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PUBLIC LIGHTING IN THE COMMUNICATIVE URBAN CONTEXT

JAVNA RASVJETA U KOMUNIKATIVNOM URBANOM KONTEKSTU

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Abstract
The article explores holistic approach of understanding the importance of lighted urban environment. The city at night is quite different from the city during the daytime. In the evening, attention is focused on the effect of the light; during the daytime it is the support structure that plays a part in determining the public appearance. The requirements for the successful lighting are: visibility of objects that ensure safety and orientation, recognition of traffic situation, the ability to create comfort and well being, limited or shielded light brightness, and suitable color of the light to the surrounding and visible role in social interaction. Considering all demands a city has an attractive and inviting appearance, even after dark. The lighting creates a pleasant atmosphere, but should not dominate. On the other side, even qualitative created artificial light has some negative environment burden usually called light pollution. The article presents some possibilities to achieve the balance between realization of positive lighting aspects and improvement of negative illumination effects.

Sažetak
Članak istražuje holistički pristup razumijevanju važnosti rasvjete gradske (urbane) sredine. Grad noću je sasvim drugačiji od grada danju. Navečer je pažnja usmjerena na učinak svjetla; danju, međutim, ulogu u definiranju javnog prostora preuzima nosiva struktura. Uvjeti koji se moraju zadovoljiti da bi rasvjeta bila uspješna su: vidljivost koja jamči sigurnost objekata te orijentaciju, prepoznavanje prometne situacije, sposobnost stvaranja udobnosti i blagostanja, ograničena ili prigušena svjetlina, boja svjetla odgovarajuća okolini i vidljiva uloga u društvenoj interakciji. Uzmemo li u obzir sve ove zahtjeve, grad će dobiti privlačan izgled čak i kad padne večer. Rasvjeta stvara ugodnu atmosferu, ali ne smije dominirati. S druge strane, čak i kvalitetno napravljena umjetna rasvjeta ima neke negativne strane koje obično zovemo svjetlosno onečišćenje. Članak pokazuje neke od mogućnosti postizanja ravnoteže između ostvarenja pozitivnih strana rasvjete i smanjenja negativnih učinaka.

1. INTRODUCTION

Light has a great importance in our environment as one of the most efficient message carrier. Eyesight provides the largest amount of information, which can help to explain what happens around us. Light make visual irritation possible but it enable us to comprehend the environment and accordantly respond to events /**1**/. Troubles appear when there are such extreme conditions that human visual system can't adapt. Too many or too much light is felt like uncomfortable. In the worst case, the reaction on particular situation can be wrong. Artificial lighting of public places is noticeable component of urban environment. It is important because of personal property and traffic security. It also forms complete visual image of the city /**2**/. Artificial light provides higher living quality during the dark part of the day. That means that we have a profit, but we are also affected. The main purpose of the article is to present holistic approach of dealing with artificial night light within towns and other urban environments in order to make successful urban development possible. The main questions are: What are the main influences on urban environment lighting to provide its quality, applicability to users, ecological acceptance and esthetic efficiency? Is it possible to define artificial night light of urban environment as positive or negative generator of urban development? Let us suppose that artificial night light increase as well as decrease developing process of urban environment. Intensity of land use is the greatest impact factor and decides which direction spatial development can take.

2. THE IMAGE OF THE NIGHT CITY

The most frequent lighted surfaces of urban environment are: traffic areas (public streets, railways and airports), public areas (squares, parks), production areas, business buildings and institutions, recreation grounds, cultural memorials, advertising surfaces and conditionally dangerous areas. There are different kinds of lighting arrangements. Those ones, who provide the best living condition to all users, are classified as successful. Others, whose doesn't cover the needs of all users, are unsatisfying. Generally, too much light or light pointed in wrong direction increase the image of unsuitable living area, wasteful energy area and area within increasing emission of warm house effect. Powerful unsheathed lights have low exploitation and can cause dangerous glow. That is very dangerous for vehicle drivers. Artificial night light can also disturbed users of public areas and local residents of closed settlements. Decorative lighting and lighting commercials are not always wanted. Advertising laser rays turning round the sky make night sky observation in radius of 30 km impossible. Lighting of cultural monuments and business properties is also questionable. Those object are usually lighted from underneath to above constantly during all night. Wrong positions of lights throw the glow past the target and make lot of energy apart.

3. LIGHTING MANAGEMENT OF URBAN ENVIRONMENT

3.1 Natural circumstances

Night light is that kind of light which we can detect in dark environment. There are natural sources like moon and stars which are ecologically completely acceptable, but not suitable to us. To increase the light intensity public lighting is arranged all over dark areas.

3.2 Spatial planning demands

Fundamental structure of urban environment is important cultural heritage. Lighting can increase visual image of the city. According to Premzl /**3**/ this happens only if cultural and architectural worth analysis becomes equal with stressed elements of city image. This is the only case when lighting infrastructure becomes visual city designer. Lynch /**4**/ divides urban environment to particular components like paths, edges, districts, nodes and landmarks. Those ones have a great recognition value and make reading spatial order possible. Lighting those elements important increase the mental city image, recognition of structural connections and strengthen spatial identity.

3.2.1 Traffic system and its lighting influence

Traffic road system is one of those urban elements who have the greatest impact on city morphology, esthetical shape and function of the city. It also present different historic development period. Traffic system and lighting system arise at the same time and they are slightly connected. Specially the last one has a great recognizable importance during the dark period of the day and it has an influence on holistic acceptance of environment. Traffic system is the major user of lighting infrastructure. Light enable successful function of each single element, like traffic paths, traffic objects and transport vehicles. The first ones are illuminated as a line, the second ones are spot lighted with great intensity. A ground principle of traffic system function should assure successful development. It is important to archive the level that preserve human and ecosystems health, decrease need of energy and enlarge social and economic welfare /**5**/. Spreading and developing road system increase intensive site illumination which is needed for its successful function. But the same time another problem appears? Where is the limit between positive and negative illumination effects? It is fixed by numerical superior users.

3.3 Users' demands and their visual awareness

Artificial night light is an advantage that makes us activities, during the dark period of the day, possible. There are many different theories to indicate whether some illuminated surface attract us or not. According to Veitch /**6**/ the most acceptable are constant illuminated vertical surfaces. The same one are also judged as uninteresting. Colour contrasts are accepted as interesting as well as spotted illumination or change of direct and indirect illumination. The most discomfort to users cause illumination glow.

3.3.1 The choice of suitable illumination for traffic facilities users

There are always different kinds of users like drivers, cyclists or pedestrians, using traffic facilities at the same time. Each group has their own lighting needs. If this fact is considered, intensity of land use has the greatest impact on traffic lighting facilities and has an expansive importance for future development. In order to satisfy all users, too many lighting objects are placed and that can cause negative side effect. Pellegrino /**7**/ present the facts that there are technical characteristic that make illuminant come up to users. Drivers have different demands as pedestrians. The choice of right type of

illuminant is so important as well as how much light is actually reflected into the environment. Drivers need constant lighted way. The best lighting object are those one who have completely straight under glass and are practically completely screened. Suitable lighted streets are more attractive and they are frequently used. Intensity of their use affect development tendency of urban structure.

3.3.2 The influence of artificial outdoor night light on residents

Night light is very important to regulate the feeling of safety. Pinter and Farington /**8**/ report about the research made in Dudley city (UK). The experiment was made in local community with 365 residences. The results show that the lighting optimization increase feeling of safety and grade of criminal actually decrease for 15%, among them housebreaking, vandalism, stealing of transport vehicles and robberies. In this case improved street light have positive effect and reduce the public costs spend to prevent criminal.

But how much light do we need to achieve positive effect? Another two researches made in New York City and Albany proving that there is a huge difference between sex, age and departure illumination. According to Boyce /**9**/ additional light in low illuminated surfaces (between 0 and 10 lx) increase our safety perception. If departure illumination is high (50 lx or more), additional light make no sense. According to all that, the most suitable illumination grade is about 30 lx. That enables us to recognize danger from far away.

3.4 Technological and aesthetic criteria

To achieve constant development of urban environment, we have to use such lighting elements which make a good use of energy. Unshaded lighting elements are not suitable. According to Orgulan's and Slatinek's /**9**/ measures, the best choice is completely shaded luminous. Those one light equally and have minimal glow.

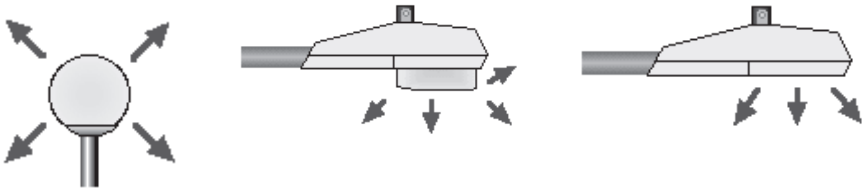

Image 1: Examples of illuminant; unshaded illuminant, partly shaded illuminant, completely shaded illuminant.

Colour of the light is also important. White or yellow shades are usually needed, especially for traffic objects and pedestrian areas. Decorative illumination use larger colour scale. It is depended on spatial designing component. Illuminated elements create visual leading, spatial identification and recognizing hierarchy.

Changing illumination intensity during the night is crucial. If the usage of public areas gets low during the night, illumination intensity can be reduced. Such prompt action has many advantages. All negative effects towards humans and animals stop immediately. Costs for energy usage get also down. Appearance of illuminant is important as aesthetic designed identity inside urban structures. All factors listed as a table must be considered.

Factor	*daylight time*	*night time*
accordant arrangement of illuminant	X	X
enabled visual leading		X
illuminant location and surrounding elements	X	
size, shape and colour of poles	X	
handles on the poles		X
appearance of illuminant	X	X
slope of illuminant	X	X
high of illuminant		X
colour of the light		X
intensity of the light		X

Table 1: Aesthetic designed factors of setting illuminant

In new urbanized district aesthetic designed illuminant with contemporary technology are already used. As a problem is exposed elder lighting equipment.

3.5 Ecological influence of artificial night light

The ecological influence of artificial night light means the influence on plant or animals and covers the whole ecosystem. It could be temporary or constant. Longcore and Rich /**9**/discovered that artificial night light change the relationship between predators and pray. This way all crucial ecosystem functions are affected. More light make better orientation in the dark possible, but it can also confuse animals. Predators might be more successful during the hunt, but the pray adopted to dark might be confused through too much additional light. Some insect or birds are attracted by artificial light. Their behaviour patterns and reproduction scheme are influenced.

4. CONCLUSION

Dealing with artificial night light within towns and other urban environments request holistic approach. Only qualitative chosen and sated surface lighting is applicable to everyone, ecologically acceptable and aesthetic effective. To rich these stages there are many limitations which should be considered, like natural circumstances, urban demands, users' demands, technological and nature conservation demands.Urban environment is controlled and designed by our measures. Presence of the light during the dark time of the day increase visibility of traffic situation, increase personal security, decrease grade of vandalism and make better orientation possible. It also cleared up the mental image of the city. Generally we can say artificial night light makes our environment more comfortable. But if the urban environment uses too many users, they have too many different spatial interests. In order to please all of them, there are numerous more or less successful lighting arrangements. Sometimes the light quantity is too high. As a result appears disturbed development process. Intensive illumination is not always functional, especially if dangerous glow is presented. Consecutive waste of energy and high operating costs are also seen as a problem. Useless artificial light is treated as light pollution and it is sensed as development weakness. The light should be pointed only there, where we need it. This is the basic rule about using the light. Even the light reflected from illuminated surface change natural circumstances. The greatest harm cause unscreened lighting objects. The presence of artificial night light in urban environment effects ecosystems, animals and vegetation. Their biodiversity is harmed. One of the aims of successful urban development is to preserve natural circumstances for future generations /**10**/. But the solution is not so simple. We can't simply abolish the night light. It is needed to satisfy all quality parameters of living inside urban environment. Successful lighting management in urban environment means balancing between conservation of positive aspects and improvement of negative illumination effects.

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