

Application of Green Purchasing Behaviour in Companies

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Abstract—This paper is aimed at the definition and description of the process of green purchasing and its application in companies. Green purchasing represents a purchase of environmentally friendly products and services and includes the selection of contractors and the setting of environmental requirements in a contract. In more detail the paper presents approaches and methods used by companies in selecting their suppliers, requirements for implementation of environmental management systems and selection criteria. Additionally, it provides examples of purchase of paper and wood products originating from sustainable resources.

Keywords—green purchase, environmentally friendly products, supply chain, award criteria, products from sustainable resources

I. INTRODUCTION

Green purchasing (procurement) is the purchase of environmentally friendly products and services, the selection of contractors and the setting of environmental requirements in a contract. Green purchase behaviour deals with the purchase of sustainable products or environmentally friendly products recyclable and beneficial to the environment. It compares price, technology, quality and the environmental impact of the product, service or contract [1].

Green procurement policies are applicable to all organisations, regardless of size and ownership. It ranges from simple decisions e.g. to purchase renewable energy or office paper from sustainable and recycled sources or more comprehensive such as setting environmental requirements for suppliers and contractors. There is a number of biggest opportunities used by supply management to support their companies like reusing the water in manufacturing of supplied products, switching from toxic to nontoxic substances, reducing air emission and hazardous waste to make supplier energy more efficient. North Rizza [2] mentions that a good reference is a point for every organization to understand what elements fall under the sustainability umbrella first.

From the demand side of the market, consumers' behaviour in respect to green purchasing is evaluated in terms of their intention or willingness to purchase green

goods and the conscious behaviour or intention eventually transformed into their purchase decision for such in order to benign for environmental sustainability [3].

Green public procurement (GPP) is a process when public authorities try to procure services, products and works with reduced environmental impact throughout their life cycle compared to goods, services and works with the same primary function procured in other ways [4]. Green procurement is a habit of everyday practice; it cannot be seen as a separate form of knowledge and therefore needs to be adjusted to the existing procurement practise [5]. Public procurement plays an important role in the acquisition of services or goods by public entities. According to Rainville [6] significant expenditure across Europe resulting from this practise contains 19% of European GDP. The efficiency and cost effectiveness are one of primary policy objectives of public procurement supporting proper use of a taxpayer. Secondary policy objectives of public procurement provide social benefits stimulating innovation and environmental improvement. Green public procurement presents central practice aimed at meeting these objectives. Malin [7] indicates that such procurement can be used as a policy instrument for reaching environmental quality objectives.

Organisation for Economic Co-operation and Development (OECD) is committed to green procurement. In 2002, the Recommendation on the Environmental Performance of Public Procurement [8] supporting green targets and accepting measures to make sure that the targets are met was accepted by the OECD countries. Environmental targets in procurement strategies were implemented by the member countries of the organisation increasingly. Collection of the best practises for green procurement providing good practices for green public procurement at national and sub-national levels has also been prepared by OECD [9]. Guidance in this area, in the form of national green public procurement criteria, policy framework monitoring GPP professionalising green procurement, raising awareness, introducing environmental standards in procurement, understanding market capacity and assessing costs and benefits are included in the practice [10].

Green procurement policies and programs can reduce expenditure and waste; increase resource efficiency; and influence production, markets, prices, available services and organisational behaviour. According to Mosgaard [5] green procurement is not an easy task. The purchasers need specific environmental and often technical competences to perform green procurement. It involves collaboration between the actors in a supply chain, as the environmental issues considered are not as simply communicated as, e.g., the price of a product.

On the other hand, there are also obstacles to implementing a green procurement program. Those include e.g. lack of readily available environmentally friendly products, expensive or non-existing environmental alternatives, inaccurate studies, lack of organisational support, and inaccurate or unsupported environmental claims by manufacturers and suppliers [1].

II. SELECTION OF SUPPLIERS

In number of supplier selection studies, substantial discussion related to the enhancement of supplier capabilities in terms of improving their environmental performance, either by introducing sustainable aspects or by having necessary certifications has been mentioned. Several authors state that supplier selection plays an important role in promoting a business to gain maximum ecological-economic benefits [11]– [13].

Cousins et al. [14], De Boer et al. [15] and Van Weele [16] define supplier selection as one activity comprising several tasks. Firstly, the needs are identified. Subsequently, purchasers agree on measurement criteria for potential suppliers. A selection is completed with reviewing the information submitted by candidate suppliers resulting from several rounds. Finally, the choice is achieved following the number of qualified suppliers offer [17]. Humphreys et al. [18] developed a comprehensive framework of the supplier selection process which incorporates environmental performance (Fig. 1.).

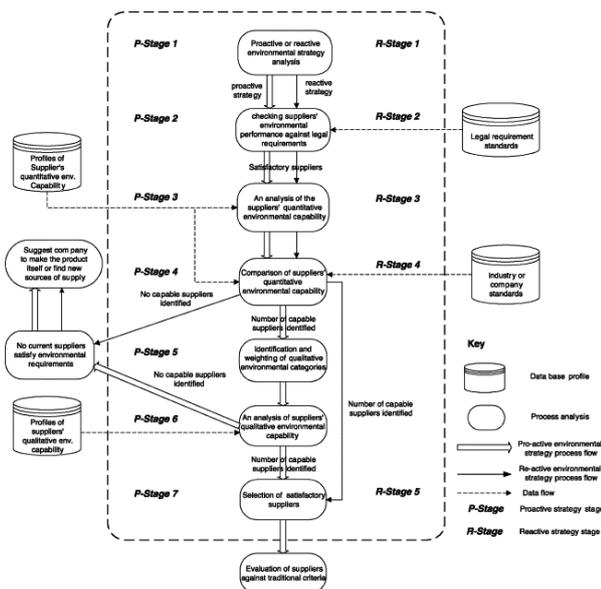


Fig. 1. Stages involved in the decision support system. (source: [18])

Nawrocka [19] summarised the techniques used for supplier evaluation and selection and classifies them as follows: (i) Multi-criteria decision-making technique, (ii) Mathematical programming technique and (iii) Artificial intelligence technique. Multi-criteria decision-making (MCDM) technique is a methodological framework aiming at proving knowledgeable recommendation amid a finite set of alternatives, also known as actions, objects, candidates, or solutions, while being evaluated from multiple viewpoints, called criteria, also known as features, attributes or targets [20]. The research of Hamdan and Cheaitou [21] provides a decision-making tool how to deal with problem of multi-period green supplier selection and order allocation problem. Mathematical programming (MP) technique is a general term in decision-making research. For selection applications Adler et al. [22] specifies several techniques for detailed review. Artificial intelligence (AI) techniques consist of 12 techniques regarded as AI techniques. Major and neural network, rough set theory and grey system theory are four of them together with eight other AI techniques including case based Bayesian networks, particle swarm optimization, ant colony algorithm, Dempster–Shafer theory, association rule, support vector machine, and decision tree [23].

A. Environmental Management Systems and ISO 14001

Any organizations (public or private) willing to improve their overall environmental behaviour may decide to introduce an environmental management system. Environmental management systems are organizational tools to improve the overall environmental performance of an organization. An organization with an established environmental management system can apply for certification under one of the two main environmental management systems used in the EU: "EMAS" or European / International Standard for Environmental Management Systems (EN / ISO 14001).

EMAS schemes are primarily used by organizations based in the EU or in the European Economic Area, although organizations and establishments located elsewhere (but always verified under the control of the European Accreditation Body) may also benefit from it. EMAS is open to every type of organisation eager to improve its environmental performance. It spans all economic and service sectors and is applicable worldwide. EMAS helps organisations optimise their internal processes, achieve legal compliance, reduce environmental impacts, and use resources more effectively. All kinds of organisations – public and private, large multi-national companies as well as small and medium sized enterprises (SMEs) with a few financial resources and limited in-house environmental management expertise can enjoy the benefits [24].

The ISO standard is open to organizations around the world. Aligning the enterprise green strategy development and establishing the green criteria are the core of the green supplier selection (GSS) model [25]. The environmental management standard ISO 14001 has been used as the most common benchmark EMAS (the European Eco-Management and Audit Scheme). One approach to accomplish better environmental supplier performance is via diffusion of standardized environmental management systems such as ISO 14001.

Sustainable practice must be implemented throughout the supply chain in order to obtain the licence. Caniels [26] gives an example of the German automotive industry where original equipment manufacturers develop their own standards that usually go beyond the requirements of ISO, particularly when it comes to environmental issues. These green standards are defined by the end-product manufacturer, but sometimes they are developed together with key suppliers. Green purchasing has significant implications for the firms implementing it, especially when it comes to the criteria used in supplier selection. Supplier selection and evaluation processes were dominated by criteria such as price, quality and delivery [27]. Green purchasing, however, requires the inclusion of environmental criteria in supplier selection leading us to the concept of green supplier selection (GSS) [28]. "Green" refers to the environmental aspects within the sustainability concept.

B. Exclusion Criteria

Public Procurement Directives [10] mention the examples where an economic operator can be excluded by contracting authority. In some particularly serious criminal cases, exclusion is mandatory. In case when European or international environmental legislation are not accepted, suppliers can be excluded. Following reasons can result in excluding as well: serious professional misconduct resulting in the integrity of the economic operator questioning, significant or persistent deficiencies in meeting some of the essential requirements of the prior procurement resulting in termination or other comparable sanctions, distortion of any of the above information or inability to submit supporting documents.

According to the 2014 Guidelines [29], exclusion can be caused by not keeping within international environmental conventions, namely the Vienna Convention for the Protection of the Ozone Layer, Basel Convention on Hazardous Waste, the Stockholm Convention on Persistent Organic Pollutants, Convention on Prior Informed Consent (Hazardous Chemicals and Pesticides).

The economic operator suitability is assessed following the participation conditions. Two-phase procedures as a part of the initial phase of showing the interest can be also used to create a shorter list. Submitted competition proposals are assessed due to "meet / not meet" criteria either before or after the tender. The conditions for participation in the GPP relate to technical and professional capacity of human and technical resources, experience and references, training and professional qualification of staff, environmental management schemes and systems (e.g. EMAS or ISO 14001), supply chain management/tracking Systems, product samples, conformity assessment modules.

Contracting authority during the selection phase may request the information, e.g. contract the operator intends to subcontract. Information necessary for subcontractor is associated with supply chain management and tracking systems that an operator will be able to use when performing a contract. When the contract covers products, samples as well as certificates of conformity or quality may be required in the selection stage [29].

Environmental technical competence may include technical capability to minimize waste generation, prevent

leakage / leakage of pollutants, reduce fuel consumption, or minimize disruption of natural habitats. In practice, issues generally discussed are, e.g. [30]: Is this company experienced in implementing environmental contracts in a sustainable way? Does this company hire or have the opportunity to hire personnel with required knowledge and skills necessary for resolving the environmental difficulties of the contract? Can the company use technical equipment for environmental protection? Are there available means to ensure the quality of the environmental aspects of the contract (e.g. access to relevant technical bodies and measures) etc.

III. AWARDING A CONTRACT

The environmental award criteria are introduced in the EU Buying green handbook [29] and they:

- comply with the Treaty principles;
- ensure the possibility of effective competition;
- are linked to the subject-matter of the contract;
- are mentioned expressly in the contract notice and tender documents along with their weightings and any applicable sub-criteria; and
- do not confer an unrestricted freedom of option on the contracting authority.

During the award stage, points to recognize environmental performance beyond the minimum requirements set in the specifications may be allocated. No weighting maximum is set by environmental criteria. General rules for awarding the contract include criteria for evaluation offers. In the award stage, the contracting authority evaluates the quality of the tenders and compares costs. Since 2014, the procurement directive [29] mention that contracts are conducted in case of the most economically advantageous tender. Some approaches may be considered particularly appropriate for GPP. Life-cycle costs reveal the true costs of a contract. Energy and water consumption, maintenance and disposal costs provide better greener option over the full life-cycle [29].

There are also several rules set out regarding transparency in award criteria. Environmental award criteria reflecting the case law of the Court of Justice, clarify the possibilities for the contracting authorities to meet the needs of the public. They must not confer an unrestricted freedom of choice, must be advertised in advance. Moreover, they guarantee equal treatment and they should ensure the possibility of effective competition [31].

Applying environmental award criteria is next point of awarding a contract. The legal framework provides considerable scope for the purpose of environmental award criteria and a variety of other methods and approaches. They may be used in specification or award criteria, weighting approaches and using labels, too [29]. Vidal and Sánchez-Pantoja [32] grouped the selected several environmental criteria. They suggest the method based on a distance life-cycle assessment multiple criteria decision-making for obtaining single score to evaluate award criteria for green public procurement. The simplified life cycle assessment methodology is applied in a new method based on ability to

evaluate the achievement of each award criterion during green public procurement process. Labels and other forms of third-party evidence help assess how well a tender performs against chosen award criteria, and how to verify tenders claim, too [29]. For example, Song et. al. [33] in his study examines the effectiveness of ecolabels in informing sustainable consumption by using data collected from respondents in the natural shopping environment using eye tracking glasses. Díaz et. al. [34] proposes a certification scheme for energy efficiency in building based on targets of greenhouse gas emissions. This methodology is designed to promote a significant reduction of greenhouse gas emissions. The certification scheme is designed to be compliant with the European legislation. Chakravarthy et. al. [35] presents an overview of ecolabels in the European Union, Germany, China, Nordic countries and India. The awareness of ecolabels among the retailers and traders of environmentally friendly products in India is assessed in the research. The GREA (Green Data Envelopment Analysis) approach is applied to a well-known automobile spare parts manufacturer in India. The company is an ISO 9001.14001/18001 certified company and was established in 1967. It is an established manufacturer of high-quality rubber parts catering to the automotive industry for the last four decades. The results demonstrate that the GDEA model considers the environmental factors in a two-pronged approach. Firstly, it lets the carbon footprints determine the efficiency of the supplier and secondly, the model penalizes a supplier for not meeting emission standards. The approach provides the user with the flexibility to adjust the impact of environmental factors in the overall supplier selection process [36].

IV. PURCHASE OF SUSTAINABLE WOOD AND PAPER PRODUCTS

One of the typical examples of green procurement practices is the usage of environmental labels that help to identify sustainable products or services. Forests and the goods and services they provide are renewable resources. Forests will continue to yield these benefits indefinitely if they are managed and utilized in a manner that is environmentally friendly, socially equitable, and economically viable. Sustainable timber procurement is one way of contributing to the continuing health and vitality of the world's forests. One of the globally accepted tools to promote supply and utilisation of legal and sustainable wood is the forest certification such as PEFC certification. PEFC certification is widely accepted by procurement policies and is regularly adapted to ensure alignment with current and upcoming legislations and regulation.

Companies and well as public authorities can incorporate requirements for certified products into their green procurement policies. Sustainable timber procurement policies can encourage smarter, more efficient procurement that considers follow-up costs, such as disposal and recycling at the end of a product's life. Applying such policies, companies can encourage innovative approaches for the use for sustainable timber and provide potential markets for resulting new products, giving suppliers a competitive advantage both nationally and internationally. Specifically, sustainable timber procurement policies and the promotion of timber and wood-based products are beneficial in [37]:

- demonstrating legal and regulatory compliance,

- realizing cost savings and financial benefits,
- driving local innovation and developing potential markets (e.g. working with local suppliers),
- rewarding responsible local companies,
- creating local green jobs,
- improving companies' image,
- contributing to global sustainability.

V. CONCLUSION

As the world grapples with a growing number of challenges including climate change, natural resource-depletion, biodiversity loss, poverty, and population growth, many solutions have been offered as part of efforts to achieve a greener world. Yet it is becoming increasingly clear that we need to work harder to foster the transition to more sustainable patterns of production and consumption.

Green purchasing is an approach based on sustainable procurement dealing with the concept of social responsibility and good corporate citizenship. One of its main features is the acceptance of ecologically responsible practices in business activities. The main goal to practice green procurement is environmental impact, budgetary importance, potential to influence the market, political priorities, market availability of environmentally preferable alternatives, cost considerations, availability of criteria, visibility and considerations. It was the intention of this paper to present a general review of green purchase, supply chain and award criteria used in this process.

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