of urban areas and buildings – “the layout” [14]. In space syntax, the spaces are understood as voids (streets, squares, rooms, fields, etc.) between walls, fences and other impediments or obstructions that restrain (pedestrian) traffic and/or the visual field. By graph theory and the idea of urban morphology, the theory of space syntax describes and measures quantitatively the configurational properties of urban space [11]. The theory sees the built environment as a system and states that it affords or carries movement from one space to another space within a system. Built environments that are most directly linked to other built environments will tend to attract higher densities of movement. Theory of space syntax also posits that accessibility of potential victims serves as an opportunity to motivate offenders.

The research aimed to investigate the distribution of crimes committed in open public spaces of Vilnius, Kaunas, and Klaipėda, for that purpose two main documents - the Criminal Code of the Republic of Lithuania [1] and the Code of Administrative Offences of the Republic of Lithuania [16] - were analysed and a preliminary list of codes' clauses stating criminal activities typically committed in public open spaces was made. After consultations with Kaunas City Police officers, the final list consisting of 17 criminal activities was made:

- Criminal Code clauses: desecration of state symbols, desecration of foreign national symbols, crimes against human life (murder, attempted murder), bodily injury (contusion), crimes against the freedom of sexual self-determination and inviolability, car theft, theft from a car, other theft, robberies.
- Clauses of the Code of Administrative Offences: intentional destruction of property or injury, cruelty to animals, damage to streets, structures and installations, small hooliganism (words or gestures, etc.), hooliganism committed by minors, illegal shooting of a firearm, drinking of alcoholic beverages in public places or drunken apparition, engagement in prostitution or usage of prostitution services.

Official data (including type, exact address, time of commitment) of selected criminal activities registered in two years period (2010 - 2011), as well as the master plans of the cities and other related documents were analysed.

Distribution of crime in Vilnius

The survey of crime in Vilnius city [19] was aimed at identifying the most vulnerable to crime and, conversely, the safest land uses and their permutations in accordance with both different types of criminal acts and crime as a whole. The findings are based on the analysis of 30527 incidents of anti-social behaviour along 17 types of criminal act, 14 types of land use and their permutations, and 676 streets. Thus the survey steps well beyond the frameworks typical to the related previous researches and contributes to the reduction of the gap between theoretical insights and empirical evidence.

For the assessment of crime on the city's streets, Vilnius County Police Headquarters provided a register of criminal acts committed in Vilnius city during 2010-2011 [24], which included 30527 acts in total. However, only 18893 acts were analysed further, as only the incidents that were committed in open public spaces, as defined by De Abreu and Trigueiro [8] were of interest for the survey. Their distribution is illustrated in Fig. 1, where the yellow dots represent crimes committed during the daytime, and the black ones – during the night-time.

Vilnius city master plan until 2015 [23] was used for the assessment of land uses. The plan includes development priority areas, a number of land uses (e.g., commercial, forests), types of borders (e.g., borderlines of cultural reserves, protected territories), important objects (e.g., close ports, railway station, airport) and transport infrastructure (e.g., roads, railways). The territories are planned in consideration of the current situation, vision and needs of the city.

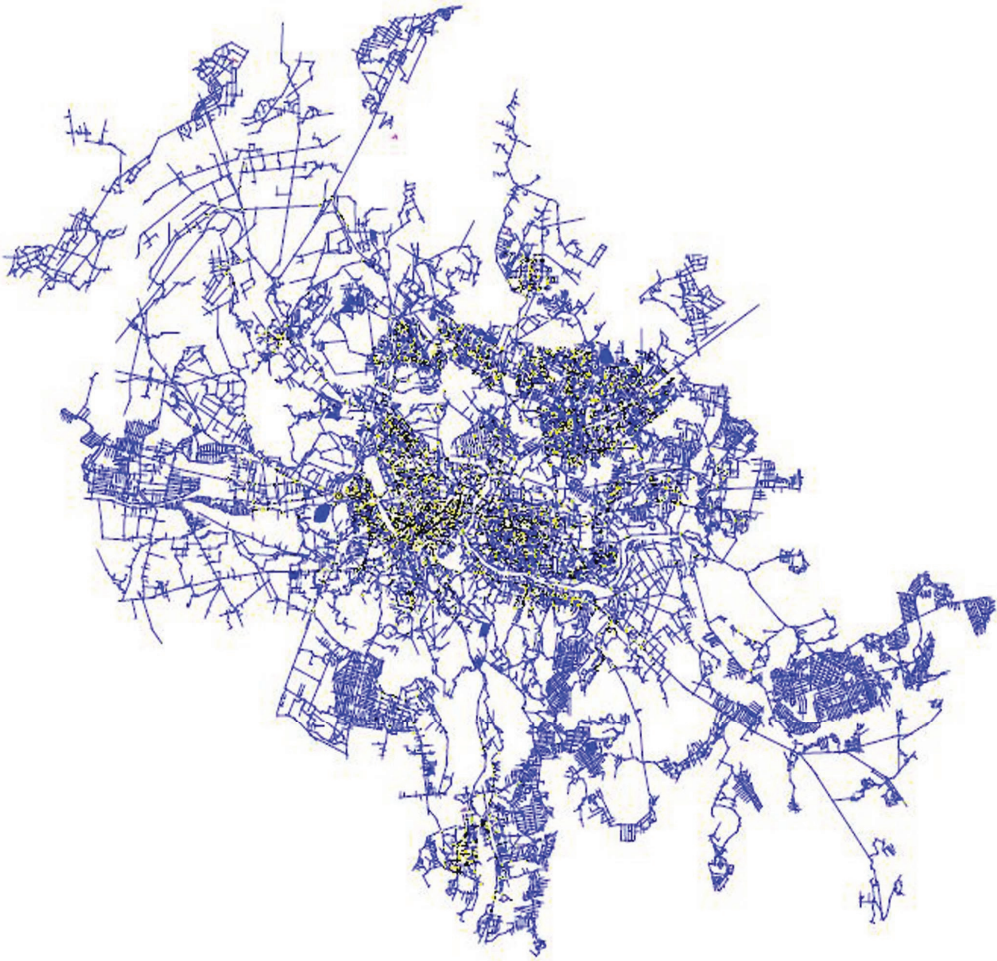


Fig. 1. Distribution of crime in open public spaces in Vilnius, 2010-2011.

Sources: formed by authors according to [24]

In this survey, the authors [19] investigated only the land uses in:

- a. The Old Town;
- b. City centre, important local centres (further – city centre);
- c. Local centres and other mixed areas with high building intensity (further – local centres);
- d. Residential areas with high building intensity (further – dense residential areas);
- e. Residential areas with moderate building intensity (further – moderately dense residential areas);

- f. Residential areas with low building intensity (further – sparse residential areas);
- g. Gardeners communities' areas which are being converted into residential areas with low building intensity (further – gardens);
- h. Areas for the society's needs, specialized and complexes' areas (further – specialized areas);
- i. Areas for the society's needs, specialized and complexes' areas with much greenery (further – planted specialized areas);
- j. Infrastructure territories (further – infrastructural areas);
- k. Business, production and industrial territories (further – industrial areas);
- l. Greenery for intensive and extensive usage (further – greenery);
- m. Forests and forested territories (further – forests);
- n. Waters and watering-places (further – waters).

Due to cluster analysis of the land uses, which are crossed by streets where at least one criminal incident happened during 2010-2011, 9 clusters emerged. In order to identify the most vulnerable permutations of land use along the envisaged types of criminal acts, the relational distribution of the criminal acts, expressed in percentages, was estimated in each cluster of land use. The results, which explain 71.16% of the total crime distribution, are reported in *Table 1*.

As the table indicates, on the streets of clusters 5, 8 and 9, which all include dense residential areas, robbery and thefts are rather common. However, cluster 5 is the safest one amongst them, thus leading to a conclusion that dense residential areas, without any specialized areas and greenery are more crime-vulnerable than when they integrate the named two other land uses.

The inclusion of specialized areas and greenery into dense residential areas would not only contribute to prevention of crime on the streets, but enrich the social life and glamorize the urban spaces as well. Greenery seems also to inhibit crime, when integrated into city centre and local centres and mixed with infrastructural areas and waters, as the analysis of cluster 1 suggests. On the other hand, if the mix of greenery, dense residential areas and specialized areas is combined with local centres, it becomes even more attractive to criminals than dense residential areas alone, taken separately. Therefore, it is purposive to implement policies which reduce building intensity in local centres and other mixed areas with high building intensity, but increase the number of specialized areas and greenery.

If to compare clusters 4 and 7, which both include sparse residential areas, one would notice that the former cluster is, in general, a little safer. However, it is much more vulnerable in respect of crimes against human life, whereas cluster 7 is mostly unfriendly to animals. This leads to a conclusion that sparse residential areas should not be mixed with forests, while, in these land uses, it is necessary to implement a number of social actions and make a substantial effort, aimed against the cruelty towards animals. The same actions are also needed in respect of forests only, separated from residential areas or other land uses, as the analysis of cluster 6 suggests.

Table 1. Land use and relational vulnerability to criminal acts

Type of criminal act	Cluster No	Relational vulnerability to crime within the clusters of land use, %								
		1	2	3	4	5	6	7	8	9
Sum, %		City centre, infrastructural areas, waters	Not land use specific cluster	Specialized areas, infrastructural areas, industrial areas, forests	Sparse residential areas, forests	Dense residential areas, specialized-areas, greenery	Forests	Sparse residential areas	Dense residential areas	Local centres, dense residential-areas, specialized areas, greenery
Desecration of the national symbols	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02
Crimes against human life	5.14	0.00	0.60	1.43	1.32	0.00	0.75	0.69	0.35	0.00
Crimes against human health	4.24	0.28	0.30	0.95	0.24	0.49	0.27	0.17	0.54	1.00
Crimes against human sexual freedom and immunity	6.36	1.11	0.42	1.18	0.69	0.37	0.66	0.64	0.49	0.79
Theft of motor vehicles	5.90	0.65	0.37	1.19	0.48	0.87	0.23	0.38	0.80	0.93
Theft from a car	4.52	0.18	0.32	0.84	0.23	0.55	0.20	0.10	0.60	1.51
Other thefts	3.58	0.24	0.49	0.74	0.15	0.24	0.11	0.22	0.50	0.90
Robbery	5.32	0.28	0.39	0.65	0.31	0.85	0.30	0.06	0.65	1.83
Intentional damage to or destruction of property	4.78	0.38	0.60	1.52	0.09	0.77	0.17	0.06	0.50	0.69
Cruel animal treatment	6.48	0.00	0.63	2.02	0.00	0.00	0.79	1.45	0.00	1.59
Damage to streets, their buildings and installations	2.86	0.00	2.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Small-scale hooliganism	4.64	0.31	0.66	1.02	0.11	0.68	0.07	0.11	0.47	1.19
Hooliganism by juvenile offenders	4.05	0.81	0.39	0.22	0.25	0.40	0.06	0.32	0.79	0.81
Illegal shooting from a gun	5.59	0.00	0.30	0.96	0.66	0.53	1.13	0.69	0.58	0.75
Drinking alcohol in public places or an apparition there while being drunk	4.30	0.26	0.56	0.97	0.11	0.53	0.10	0.16	0.57	1.06
Prostitution or repayable usage of the services	3.35	0.14	2.36	0.26	0.00	0.18	0.05	0.05	0.12	0.20
Sum across all the types of criminal act	71.16	4.65	11.25	13.93	4.64	6.45	4.91	5.10	6.98	13.26

Sources: formed by authors according to [19].

Specialized areas occur within clusters 3, 5 and 9. The two latter ones have already been discussed above. However, cluster 3 is the most vulnerable to crime, therefore, specialized areas should not be planned in combination with infrastructural and industrial territories, and forests. Instead, infrastructure territories should be integrated into greenery and waters, i.e., cluster 1. Nonetheless, the city's economic life requires that infrastructural areas are inseparable from the industrial ones. If so, this mix could finely embrace greenery and waters, but it should definitely exclude specialized areas and forests.

The analysis of Vilnius city police data allows for identification of some general tendencies. Thus, dense residential areas, without any specialized areas and greenery, are more crime-vulnerable than when they integrate the named two other land uses. The inclusion of specialized areas and greenery into dense residential areas would not only contribute to prevention of crime on the streets, but enrich the social life and glamorize the urban spaces as well. Greenery seems also to inhibit crime, when integrated into city centre and local centres and mixed with infrastructural areas and waters. On the other hand, if the mix of greenery, dense residential areas and specialized areas are combined with local centres, commercial and / or industrial areas, it becomes even more attractive to criminals than dense residential areas alone, taken separately. Therefore, it is purposive to implement policies, which reduce building intensity in local centres and other mixed areas with high building intensity, but increase the number of specialized areas and greenery there.

Based on the findings of the research, specialized areas should not be planned in combination with infrastructural and industrial territories and forests or left alone as a significant in size and clearly separated territory. Instead, public lands should be combined with dwellings and greenery, but an overload in the shape of different land uses, especially in city centres and local city centres, should be avoided. What makes even safer combinations of land use vulnerable to crime - are commercial, industrial and infrastructural territories, or their permutations. Nonetheless, a city's economic life requires that infrastructural areas are inseparable from the industrial ones, and often – commercial ones. If so, this mix could finely embrace greenery and waters, but it should definitely exclude specialized areas, forests, or residential areas – either dense or sparse. In this case, the example of the USA is instructive – the biggest shopping and entertainment centres are typically distant in respect of city centre or residential areas in that country.

Regarding sparse residential areas, one would notice that, in combination with forests, they are crime-vulnerable, especially in respect of crimes against human life. This leads to a conclusion that sparse residential areas should not be mixed with forests, while, in these land uses, it is necessary to implement a number of social actions and make a substantial effort, aimed against the cruelty towards animals, as these areas are the least friendly to animals. The same actions are also needed in respect of forests only, separated from residential areas or other land uses.

Conclusions

1. Success of cities in the global competition depends on a set of qualities, which a city can offer to its current and potential members. High level of security within a city, especially in its open public spaces, is a very important factor forming the general quality of life for the population of a city. In order to effectively fight with the crime, city government has to cooperate closely with other public institutions, private sector organizations and community members and to apply a set of different methods, which make a city difficult for criminal activities. The more diverse the strategy of fighting the crime is, the better results can be achieved.

2. Space syntax method developed by urban planners helps to identify, represent and measure the social spatial relationships in urban environment. It helps to link crime activity to the patterns of activities and movements in urban structure and to identify and then correct the properties of urban structure, which may have an impact on crime in cities.

3. If to investigate patterns of crime within the land uses in Vilnius deeper, some important conclusions can be made. Here different socially-attractive objects are located near the main streets, but most of the crime happens on the streets nearby, as precisely they are typically used as the shortest way to get to the objects by potential victims and, at the same, they allow for a rapid escape of offenders because these streets and territories are both partly isolated and located close to other streets. To put it in other way, streets and territories, which are located near the mostly integrated areas, deserve the greatest part of attention of planners, decision-makers, residents, etc. The same rule applies to sparse residential areas, combined with forests, as well: the areas have their own major streets and areas, which are perfectly connected to less important, but more crime-vulnerable, streets and areas, which by numerous potential victims are regarded as the shortest ways to approach an attractive object.

4. It can be concluded that an innovative urban management would result from a synergy between social and structural elements of a city. As the findings have demonstrated, the actions which are originally aimed at crime prevention, when implemented, would also lead to the enrichment of social life, the city's aesthetics and a more harmonized relationship between the inhabitants and the surrounding environment. Hence, this synergy is precisely the way of creation of an attractive and successfully functioning city.

Acknowledgements

This research was financially supported by the Research Council of Lithuania (agreement no. SIN 08/2012). The collaboration of Vilnius County Police Headquarters, Kaunas City local Police Units and the Information Technology and Communications Department under the Ministry of the Interior of the Republic of Lithuania are gratefully acknowledged.

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Saugaus miesto kūrimas taikant miestų planavimo ir vystymo metodus

Anotacija

Nusikalstamumas ir jo mažinimas – vienas iš pagrindinių daugelio pasaulio ir Lietuvos miestų gyventojų rūpestis. Tai vienas iš esminių socialinių pavojų, pasireiškiantis visais visuomenės lygmenimis: tiek individualiu, organizacijos, miesto, nacionaliniu, tiek ir tarptautiniu (globaliu). Bendruomenės narių ir jų grupių saugumo užtikrinimas yra vienas iš svarbiausių vietos valdžios institucijų veiklos uždavinių. Akivaizdu, kad tik taikant kompleksines strategijas, apimančias skirtingus nusikalstamumo prevencijos metodus, galima pasiekti teigiamų rezultatų. Nors mokslininkų ir praktikų diskusijose nusikalstamumo miestuose mažinimo tema dominuoja socialinių mokslų atstovų siūlomi sprendimai, straipsnio autoriai pabrėžia, kad būtina pažinti ir kartu aktyviai taikyti miestų planavimo srities specialistų siūlomus nusikalstamumą mažinančius metodus. Antroje straipsnio dalyje išsamiau pristatomas vienas iš miesto planuotojų siūlomų - erdvės sintaksės - metodas, padedantis nustatyti miesto urbanistinės struktūros ir nusikalstamų veikų įvykdymo sąlygų ryšius. Taip pat pateiktas tyrimas, kuriuo buvo siekiama, pritaikant erdvės sintaksės metodą, nustatyti Vilniaus miesto mažiausiai saugias atviras viešąsias erdves ir jų ypatumus bei pateikti siūlymus miestų vadovams, kaip šalinti nusikalstamumo priežastis taikant ne tik socialinius, ekonominius, bet ir miesto planavimo srities sprendimus.

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Straipsnis įteiktas redakcijai 2012 m. rugpjūčio mėn.; recenzuotas; parengtas spaudai 2012 m. rugsėjo mėn.