Modelling the Process of Green Public Procurement

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Abstract **– One of the opportunities how to foster *s*ustainability of public procurement is via purchasing goods and services taking into account balanced and integrated social, economic and environmental aspects while meeting the needs of public institutions. However, more exact methodological procedures are absent in the implementation of green public procurement. Such methodology could enable assessing the quality, quantification and significant connectivity to green and knowledge economy in current practice. Authors of the paper provide more exact methodology of green public procurement of goods and services based on its connectivity to the worldwide standardized indicators of sustainable socio-economic development as well as the results of their own research.**

Keywords **– sustainable development, public procurement, development indicators, environmental characteristics, methodological procedure.**

1. Introduction

Nowadays voluntary environmental policy instruments are increasingly applied in private and public practice. One of them is Green Public Procurement (GPP). The core of GPP lays in integration of environmental characteristics in the process and procedures of public procurement. Sustainability of public contracts is a process of purchasing goods and services, taking into account social, economic and environmental aspects of development that will have such a purchase on society and economy. The GPP supports a number of international development policies and strategies of the EU which proves that it is an important instrument contributing to achievement of economic and environmental objectives [8]. An application of this environmental policy instrument supports a sustainable use of natural resources, achieving changes in customers´ behaviour towards sustainable production and consumption, and also it encourages environmental innovations and green growth [3, 11].

2. Background for strategic and methodologic approach towards green public procurement

Implementation of economic instruments aimed at strengthening competitiveness of economy through innovations and environmentally friendly technologies plays an important role in creating and promoting the green economy [5, 12, 18].

Besides these instruments it is of great importance that the Slovak Republic also focuses on use of voluntary instruments of environmental policy in the field of environmental management and audit scheme (EMAS) and Eco-labelling of products, creates conditions for promotion of green public procurement and implementation of action plan for environmental technologies [17]. Transition to the green economy will also require that there should be paid more attention to sustainable production and consumption which will take into account an entire life cycle of the product [2, 14]. The sustainability of public contracts is ensured via process of purchasing goods and services, taking into account social, economic and environmental aspects of development and the impact of such purchases on the society and the economy [4]. The GPP is one of voluntary instruments of international environmental policy.

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Green growth strategies have to encourage greener behaviour of businesses and consumers, to facilitate a smooth and equitable relocation of jobs, capital and technology towards greener activities and to provide adequate incentives and support for eco-innovation [15, 16]. Public institutions have to set goals in different areas of the GPP as well as measures for reaching these goals and so ensure successful implementation of green administration [5]. It is inevitable to incorporate these measures into the internal regulations of institutions. An initial concept of the GPP is focused on an existence of clear, verifiable, reasonable and ambitious environmental criteria of products. These criteria are based on the life cycle assessment in a scientific knowledge base [20].

In its announcement entitled "Public procurement for a better environment", the Commission presented an idea to create a procedure for determining the common criteria for Green Public Procurement.

3. Green public procurement as an intervention tool for optimizing product life-cycle

Green growth strategies use a variety of economic, political and market measures and interventions (Figure 1.) at the state levels, by support of investment and innovation in an implementation of environmentally friendly and economically viable technologies ensuring environmental protection and efficient use of natural resources as much as possible [9, 19].

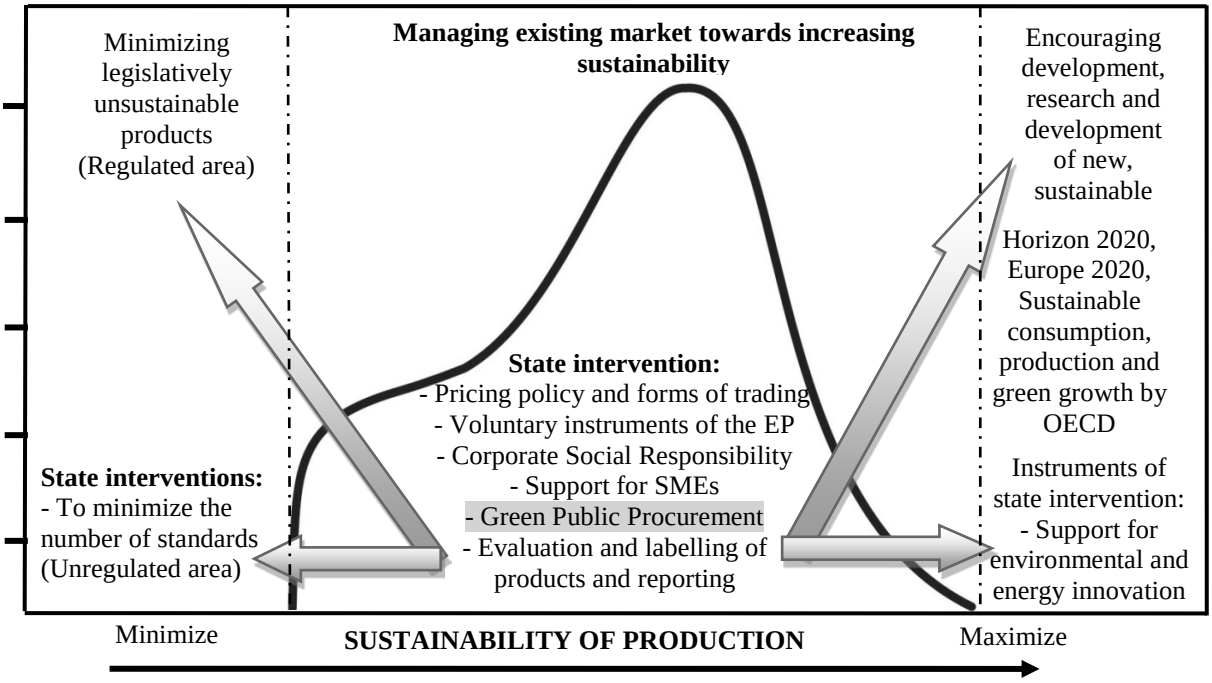


Figure 1. State intervention to support the sustainability of the green products and the status of GPP

Green growth indicators as measurable variables are helpful in monitoring whether the company deteriorates or improves its environmental performance and complies with current legislation relating to its activities [1, 13]. In a cyclic flow of economic activity, the area of sustainable production is a natural starting point for a definition of the green growth indicators, where the outputs (goods and services) are produced by company inputs [6].

In some economic models such inputs include e.g. services, capital and intermediate products which are used directly in the production [10].

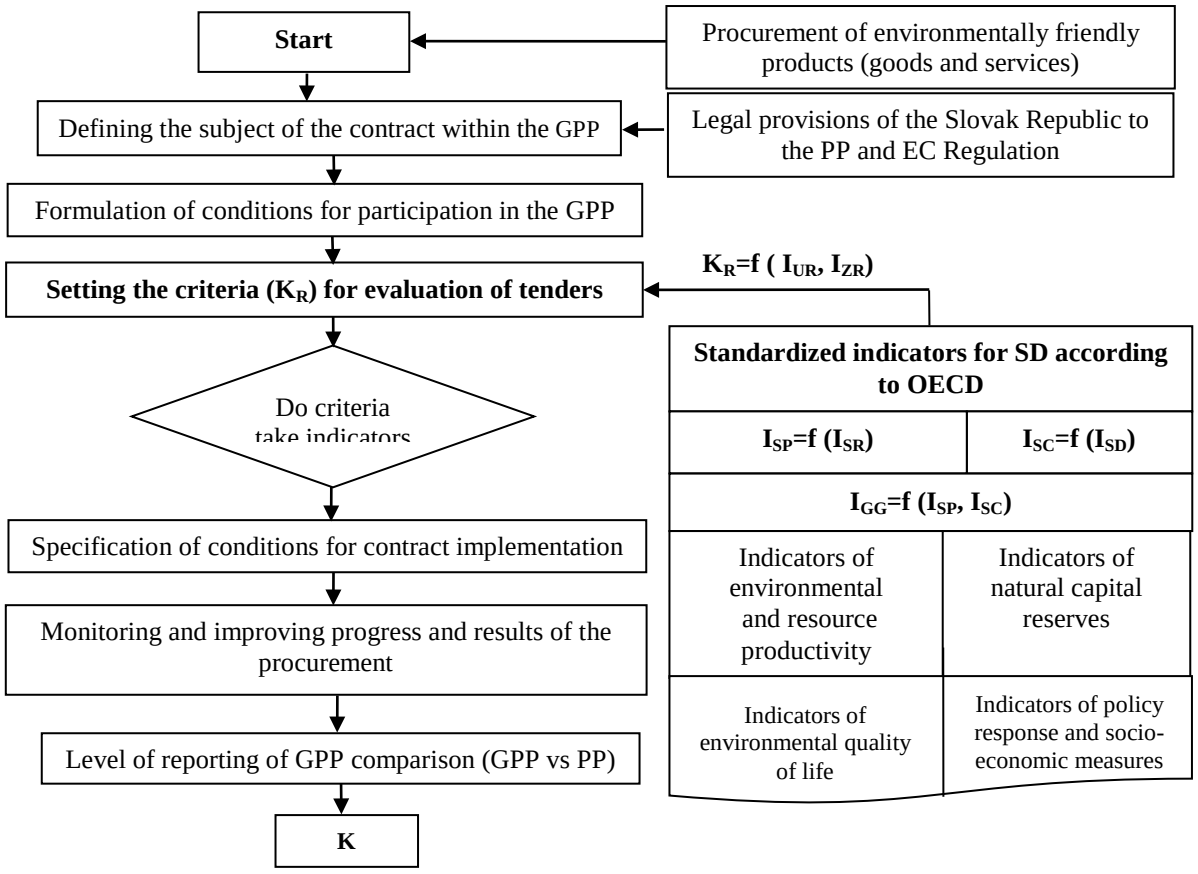
Heading towards green growth requires an assessment of the quality and composition of growth, with regard to participating subjects. In the area of economic activities, the area of production is shown as a natural starting point for determining the indicators of green growth. A production system is an input-output system.

1. Process modelling of green public procurement

A proposal of process model of green public procurement is based on the basic requirements of a public contract with an inclusion of the

environmental characteristics and indicators of green growth. The methodical procedure is proposed so that it would be possible to develop a "green" order and then to implement a whole process of green public procurement up to the evaluation of the tenders and closing of the contract with the successful tenderer. Processes of the methodology of integration of the sustainable development indicators into the process of green public procurement are presented in the form of algorithmic flow diagram (Fig. 2.). This process can be carried out also through standardized indicators of green growth derived from indicators of sustainable production and consumption. A decisive step within the integration of the indicators of the sustainable production, consumption and green growth in the GPP is dimensioning criteria for evaluation of tenders in the context of green public procurement.

In a case that these criteria take into account the standardized indicators for the sustainable development by the OECD, it is possible to continue smoothly and to specify conditions of the implementation of a public contract, and consequently implement monitoring and reporting of the process of green public procurement [21].



SP– sustainable production, SC – sustainable consumption, SD – sustainable development, GG – green growth, I_{SP} – indicator of sustainable production, I_{SC} – indicator of sustainable consumption, I_{SD} – indicator of sustainable development, I_{GG} – indicator of green growth, K – criterion of development

Figure 2. Processing of green public procurement as a support to sustainable production, consumption and green growth

The sustainable development, in terms of the proposed methodology, can be achieved simultaneously by monitoring indicators of the sustainable production, consumption and green growth.

In addition to standard environmental characteristics, current indicators of the sustainable production, consumption and green growth, not excluding the related voluntary environmental policy instruments have been integrated in the process of evaluation of the criteria for the specific contract within the need to propose more exact methodological procedure of the GPP.

Table 1. lists selected environmental criteria and indicators for their evaluation as well as proposal of their scoring.

Table 1. Scoring of indicators to evaluate tenders in accordance with environmental criteria

Criterion for evaluation of tenders (K_R)	Indicators of meeting the criterion	Score
1. Management system (MS)	Certificate of QMS ISO 9001, EMS according to ISO 14001, Registration the scheme EMAS III	30
	An initial environmental review	15
	Register of environmental aspects, impacts and risks	15
	Environmental policy	10
	Environ statement and its verification by environ verifier	15
	Environmental audit	20
	Internal environmental audits	20
	Environmental reports	15
2. Environmental labelling of products (ELP)	Certificate of European Environmental label (the Flower)	20
	Certificate of national environmental label type I (EVP, etc.)	20
	Energy Star Mark	15
	EU energy labelling	10
	Certificate of type FSC, PEFC	15
	Regional / national brand of integrated production	20
3. Integrated Product Policy (IPP)	Patents relevant to green growth	20
	Rate of waste recovery	10
	Assessment of material consumption	10
	Assessment of life cycle costs	10
4. Environmental technologies (ET)	Environmental product innovations	20
	Documents providing the BAT technology	10
5. Evaluation of Product Life Cycle (LCA)	Implementation of LCA according to ISO 14044	20
	Register of environmental aspects, impacts and risks	10
	Inventory analysis	5
	Life Cycle Impact Assessment	15
	Interpretation of Product Life Cycle	5
6. Environmental performance evaluation (EPE)	Implementation of EPE according to ISO 14031	20
	Register of environmental aspects, impacts and risks	10
	Evaluation of indicators of environmental performance	20
7. Environmental management accounting (EMA)	Implementation of EMA	20
	Cost Accounting Material flow according to ISO 14051	20
8. Other evidence	Manufacturer's technical file	20
	A written declaration by the manufacturer / supplier of compliance with the criteria	10
	Package of Product Labelling	5

In order to test the methodology, we have applied it on evaluation of office paper supply. There have been selected seven relevant evaluation criteria, presented in Table 2.

Table 2. Scoring of indicators for office paper according to environmental criteria

An evaluation criterion of offer (K_R)	Indicators of meeting the criterion	Score
1. Management system (MS)	Certificate of QMS ISO 9001, EMS ISO 14001, Registration EMAS III	30
2. Environmental labelling of products (ELP)	Eco-label type I (EVP, etc.) and EU Eco-label (European flower)	20
	Certificate of FSC, PEFC	10
3. Integrated Product Policy (IPP)	Assessment of material consumption	10
4. Environmental technologies	Documents proving BAT technology	10
5. Evaluation of Product Life Cycle (LCA)	Implementation of LCA ISO 14044	20
6. Environmental performance evaluation (EPE)	Implementation of EPE ISO 14031	20
7. Other evidence	Manufacturer's technical file	20

Based on Table 2., we have assessed both formats of the office papers, assigning score according to relevant environmental criteria. Results are presented in Table 3.

Table 3. Scoring of indicators for evaluation of tender for office papers according to the environmental criteria

Name of the office paper	Indicators of meeting the criteria K_R	Score
Xerox Recycled Paper A4, White (A)	The certificate EMS ISO 14001	30
	The of registration EMAS III	30
	Environ ELP - Blue Angel, Nordic Swan	40
	OE - manufacturer's technical file (DIN, EN 12281)	30
Xerox Business 80g A4 DIN 4 HOLE, Whitepaper (B)	EMS 14001 or EMAS III – Certificate, logo	30
	ELP – Certificate of ECF	15
	OE - manufacturer's technical file (ISO 9706, EN 12281)	30
Xenographic paper Image, Business A4 80g/m^2, white, suitable for Atr + Laser (C)	EOP – Certificate of type FSC	15
	Total score (format A4)	220
Paper Xerox Performer A3, 80g/m^2 (D)	EMS 14001 or EMAS III – Certificate, logo	30
	ELP - Certificate of type ECF	15
	OE - manufacturer's technical file (ISO 9706, EN 12281)	30
Xerographic paper Image Impact A3 80g/m^2, white, particularly for colour laser printing (E)	ELP – Certificate of type FSC	15
	ET - Documents proving BAT technology	10
	OE - manufacturer's technical file (ISO 9706)	15
	Total score (format A3)	115

Table 4. Determination of weights of selected environmental criteria for evaluation of tenders of office paper within GPP

Criterion for evaluation of tender (K_R)	Points (%)	Weights (A)	Weights (B)	Weights (C)	Weights (D)	Weights (E)
1. MS	0,3	1	1	0	1	0
2. ELP	0,3	1	1	1	1	1
3. IPP	0,1	0	0	0	0	0
4. ET	0,1	0	0	0	0	1
5. LCA	0,2	0	0	0	0	0
6. EPE	0,2	0	0	0	0	0
7. OE	0,2	1	1	0	1	1
		0,8	0,8	0,3	0,8	0,6
Total score	1,4	0,6	0,6	0,2	0,6	0,4

The calculation of the weights for each criterion has been conducted by percentage expressing specific scoring criteria which was then multiplied by particularly achieved characteristics of each office paper to the total score of evaluation of fulfilment of all environmental criteria.

Table 5. Final value of the evaluation of criteria of tenders with integration of environmental characteristics

Format	Name of office paper	Number of sheets (pieces)	Price (€)	Score	Delivery date (number of days)	Score	Points economic criteria (together)	Ranking	Environmental criteria (total score)	Total score	Ranking
A4	A	500	2,32	76	4	15	91	2.	104	195	1.
A4	B	500	2,55	72	2	30	99	1.	60	159	2.
A4	C	500	4,39	40	2	30	70	3.	5	75	3.
A3	D	500	4,59	71	2	20	91	1.	60	151	1.
A3	E	500	9,71	34	2	30	64	2.	24	88	2.

As it is evident from table above, the product Xerox Recycled Paper meets most of requirements taking into account the most economically advantageous tender and thus economic and environmental criteria.

5. Conclusion

Recently, the voluntary tools of environmental policy are increasingly applied in practice of all economic sectors [7]. These tools include also Green Public Procurement. Key elements of process algorithm for GPP were designed and verified in a practical example of procurement of office paper. The methodical procedure in this text suggests the possibility to develop a green order and then to implement a whole process of green public procurement starting with setting the criteria for evaluation of the tenders and ending with closing the contract. Benefits of GPP implementation are summarized:

1. Environmental benefits

- Increasing the efficiency of energy consumption and optimizing its use,
- Reducing water consumption, waste water treatment and recycling,
- Reducing use of non-renewable resources,
- Elimination of pollution of air, water and soil,
- Reducing produced packaging waste,
- Increasing environmental quality of life.

2. Social and health benefits

- Continually improving air quality,
- Healthier working environment,
- Protecting health of workers and general public,
- Improving quality of life,
- Healthier working environment,
- Health protection of general public.

3. Economic benefits

- Approach LCC (Life Cycle Costing) - Increasing economic efficiency within the LCA analysis,
- Financial savings from recycling and waste recovery,
- Financial savings from extended life of the product,
- Financial savings from environmental accounting and environmental taxes,
- Financial savings from reducing fines for environmental damaging,
- Financial benefits from increased competitiveness.

4. Political benefits

- Achievement of environmental objectives of organization,
- Achievement of local environmental objectives,
- Achieving global environmental objectives,
- Improvement of image.

These benefits include environmental, social and health, economic as well as political benefits.

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