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**PREGLEDNI NAUČNI RAD / OVERVIEW SCIENTIFIC PAPER**

# VALUE FOR MONEY IN PUBLIC-PRIVATE PARTNERSHIP PROJECTS IN THE FIELD OF STREET LIGHTING IN THE REPUBLIC OF SERBIA

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***Abstract:*** *Public administration reform, better known as the New Public Management - NPM, which began in the mid-1970s, had a key impact on the development of modern public administration. The NPM emphasizes the economic values of public administration, to the detriment of its other values. Public Private Partnership- PPP is one of the basic elements of NPM doctrine. PPP is a partnership between the public and private sector that aims to provide a service traditionally provided by the public sector. An integral part of every PPP is the Value for Money methodology. The "Value for money"- VfM method emerged in this process of public administration reform, first in the UK. The document of the British Government Private Finance Initiative (PFI) from the year 1992, presented the basis for the creation of a new so-called "Venture", which at that time was called a joint venture, and which is today known as PPP. PPP is a relatively new institute that has existed in the Republic of Serbia since 2011. In this paper, we will deal with the application of the VfM methodology in PPP projects related to street lighting in the Republic of Serbia, and try to give answer about social and economic justification of PPP and potential economic savings that can be achieved in the public sector through the implementation of PPP. At the present time, when there is more and more talk about the need for environmental protection, sustainable development and energy efficiency, PPP projects can have an increasing importance in this area. For this reason, we have limited the application of VfM methods in PPP projects in the Republic of Serbia only to street lighting projects which provide the mentioned goals.*

***Keywords:*** *Public-private Partnership; Value for Money methodology, street-light projects, municipalities/cities*

***The JEL classification:*** *H83, R11, R58.*

## INTRODUCTION

A public-private partnership (hereinafter: PPP) is a partnership between the public and private sector which aims to deliver a service traditionally provided by the public sector (Kušljić, Danijel; Marenjak, Saša , 2011). In a broader sense, public-private partnership is defined as the implementation of all known types of cooperation between public and private partners, which, in many cases, leads to the establishment of joint ventures. (Jovanović, Legal and Institutional Framework of Public-Private Partnership in the Republic of Serbia, 2016). However, the term PPP today in a narrower sense implies joint activities in the scope of which the public and private sectors combine resources and expertise in order to meet a public need through adequate allocation of resources, risks and rewards (Jovanović, Uskladjenost pravnog okvira Republike Srbije sa propisima Evropske unije u oblasti javno-privatnog partnerstva, 2014). The possibility of benefiting from co-operation between private and public sectors opens new dimensions for investment opportunities of the public sector and enables the implementation of projects which would not be, under normal circumstances, possible to realize, either from financial, technological or knowledge reasons (Jílek,Petr; Silovská, Hana Černá; Kolařík,Petr; Lukavec Martin, 2018).

The partnerships between the public and private sectors for fulfilling public functions are on the rise at all levels of government (Rosenau, 2000) PPP is a model which implies benefits for both partners. The private partner, the investor, receives a secure income over a long period of time while the public partner successfully performs business activities and provides services, with a minimum of its own investments. Naturally, the beneficiaries of services, i.e. the citizens, also benefit from this, because the PPP model, as a rule, increases the scope and quality while reducing the price of public services (Juričić, Damir; Marenjak, Saša, 2016). Improving cooperation between the public and private sectors through PPP, at the level of regional and local self-government presents, both in theory and in practice, one of the most important factors of local economic development (Pavlović-Križanić, 2015) since local economic development should be everyone's business, including the local population, the local businessmen, as well as the government (Meyer, 2014).

Since local development planning which is entirely based on public revenues presents too narrow a foundation for faster community development, it is necessary to improve budget financing by attracting private capital for the purposes of building infrastructure and improving the quality of services (Špiler, Marko; Jovanović, Andrijana, 2017). Therefore, local sustainable economic development

and PPP are a win-win combination, since PPP as a framework of joint action of the public sector and private capital for the functioning of activities of general interest as well as efficient and economically sustainable infrastructure development, ensures that public entities adopt the entrepreneurial way of thinking and behaving, and that the private sector introduces the criteria of public responsibility and the obligation to protect the public interest. In addition, if the PPP project engages the potential interests of the local business community, it would be useful to find a way for members of that community to be actively involved in their realization (Cvetković, Predrag; Sredojević, Slađana, 2013). Today, PPP is becoming an integral part of local integrated development plans (Radovanović, Tihomir; Grandov, Zorka; Filijović, Marko, 2019)

An integral part of every PPP is the Value for money (VFM) methodology. It should demonstrate the social and economic value of the association of the public and private sectors, with an aim to improve the level of services provided to citizens. In this paper, we shall deal with the implementation of the Value for money methodology in PPP projects related to street lighting in the Republic of Serbia.

## PUBLIC ADMINISTRATION REFORM, PUBLIC-PRIVATE PARTNERSHIP AND "VALUE FOR MONEY"

The public administration reform that followed the oil shock of 1973, especially in Great Britain (Pusić, 2007) led to the creation of a new doctrine of public administration (New Public Management - NPM) (Hood, 1991) based on its economic values (the so-called 3E - economy, efficiency and effectiveness). As pointed out, NPM as a doctrine of public administration is based on its economic values, but often to the detriment of other values of public administration (Manojlović, 2010). This model of public administration (Milenković D., Javna uprava – odabrane teme, 2013) implied, among other things, the collapse of previous state monopolies, especially in the construction, maintenance and management of infrastructure facilities (railways, roads, etc.), and the entry of the private sector into the so-called "world of public services" (Đorđević, 2008). Until then, these services in many countries were provided by the state and their public administrations at different levels and in different areas, such as health, education, welfare, utilities, etc (Mecanović, 2006). Therefore, we can claim that the New Public Management doctrine was the basis for the emergence of PPP concept since the mid-70s of the 20th century. In fact, PPP is a tool of NPM concept (Perko - Šeparević, 2006). Other similar concepts, firmly connected with NPM

and PPP, are also quickly appearing, for example, outsourcing (O'Looney, 1998) or contracting-out (Domberg, Simon; Jensen, Paul, 1997).

The "Value for money" (VfM) method emerged in this process of public administration reform, first in the UK. The document of the British Government Private Finance Initiative (PFI) from the year 1992, presented the basis for the creation of a new so-called "Venture", which at that time was called a joint venture, and which is today known as PPP (Milenković D., Savremene teorije i moderna uprava, 2019). In the long term, the VfM method, which presents mandatory content of the PPP project, should serve to reduce costs in public administration, but simultaneously improve the quality of public services to citizens in certain areas, by engaging the private sector (and capital) in their implementation.

However, over time, in the process of public administration reform, the question arose as to what the VfM was and whether the "value" was only economic in its nature. Today we can rightly claim that VfM encompasses two values. The first one is social - it is manifested in the improvement of performing public services to citizens, which encourages and enables (local) sustainable economic development of the community. The second one is economic: reducing the costs of the public-legal entity (state, federal units, local self-government units), by engaging private capital and the private sector in performing them.

Significant incentives for public-private partnerships were provided by the EU Guidelines for Successful Public-Private Partnerships (European Commission, February 2003), followed by the Green Paper on Public-Private Partnerships and Community Law on Public Contracts and Concessions (EU, European Commission, Brussels, 2004).

According to the Green Paper, the two basic forms of public-private partnership in EU member states are:

- Contractual public-private partnership - regulated by the contractual relationship between public and private partner;
- Institutional public-private partnership - public and private partner establish or participate in the ownership of an independent enterprise which provides public services and works, in which they cooperate jointly and in partnership.

However, public-private partnerships are not only institutional models and PFI models, but rather PPP today encompasses a large number of different models of connection between private and public participants, especially through vari-

ous models of contractual partnerships (Sharma, Monika; Bindal, Anita, 2014). PPP models range from the provision of very simple services and management contracts, to, based on the performance, incredibly complex and management, concession and asset transfer contracts involving a partnership between the government and the private sector.

Some of these models are: Private-Financing (FO: Finance Only); Design-Win in Bidding-Building (DBB: Design-Bid-Built); Design-Build-Maintain (DBM); Operate-Maintain (OM); Design-Build-Operate (DBO) Design-Build-Finance-Maintenance-Operate (DBFMO), Build-Own-Own-Operate-Transfer (BOOT), Lease-Develop-Operate (LDO), Build-Lease-Operate-Transfer (BLOT), Buy-Own-Operate-Transfer (BUYOOT) (Kačer, Hrvoje; Kružić, Dejan; Perkušić, Ante, 2008).

On the other hand, the EU Guidelines for Successful Public-Private Partnerships have specifically insisted on the financial and economic implications of PPPs, and address risk management and its financial impacts on the project. Since the primary responsibility of the public sector is to provide VfM to the society, the document presents several techniques and considerations for determining and assessing value. Approved funding is recognized as a useful tool in project financing, but it also carries certain risks. Approved funds should be carefully aligned with the actual needs of the project and the beneficiary in order to minimize the negative effects and ensure the sustainability of the project and VfM.

Higher quality of public services and savings, i.e. the VfM methodology in PPP projects, is what makes the state or rather other public bodies (federal units, regions, other various forms of territorial autonomies and local self-government units) decide to outsource the provision of certain public services to the private sector, whereby the public body retains the right to exercise direct control over the agreed quality and level of services provided.

PPP is a relatively new institute in the Republic of Serbia. The Republic of Serbia regulated PPPs with the Law on Public-Private Partnerships and Concessions from the year 2011, with subsequent amendments ("Official Gazette RS" No 88/2011, 15/2016, 104/2016). In the Republic of Serbia, according to the Law on Communal Services and Utilities from 2011, with subsequent amendments ("The Republic of Serbia Official Gazette", Issue: 88/2011, 104/2016), entrusting the performance of these activities is always considered as PPP (Article 9, paragraph 7). Thus, the aforementioned technical communal services at the local

level (public services and utilities) are increasingly the subject of PPP at the level of Serbian municipalities and cities, which is why PPP projects in the Republic of Serbia today are especially represented at the level of local self-governments.

The Commission for Public-Private Partnership of the Government of the Republic of Serbia has a significant role in the Law on PPP. The Commission gives consent to the proposed projects, provided and only if the project contains all of the elements defined by law, and the acts of the Commission. From 1 January 2012 to 1 July 2020, the Commission approved 161 public-private partnership project proposals with or without concession elements. The total value of these projects at the moment is around 3 billion Euros. Over the years, work has been done to understand the significance of this concept and there is increasing courage to use it. The basic idea is to improve the quality of services at the local, provincial or state level with private money. In that sense, we can conclude that in the Republic of Serbia there is a growing interest of public bodies, especially local self-governments in the model of public-private partnership, which is shown in the following chart.

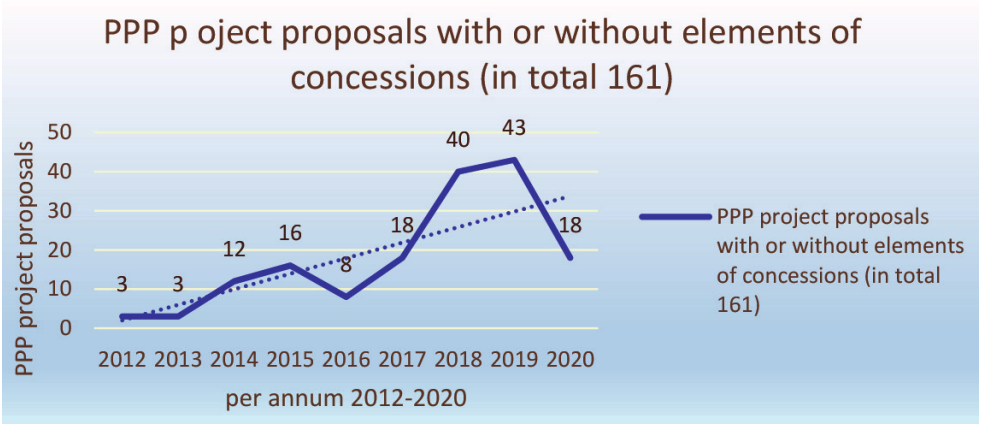


**Figure 1.** PPP project proposals with or without elements of Concessions In Republic of Serbia

**Source:** The Commission for Public-Private Partnership of the Government of the Republic of Serbia

The provision of street lighting services in the Republic of Serbia is one of the communal services and utilities provided to citizens by the local self-government unit (municipality / city). Of the 62 projects approved by the Commission for Public-Private Partnership in the Republic of Serbia from 2012 to January 31, 2018, as many as 88% were partnerships related to public services and utilities' activities, or rather public services provided by local self-government units. The

largest part consisted of projects related to urban and suburban transportation (34.5%) and street lighting projects (32.8%), i.e. a total of 18 (Milenković D., Savremene teorije i moderna uprava, 2019).

Including the entire year of 2018, 2019 up to July 1, 2020, the number of street lighting projects approved by the Commission amounted to 48 or 29.8%. In the subsequent research on the application of the VfM method, only street lighting projects were taken into consideration, which were approved by the Commission during 2018, 2019 until July 1, 2020, and on the basis of which the municipalities / cities then concluded contracts for PPP implementation (a total of 11).

## VALUE FOR MONEY METHODOLOGY (VFM)

Investments of importance to the general public (public investments) present an important factor in the creation of domestic product and prosperity. Not only do the value of the social product and the achieved level of prosperity affect the act of investing, but they also affect its quality (Jovanović, Legal and Institutional Framework of Public-Private Partnership in the Republic of Serbia, 2016). Value for money (VfM) is an analytical procedure which seeks to determine whether taxpayers' money would have been better spent on traditional investments, where the public body appears as an investor and assumes all or a greater risk of public investment, or if it is more cost-effective to purchase such a service from private sector suppliers by allocating most of the risk to that entity in a public-private partnership. The public sector emerges as the main one, and it ensures that public services are provided to beneficiaries, while the private sector serves as the contractor, whose role is to actually provide the services which have been contracted.

Comparing different methods of public investment implies a comparative analysis of the traditional model and the PPP model. In this sense, the VfM is calculated by comparing the effects of these public investment models. Each model has its costs and benefits. The main benefit is the success in achieving the public service standards that the public partner must establish throughout the duration of the contract. Costs represent the total cost of living (WLC: whole-life cost) of the investment; for public buildings, they include the costs of their construction and maintenance. Since investing, and not just in the public sector, involves a number of risks, establishing value for money requires that all these risks be determined, quantified, described and analyzed (assessed). Therefore, in order to measure the degree of this added efficiency which needs to be provided through

PPPs, governments often conduct value-for-money measurements. VfM looks at the benefits of a PPP project procured by way of PPP for the government and therefore observes a wide range of values, including overall cost of living, quality and suitability for a good or service in order to meet user requirements and external factors (such as economic growth, environmental impact, financial mobilization, social impact and sector management) (Delmon, 2009).

The risk assessment must be concluded by a quantitative statement of each individual risk. Finally, these identified and quantified risks are shared between the partners: some risks will be fully assigned to the private partner, while some will be shared. The practice of many countries with experience in applying the PPP model shows that there are numerous projects which bring the greatest value for money. This methodology can be applied to PPPs with the aim of securing the financing, construction, reconstruction, management or maintenance of infrastructure or other public facilities or the provision of public services. The Law on Public-Private Partnerships and Concessions stipulates that proposed PPP projects must, inter alia, contain a business plan which includes assessment, cost analysis and VfM (in accordance with the PPP Commission Methodology). Such a business plan must also contain information on the financial eligibility of the PPP to the authority concerned; information on how the project shall be financed (from the budget, by donors or by using private finance) and how much such funding shall cost; the availability of finances and planned risk distribution. Proposals for public-private partnership projects must also contain an analysis of the economic efficiency of the proposed project (Jovanović, Legal and Institutional Framework of Public-Private Partnership in the Republic of Serbia, 2016).

In Great Britain, which is considered to be the originator of the VfA method, the simplest model of savings through PPP can be briefly explained on the example of projects for the construction of four roads. The first part of the table explains the value of the project of the private partner who was awarded the tender for the construction of roads. The second table shows the estimated value of costs in case the project was implemented by the public sector. The third table demonstrates the total savings in millions of pounds, and the fourth, the percentage of savings in each realized project.

**Figure 2.** PFI Value for Money (values indicated in £ millions)

| Project | M1-A1 | A1(M) | A419/7 | A/69 |
|---|---|---|---|---|
| Expected cost of winning bid | 232 | 154 | 112 | 62 |
| Public sector alternative cost | 344 | 204 | 123 | 57 |
| Saving | 112 | 50 | 11 | (5) |
| Saving % | 32.5% | 24.5% | 8.9% | (8.7%) |

**Source:** (Dalmon 2009) Value for Money Drivers in the Private Finance Initiative 17th January 2000

The VfM methodology of this research related to street lighting projects in the Republic of Serbia is based on the VfM methodology contained first in the Guidelines for Successful Public-Private Partnership (EC, 2003), followed by the methodology contained in the document entitled: A Guide to the Qualitative and Quantitative Assessment of Value for Money in PPPs prepared by The European PPP Expertise Center - EPEC 2018 and the Methodology for the analysis of obtained value with regard to invested funds (VfM) in public-private partnership and concessions adopted by the Commission for Public-Private Partnership of the Government Serbia in 2013. The methodologies are mutually harmonized, and we shall briefly point out the basic elements, which are present as such in all three. The VfM methodology is applied in the Republic of Serbia not only to street lighting projects, but to all PPP projects.

The methodologies are very complex, since they imply that during the implementation of the PPP project, a balance between value and costs must be achieved through VfM. Whereas the value aspect implies the quality and quantity of services provided (on the part of the private sector), the cost aspect implies the cost of the payer (public body, or in this case in the Republic of Serbia in projects related to street lighting – the local self-government unit or rather municipality or city unit) in the course of the project duration.

The cost aspect also includes the costs of risk management. Therefore, the VfM assessment determined the realization option, which presents a balance between the long-term value which should be achieved by the realization of the project, and which is adjusted for risk and costs. This also implies considering two key factors: what is the upper limit of costs, on the one hand, and whether the minimum standard of service quality is met (the lower limit of service quality). Therefore, it is a qualitative and quantitative analysis which is methodologically implemented, and which should lead to the achievement of an appropriate balance between the provided service and the anticipated costs.

Determining the VfM is therefore a principle of maximizing the benefits to taxpayers and public service beneficiaries. The VfM categorical principle which ensures that, the lower the total costs of PPP and the higher the quality of services, the PPP provides the VfM, or rather savings. Since this comparison is based on a hypothetical projection which comprises several years of project implementation, this hypothesis should also be tested.

Therefore, the VfM verification first implies the existence of Public Sector Comparator (PSC – hereinafter: the Comparator) documentation. According to professional literature, the PSC is a hypothetical framework used as a procurement strategy tool in VfM evaluation and is a trademark in most countries around the world such as the United Kingdom, Australia, Hong Kong and Canada ( Kharizam, Ismail; Takim, Roshana; Abdul Hadi Nawawi, 2012)The PSC is also contained in the previously mentioned methodologies of the EC, EPEC and the Commission for Public Private Partnership of the Government of the Republic of Serbia. According to these methodologies, the Comparator (PSC) provides criteria for estimating the VfM, whereby the following categories are analyzed in detail: capital costs; operating costs; revenue projections; property value; risk allocation matrix; sensitivity analysis, discounted cash flows and comparison of alternative variants.

Numerous authors specially emphasize the importance of risk matrix analysis and risk quantification, which comprises: (1) project risk identification); (2) an assessment of the likelihood of the risks occurring; (3) calculating the financial impact and range of possible outcomes (Marenjak, 2013). Quantitative VfM implies that in the supply phase, all living costs and risks are quantified, and then their Net Present Value (NPV) is calculated. In PPP projects, these savings are primarily achieved by transferring part of the risk to a private partner by public contract.

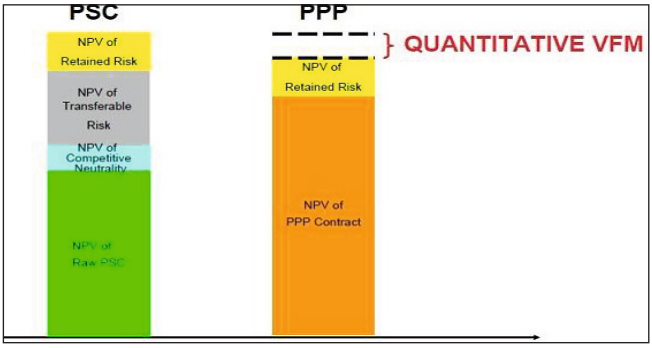


**Figure 3.** Quantitative VFM

**Source:** (Marenjak, 2013)

The total cost the PSC-Public Sector Comparator option is estimated as the sum of the Basic costs of the project (i.e. design, construction, operation and maintenance) plus the costs of retained and transferable risk. The total cost of a PPP option is estimated as the cost of retained risk plus the cost of any service provided by the state a private partner (e.g. the payment of availability) or costs incurred for the establishment of a PPP (e.g. transaction costs). The VfM would then be calculated as the difference between the total costs of the PSC option and the total costs of the PPP option ( Aldrete M,Rafael; Valdez, Gabriel A.; Bujanda, Arturo, 2012).

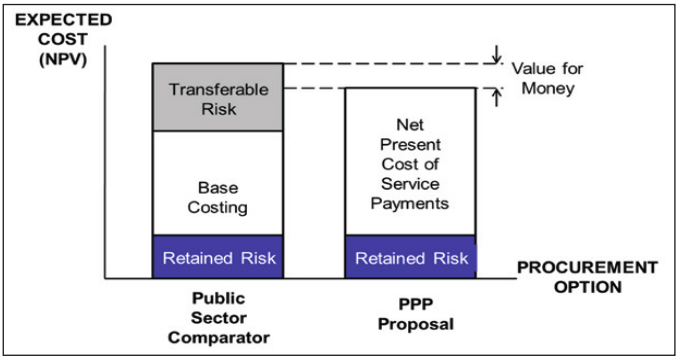


**Figure 4.** The total cost of a PPP option

**Source:** (Aldrete, Valdez & Bujanda, 2012)

The methodology in the Republic of Serbia then determines in detail all the elements of the project related to the Comparator - PSC (including numerous mathematical calculation formulas). The Comparator itself, as a point of the project documentation, must also contain attachments in the form of tables,

namely: the summary of capital costs, operating costs, the debt coverage ratio, risk matrices and risk quantification, detailed calculations for each item, sources of information, as well as the justification and explanation of key assumptions.

The most important element of the Methodology in Serbia refers to the NPV - *Net Present Value*. Discounted cash flows are of particular importance for NPV. Discounting is a key process in PPP project appraisals. It should demonstrate different values of future cash flows according to current values, or rather be calculated through a set of net present values for future cash flows. In that sense, first it is necessary to determine the discounting of the cash flow of the total project costs in the course of the preparation, implementation and utilization as well as estimated risk costs in the potentially agreed time period, on the one hand, and determine the discounting of the cash flow of the total municipality costs during the PPP implementation stage. The difference presents the net value, or rather the savings.

The discount rate presents the minimum acceptable rate of return, which is used to calculate the indicators of financial profitability of the project, i.e. the net present value of revenue and expenses of the project and the return of investment period. A discount rate of 5% is most often used for discounting for public sector projects, which are financed from budget revenues (See: Methodology for the analysis of obtained value with regard to invested funds (VfM) in public-private partnership and concessions, 2013).

On the basis of the comparison of the value of investments and the difference between revenue and expenses in project exploitation stage, the profitability of the investment project is calculated, most often through the so-called Internal Rate of Return - IRR. There are several mathematical formulas through which internal rates of return can be determined.

One of the formulas is the following in table 1

**Table 1.** Internal Rate of Return (IRR) -Mathematical formula

| |
|---|
| $0=NPV=\sum_{t=1}^{T}\frac{C_t}{(1+IRR)^t}-C_0$ |
| Where: |
| Ct = Net cash inflow during the period |
| tC0 = Total initial investment costs |
| IRR = The internal rate of return=The number of time periods |

**Source:** Investopedia, https://www.investopedia.com/terms/i/irr.asp

Finally, when it comes to street lighting projects, an important element is the analysis of data obtained by field measurements, which establishes the exact number of lamps that are the subject of reconstruction and calculates the exact installed power of light bulbs. The methodology of these projects therefore includes an analysis of the categorization of roads and the number of existing luminaries, after which the exact number of LED luminaries required for the reconstruction of public lighting and their installed power is determined. In the process of choosing the lamps, care is taken to ensure that they are modern, of exceptional photometric characteristics, a high degree of mechanical and electrical protection, made of quality and unbreakable materials, which ensures a long service life.

All the previously mentioned factors of the methodology were then used in the analysis of PPP projects in the Republic of Serbia related to street lighting, on which a positive opinion was given by the Commission for Public-Private Partnership from 2018 to July 1, 2020, and on the basis of which contracts were later signed between municipalities / cities and a private partner. During this period, 11 contracts were concluded which shall be the subject of the methodology application.

## DISCUSSION AND RESULTS

We have previously stated that PPP and VfM must have social and economic value. Before the concrete implementation of the economic segment of the VfM methodology in the PPP of street lighting in the Republic of Serbia, we shall first explain the social value and justification of these projects in the Republic of Serbia.

## Social justification of PPP projects in the field of street lighting

The main characteristics of the public lighting system on the territory of the municipality / city are mostly inefficiency and obsolescence. Such a system does not provide quality lighting and there are high costs for energy and maintenance. In addition, the function of the system is significantly impaired by years of insufficient or poor maintenance. The maintenance of public lighting systems includes the replacement of light sources (bulbs) and other parts of lamps (ballasts, bulb sockets, glass protectors), the replacement of damaged lamps, the replacement of damaged poles and cable installations, the replacement of damaged parts of measuring and control units (meters, contactors, clocks, fuses) ) and, if necessary, system expansion. Overall, the quality of maintenance of the public lighting system is insufficient, which results in insufficient quality of the lighting itself. This situation endangers the safety of all traffic participants, and considering that there are school facilities on the territory of the local self-government, the problem of inadequate lighting presents an additional problem of the safety of children and the people accompanying them in traffic.

When drafting the reconstruction proposal and finding the optimal lighting solution, the municipality / city is guided by the following principles: that the solution relies on the existing electrical installation; to propose a rational solution that meets the necessary lighting and technical criteria related to a given category of traffic road, to the extent which the current network infrastructure allows; to meet the required levels of illumination with appropriate built-in equipment and to significantly reduce electricity consumption. Significant attention must be paid to the quality selection of lamps, which was previously discussed. In addition to the selection of lamps, it is important to consider the method of managing the public lighting system. By improving the management of public lighting, the following results are achieved: the reduction of energy consumption and CO2 emissions, the reduction of light pollution, the reduction of maintenance costs and the acquisition of a “green” image. Finally, in these projects, the payment of the private partner depends on the energy savings achieved. Thus, the technical and financial risks of the investment are transferred from the energy user to the private partner.

The objectives of PPP street lighting of such projects are:
- Savings in electricity costs;
- improving the quality of lighting;
- longer service life by using economical light energy sources;
- risk allocation, or rather the transfer of risk from public to private partner;

- Environmental protection, less air pollution, or rather the reduction of carbon dioxide (CO2) emissions in accordance with the European Union requirements
- improving public safety and increasing citizen satisfaction (realization of social effects and public benefits).

As can be seen from this discussion, in municipalities and cities in the Republic of Serbia, PPP in the field of street lighting is socially justified. Not only does it benefit the community, but it also provides local sustainable economic development over a longer period of time. Based on the analysis in public-private partnership projects, it is unequivocally concluded that the proposed LED lamps provide the same or higher level of illumination compared to the current situation with a huge difference in power required, which explicitly means that huge savings are achieved in electricity required without a reduction in service levels and brightness, i.e. such savings do not reduce the quality of public utility service or safety. This savings can be of key importance for the economic part of the project as well: both for the local self-government unit and for the private partner.

The following step is to analyze their economic viability, both for a particular municipality / city and for a private partner.

## Economic justification of PPP street lighting and VfM

The total investment costs of replacing obsolete lamps for energy efficient LED (Light Emitting Diodes) lamps are financed on the basis of savings achieved under the so-called ESCO model in the contract period, which means that the project is financed from savings achieved through significant energy efficiency improvements. The essence of this model is to provide cities and municipalities, which are struggling with a lack of money, with a financial and technical solution which achieves greater energy efficiency and a reduction in energy consumption. Through long-term and mutually beneficial business cooperation, the local self-government does not borrow, and the financing is provided by a private partner. According to the ESCO model of contracting energy services, the private partner, in addition to providing project financing, guarantees, based on its expertise, the savings to be achieved and from which the fee is paid during the contract period, assuming most of the risks. These are energy services with a guaranteed effect (Jovanović, Contribution of Public-Private Partnership to the Development of the Energy Efficiency Market, 2018).

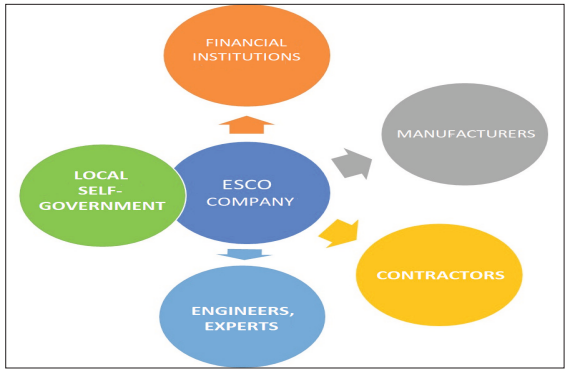


**Figure 5.** The ESCO model enhances cooperation

**Source:** ELIOS – http://elios.rs/en/about-us.html

According to the available data from PPP projects, and based on the Methodology of the Commission for Public-Private Partnership and available contracts concluded on the basis of street lighting projects approved by the Commission for Public-Private Partnership, we shall consider whether there is economic justification for them.

In the period from January 1, 2018 to July 1, 2020, and based on the obtained consent of the PPP Commission, 11 PPP contracts in the field of street lighting were concluded between local self-government units and a private partner. On the basis of the data from the concluded contracts, the table of economic justification of PPP projects in the field of street lighting is prepared below.

In addition to municipalities and cities which have concluded public-private partnership agreements and the time frame or duration of the project, the table also shows the cash flow in the case of public-private partnership, or rather the business results which the municipality / city achieves in that case. The main indicator of financial efficiency is the financial net present value of project expenditures. Bearing in mind that the public partner has no capital expenditures in the preparation and implementation period for public lighting replacement projects, and as the effects of the application of energy saving measures (ESCO) are achieved immediately after the implementation, this means that the public partner has concrete positive financial indicators already in the first year, and in this way realizes a positive cash flow from that moment on. This is one of the most significant positive effects of such a project. Given that this value is positive, it can be concluded that the projects are financially viable in the case of public-private partnership.

**Table 2.** VfM in PPP projects related to street lighting in the Republic of Serbia in EUR

| Year of project approval by the Commission | Municipality/City | Contracted | Financial net value of expenditureres (current value) | Annual savings | Savings in % compared to the current situation | Project duration in years | Total savings during project implementation |
|---|---|---|---|---|---|---|---|
| **2018** | | | | | | | |
| | Sečanj | 2019 | 449.122,17 | 107.939,00 | 81% | 12 | 1.295.268.00 |
| | Kladovo | 2018 | 931.807,00 | 228.567,00 | 81% | 13 | 2.778.490,00 |
| | Lapovo | 2019 | 21.292,00 | 53.891,00 | 91% | 15 | 789.932,00 |
| | Stara Pazova | 2019 | 791.740,00 | 362.491,00 | 83% | 13 | 5.424.720,23 |
| | Knjazevac | 2019 | 405.520,00 | 194.952,00 | 82% | 15 | 2.924.276,00 |
| | Becej | 2019 | 438.791,00 | 193.077,00 | 76 % | 13 | 2.510.003,00 |
| | Pancevo | 2020 | 786.894,00 | 768.334,00 | 82% | 15 | 11.495.135,00 |
| **2019** | | | | | | | |
| | Krusevac | 2019 | 424.729,00 | 311.008,00 | 90% | 15 | 4.300.728,00 |
| | Jagodina | 2020 | 797.090 | 492.716 | 73 % | 12 | 5.156.592 |
| | Vrbas | 2020 | 88,018 | 27,744 | 47% | 15 | 416.160 |
| | Vrsac | 2020 | 781.133,00 | 313.457,00 | 71% | 12 | 3.761.484,00 |

**Source:** Authors

Maximum total costs with regard to the implementation of energy saving measures comprise costs intended for electricity, maintenance costs and maximum total annual costs for local self-government in the course of a certain number of years, for the entire duration of the project, during which it pays compensation to a private partner. The project generates revenues by reducing current expenditures for electricity, in relation to the amount of expenditures for electricity before the reconstruction of the public lighting system and by reducing expenditures for maintenance services of the reconstructed public lighting system, in relation to the costs of the public lighting system maintenance before reconstruction. It is precisely this difference that presents the savings achieved in the table on an annual basis, as well as during the entire duration of the contract.

In addition to the proven financial effects on the project which have been listed here, the effect of the fact that such activity is not a credit business in accordance with the law, that it does not represent credit indebtedness for local self-government, does not increase the expenditure part and indebtedness, and that it increases the revenue part of the local self-government budget. This means that the budget deficit and indebtedness of the local self-government are reduced, which, apart from the direct effect of cost savings, presents an extremely significant positive

financial effect on the local self-government budget. Such effects and possibilities are invaluable from the point of view of budget liquidity, bearing in mind that new space is opened for local self-government for some other arrangements which may be urgent and necessary for resolving some acute problems and challenges of the municipality which cannot be financed otherwise than by borrowing.

On the example of the Public-Private Partnership Project Proposal for the replacement of part of the existing public lighting lamps with new LED lamps by applying energy saving measures in the municipality of Vrbas, which was contracted in 2020, we shall explain the obtained value in relation to invested funds (VfM). The PPP Commission Methodology was applied to the Public Sector Cost Comparator (PSC) in this project. The PSC is based on the analysis of the actual situation and costs of functioning and improvement of the public lighting system of local self-government in the Republic of Serbia.

The basic steps during the development of the PSC in this project were:

1. the calculation of basic costs of reconstruction, management and maintenance of part of the public lighting system within the PSC, when the municipality implements the project through the public procurement of works, goods and services, financed from loans and budget revenues,

2. the calculation of basic costs of the municipality within the PPP, when the private partner performs the reconstruction, management and maintenance of part of the public lighting system from private funds (capital and loans),

3. the identification, evaluation and distribution of risks between the municipality and the private partner during the implementation of the project according to the PPP model,

4. the calculation of the present value of the total costs of the municipality within the PSC and PPP by discounting the cash flow of the total basic costs of the project and the costs of incurred and transferred risks to the private partner,

5. the calculation of the value of invested money.

The following table shows the calculation of value in relation to the funds invested (VfM) into the project of reconstruction of part of the public lighting system by awarding a PPP contract in the municipality of Vrbas.

**Table 3.** VfM in the PPP project of street lighting in the municipality of Vrbas

| COST | PSC | PPP | VFM (PSC-PPP) |
|---|---|---|---|
| **I** | | | |
| Basic capital costs | 205,068.13 | 10,716.89 | 194,351.24 |
| Risks | 3,949.65 | 2,239.24 | 1,710.41 |
| Total (I) | 209,017.78 | 12,956.13 | 196,061.65 |
| **II** | | | |
| Basic operating costs | 219,664.00 | 398,835.96 | -179,171.96 |
| Risks | 36,453.45 | 0.00 | 36,453.45 |
| Total (II) | 256,117.45 | 398,835.96 | -142,718.50 |
| **III** | | | |
| Basic financing costs | 19,857.48 | 0.00 | 19,857.48 |
| Risks | 14,744.32 | 0.00 | 14,744.32 |
| Total (III) | 34,601.80 | 0.00 | 34,601.80 |
| TOTAL PSC (I+II+III) | 499,737.04 | 411,792.09 | 87,944.95 |

**Source:** (Commission for Public-Private Partnership, Republic of Serbia)

By discounting the cash flow of the total project costs in the course of the preparation, implementation and 10 years of use and estimated risk costs, the net present value of the total costs for the PSC project of the reconstruction of the public lighting system in the amount of EUR 499,737.04 has been calculated. By discounting the cash flow of total costs of the Municipality during the implementation of the PPP for the project of reconstruction of part of the public lighting system, the net present value of total costs of the Municipality within the PPP in the amount of EUR 411,792.09 has been calculated. The value in relation to the invested funds amounts to EUR 87,944.95 and presents the difference between the present value of the total costs of the PSC and the present value of the total costs of the municipality within the PPP. The positive and high value of VfM confirms the justification of awarding a public contract on PPP to a private partner for the implementation of the project of reconstruction of the part of the public utility system in the municipality of Vrbas.

Through this specific example, we have proven the economic justification of PPP in the field of street lighting in the Republic of Serbia.

## CONCLUSION

Various areas of public administration reform based on the NPM doctrine have started to be implemented in the Republic of Serbia since the year 2000. A sig-

nificant step in the implementation of the NPM doctrine was the adoption of the Law on Public-Private Partnerships and Concessions (LPPPC in 2011). Today, the PPP in the Republic of Serbia, especially at the local level, occupies an increasingly important place. The Law on Communal Activities stipulates that entrusting these activities to the private sector is always a form of the PPP. Street lighting is one of the communal activities of the municipalities / cities, which, along with the maintenance of local infrastructure / roads and urban and suburban transportation services, are most often the subject of PPP projects. Since the adoption of the LPPPC, street lighting projects have become very popular, and in the last two years alone, 11 public contracts have been concluded between the municipality / city and a private partner in this area. Street lighting projects are energy efficiency projects in the public sector. Therefore, street lighting projects, unlike other projects, enable the use of a special type of PPP - ESCO model of contracting energy services. The ESCO model is significant because the realization of the project itself is financed from the achieved energy savings (specifically, in street lighting projects - a significant reduction in electricity consumption by using LED lamps). An integral part of every PPP is the Value for money (VfM) methodology. The VfM methodology for all PPP projects must demonstrate the qualitative (social) and quantitative (economic) justification of these projects. The same applies to street lighting projects. We have previously proven the social justification by applying the VfM methodology in street lighting projects through the following facts: (1) citizens receive better and higher quality public lighting; (2) these projects provide for the improvement and protection of the environment; (3) the implementation of these projects improves energy efficiency in the public sector. By applying the VfM methodology, we have also proved their economic (quantitative) justification for the municipality / city. The economic and financial benefit is reflected in the fact that: (1) the municipality / city does not borrow on credit; (2) that the investment is financed by a private partner; (3) the municipality / city pays for the investment from the realized energy savings; (4) based on the realized energy savings, the municipality / city pays a compensation to the private partner within 10-15 years; (5) the municipality achieves significant economic savings by engaging a private partner and may allocate such funds for other purposes; (6) the private partner justifies its investment and earns a profit over a longer period of time. By applying the Public Sector Cost Comparator (PSC) in the VfM methodology, we have demonstrated the method of cost calculation as well as the level of savings achieved. The main indicator of financial efficiency is the financial net present value of project expenditures - NPV. Analyzing the basic capital costs and risks, the basic operating costs and risks, as well as the basic financing costs, we have come to the conclusion that in all 11 projects which have been concluded on the basis of a public contract in the last 2

years, significant financial savings for the municipality / city have been provided, on the one hand, and, on the other hand, the level of street lighting service quality for citizens has been improved at the same time. Nowadays, when there is more and more talk about the need for environmental protection, sustainable development and energy efficiency, but also the economic value of public administration based on 3E, we can expect further growth of PPP in the Republic of Serbia. This especially applies to PPP street lighting, which already today proves the achieved VfM. Therefore, we can expect other municipalities / cities to start taking the path of PPP in this area in the upcoming period.

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