Sustainable Public Procurement Process in Construction Industry: Literature Review

Gunawardhane K.A.P.
Candidate of PhD, Department of Building Economics, University of Moratuwa, Sri Lanka
prasannakap@yahoo.com

Karunasena G.
Senior Lecturer, Department of Building Economics, University of Moratuwa, Sri Lanka
gayanik@uom.lk

ABSTRACT

The procurement process in the field of construction plays a significant role in changing world in both public and private sector. The Public PP (Public Procurement Process) mainly focuses satisfaction of the stakeholders in line with the development objectives of the country. The importance of public expenditures within the world economy has stimulated and established interest in how public money is spent, with an emphasis on transparency and openness through the Public PP. Though a new concept to the developing countries, SPPP (Sustainable Public Procurement Process) is not another type of procurement; it rather seeks to address the environment, social and economic consequences of procurement actions from the initial stage through the design, implementation up to the end of defect liability period of the construction project. At present, the communities in Asian region are faced with worsening climatic conditions, poverty, deforestation and other environmental degradations. The developed countries have implemented the SPPP successfully as a solution to the challenges and gaps of existing procurement process. Hence, the SPPP has identified as most accepted cost effective alternative method to address the challenges and gaps of the existing procurement process in construction industry.

Thus, this research paper mainly focused to identify the best practices of the SPPP to the construction industry of the developing countries through the secondary data with special emphasis to the Sri Lankan context due to the reason that economy of the country strive to transition to upper middle income country. Hence, relevant areas scrutinized through the critical literature review to explore the applicability of adopting SPPP to the construction industry in developing countries.

Keywords: Public Procurement Process, Construction Industry, Sustainable Public Procurement Process

01. Introduction

Procurement process is used by not only the government entities but also the private organisations to obtain goods, works, and services by most appropriate manner. Further, the World Bank (2010) described that public procurement is the process use by the government entities to buy the inputs for vital public sector investments. Those investments both in physical infrastructure and strengthen institutional and human capacities lay foundations for national development. Accordingly, public procurement mainly consider the stakeholder satisfaction in line with the desired objectives of the country, where, the primary objective of the procurement process in private sector is optimum benefit to the organisation together with least cost and accepted quality in line with the desired objectives of the organisation. Hence, enhancement and improvement of the activities of Public PP (Public Procurement Process) in construction industry directly benefitted to the nation in order to uplift the living standard of the community. Therefore, Public PP is explored as series of activities that significant to the sustainable development of the country. The activities of the procurement identified as continues processes from risk assessment, selection of source, evaluation of alternative solutions, contract award, payment, and management of a contract up to the end of defect liability period (Murray, 2009; Manu and Agyeman, 2005; National Procurement Agency, 2006; Erridge, 2007; Larson, 2009; World Bank, 2010). Further, the Public PP in construction sector was the main driver of economic growth in developing countries and it makes the most significant contribution, reflecting the massive public investment programmes and several private sector projects. Furthermore, revealed that interest of the stakeholders in construction industry has growth to moderate the existing process. Moreover, the procurement process in construction industry was identified as very sensitive to change in line with the requirement of external environment of economic, political, financial, legal and technological (Williams et al., 2007; World Bank, 2010).

Thus, the construction industries in the world are striving to tackle these changes through the new and innovative ways of construction, efficient resource utilization and better organization of the activities of the projects (Rameezdeen and...
Sustainability means the capacity to maintain the entity, outcome, or process over the period of time (Solow, 1993). The concept of sustainability came to public attention after the 1972 based on the report of “Limits of Growth” that issued by the international think tank Club of Rome. In 1980 the world conservation strategy developed by the International Union for Conservation of Nature, in collaboration with UNEP (United Nations Environmental Programme) and World Wildlife Foundation, worked to make sustainability as a benchmark of international action. Accordingly, World Summit on Sustainable Development (2002) first time officially disclosed to the world the sustainable procurement as the process that promotes policies encouraging development and diffusion of environmentally sound goods and services. The World Commission on Environment and Development’s report (1987) internationally recognised definition of sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The procurement actions in order to achieve desired outcome are same on the sustainable and existing procurement process (Interagency Procurement Working Group, 2006). Steurer et al. (2007) and McCrudden (2004) argued that existing procurement process has drawn special attention on the traditional elements of cost, quality and time than the contemporary elements of social, environment and economic in order to achieve the value for money.

Further, Walker and Brammer (2009) stated that the sustainable procurement process does not differ greatly from the existing procurement process. It incorporates an initial stage to determine the effect of the procurement action in terms of a desired outcome that is both elements of environmental and social as well as an additional stage at the end of the process to monitor and assess to achieve the net effect of the desired outcome.

As defined by Brammer, S., & Walker, H. in 2010 p. 453, sustainable procurement is a process “whereby organizations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organization, but also to society and the economy, whilst minimizing damage to the environment”.

Hence, Sustainable procurement means taking sustainability considerations into account in the procurement actions. This means thinking carefully before buy, buying only what really need, purchasing products and services with high environmental performance and considering the social and economic impacts of a purchasing decision. Further the SPPP is the process that is consistent with the principles of sustainable development, such as ensuring a strong, healthy and just society, living within environmental limits, and promoting good governance. Furthermore as McCrudden (2004) noted, sustainable public procurement places government in two roles by “participating in the market as purchaser and at the same time regulating it through the use of its purchasing power to advance conceptions of social justice”. Moreover the World Summit on Sustainable Development (WSSD) in 2002 called for governments to “promote public procurement policies that encourage development and diffusion of environmentally sound goods and services” (WSSD, 2002).

Besides the large market share, public procurement affects sustainability because it has a large direct impact on the environment and the society due to the large scale and the type of services it provides (Preuss, 2009). Through sustainable procurement a significant contribution can be made to reducing environmental and social damage, further, it facilitate to formulate more positively to the greener and more equitable society (Kjollerstrom, 2008).

The SPPP intergrade requirements, specifications and criteria that are compatible and in favour of the protection of the environment and social elements with support to the economic development of the country by seeking resource efficiency, improving the quality of products and services in line with ultimate optimizing cost (Walker and Brammer, 2009). Hence, the SPPP has given equal weightage not only to the traditional elements of time, cost and quality but also to the contemporary elements of social, environment and economical when acquisition of goods, works and services
with consideration of value for money. However the procurement process which not considers social and economic elements called as green procurement. Besides, SPPP attempts to use enhanced objectives when comparing with existing procurement process (Interagency Procurement Working Group, 2006; Steurer et al. 2007; McCrudden 2004; National Procurement Agency, Sri Lanka, 2006; Williams, 2007).

Wales (2014) revealed that public procurement account from 10% to 15% of GDP among developed countries and up to 15% to 25% of GDP in developing countries. The importance of public expenditures within the world economy has stimulated and established interest in how public money is spent, with an emphasis on transparency and openness within public expenditure processes (Heald, 2003; Midwinter and McGarvey, 2001).

Accordingly, the SPPP is about spending public funds on products, services, projects that foster sustainable development of the country. Currently, sustainability issues becoming vital in the developmental agenda of nations, hence, it is time to shift the focus on immediate economic advantages systems which will result in long term benefits not just to governments but to all their constituents. Though a new concept, SPPP is not another type of procurement; it rather seeks to address the environmental, social and economic consequences of procurement actions from design through manufacturing to use and final disposal at the end of defect liability period. SPPP is defined as a process whereby public institutions meet their needs for goods, services and works in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organization, but also to society and the economy, whilst minimising damage to the environment. Further, SPPP considers the environmental, social and economic consequences of: design; non-renewable material use; manufacture and production methods; logistics; service delivery; use; operation; maintenance; reuse; recycling options; disposal; and suppliers’ capabilities to address these consequences. Finally the process upholds the principles of transparency, fairness (to both the supplier and society), long term economy, and accountability (Mueller 1997, Persson and Tabellini2001, Shleifer and Vishny1998, Strauch and Von Hagen 2000, Tanzi and Schuknecht, 2000).

The sustainable procurement is affected to potential saving of costs of the procured goods, works and services. Although it may lead to higher direct purchasing costs, though the overall lifetime cost of a sustainable product less than the cost of other cheapest options. Hence the sustainable option can result in lower operating costs, maintenance and disposal costs. Thus, despite the higher initial purchasing costs, sustainable options can offer an important return on investment through reduced life cycle cost of the construction industry. Further, it results in an average decrease of overall costs for public organizations of around 1% (Pricewaterhouse Coopers, 2009). This percentage is based on lifecycle cost estimation for seven European countries (United Kingdom, Sweden, Finland, Denmark, Germany, Austria and the Netherlands). A reduction of 1% is significant in absolute terms, given the large value of public procurement. The cost reduction could be larger for nations with a higher percentage of procurement of the GDP, such as developing countries (The Wold Bank, 2012).

Williams et al., (2007) highlighted that the new trends in SPPP and global need of upgrade the Public PP in construction industry as the global population is increasing and consumption rates per capita are growing. Hence, human consumption of resources significantly exceeds what the earth can provide. Further, essential services such as clean air and water, a stable climate and viable forests and fisheries are in long-term decline. The resources on which rely are being depleted at accelerating rates. Therefore, the authors stated that range of social, environmental and economic objectives can be delivered to the construction industry through the SPPP.

The SPPP is identified as most accepted method to address the issues and deficiencies in the existing Public PP (Interagency Procurement Working Group, 2006). The governments being the largest single buyers, it is evident that
governments buy and acquires in terms of goods, works and services with contributing significant ability to deliver sustainable development. Hence, the purchasing power of the government should rather be used to support contractors that produce sustainable products, e.g. recycled paper and hybrid products. Government procurement therefore needs to consider sustainability issues as it is the only way that it can be sure to offer real value for money over a longer term without compromising environmental and social responsibilities. This would ensure that development targets are achieved through the acquisition of goods, works and services to the construction industry without much damage to society and the environment.

With the considerations of UNEP (United Nations Environment Programme) (2011) found that the SPPP in construction industry seeks long term impact on economic, social and environmental issues, by helping to: achieve value for money, sustain economic development, improve ethical behaviour of suppliers / contractors especially, and the general public at large; reduce harmful emissions and waste generation; improved air and water quality; make local industries applying SPPP internationally competitive; increase the wealth and health of the society by improving living standards, improve working conditions and safety, labour standards; reduce labour agitation; improve condition of disadvantaged groups in the country; help accelerate the achievement of the Millennium Development Goals, and create a better society, among other things.

Accordingly, the main benefits from sustainable procurement can be summarized as: controlling costs by adopting a wider approach to whole life costs, achieving internal and external standards complying with environmental and social legislation, managing risk and reputation of the organization creating new, vibrant markets ensuring security of sustainable supply for the future ensuring maximum community and financial benefits (Interagency Procurement Working Group, 2006). Hence potential benefits of sustainable procurement in construction industry include: long-term efficiency savings, more efficient and effective use of natural resources, reducing the harmful impact of pollution and waste, reducing the impact of hazardous substances on human health and the environment, encouraging innovation providing strong signals to the sustainable products market, practical expression of organizations’ commitment to sustainable development.

Since, the public procurement contribution to the budget of developing nations is often large (about 15% to 25% of the GDP), well regulated SPPP has direct impact to expedite the sustainable development of the country (The World Bank, 2012). This will be visible in terms of efficient resource management including mainly in natural resources, social services delivery, increased projects delivery (e.g. schools, hospitals, and highways), accountability, transparency, competitiveness, fairness, promotion of growth of local industry. Further, public procurement influenced by social justice of consumer protection, societies, media, environmentalists, social activists, and other groupings.

04. Main principles and approach to the “SPPP”

The SPPP is a methodology with goal to encourage the public authorities to move towards more sustainable patterns in the public procurement that will guided by following main principles (United Nations Environment Programme, 2010; Roos, 2012).

1. **Good procurement is sustainable procurement.** This is the basic principle, which underlies all the other principles and contains the core message that good procurement must take in consideration the three pillars of sustainable development which are the social, the environmental and the economic pillars.

2. **Leadership.** Champions, such as organizations and senior management, can demonstrate leadership by sharing best practices and encouraging others.

3. **Policy through procurement.** The SPPP can contribute to the delivery of a wide range of public and private organizational objectives.

4. **Enabling delivery.** The SPPP requires the communication of a consistent message designed for the needs of various internal and external audiences. The SPPP should be supported by clear lines of responsibility, with incentives and penalties for delivery.

5. **Implementing.** Implementation should be based on a life cycle approach and on continuous improvement. Implementation should be supported by the principles of procurement and it should use a risk-based approach, demonstrate immediate success through quick-wins and ideally the SPPP should be integrated into organizational or environmental management systems.

6. **Monitoring results and outcomes.** Measuring improved environmental, economic and social performance.

Further, Walker and Brammer (2009) and Roos (2012) pointed out five key steps as approach to the SPPP as follows;
1. **Status Assessment**: The status assessment is a fast-track assessment based on an online questionnaire covering the three pillars of the SPPP to determine areas of success and areas where further work is needed. It can be used to check progress at a later stage.

2. **Legal Review & Market Readiness Analysis**: The legal review analysis assesses the national legal, regulatory, and institutional framework for public procurement and the legal possibilities to integrate the SPPP principles. The market readiness analysis assesses the availability of sustainable products and services, the responsiveness of the market, the national business sector response to potential SPPP and the capacity to meet current and future public procurement requirements for sustainable products and services.

3. **The SPPP Policy and Action Plan**: The national sustainable policy plan is expected to establish a clear direction and a mandate for implementing the SPPP. Elements should include objectives, priorities, products to concentrate on a commitment to communicate the policy to the relevant stakeholders and to monitor key objectives and outcomes.

4. **Training**: A training and guidance has been developed to raise awareness of the SPPP, provide the capacity to deliver training, and train staff from procurement, finance, legal, persons responsible for procurement and suppliers.

5. **Implementation**: Implementation of the SPPP takes into account sustainability aspects within the procurement process including whole life costing. It results in changes in products and services purchased as well as changes in behaviour of those involved in procurement. It leads to better products and services, which have less negative impact on the environment, help to save costs in the long term and contribute to social justice.

Accordingly it was identified that six main principles and five key steps to approach the SPPP through the literature.

**05. Challenges for the “SPPP”**

Through the literature several potential challenges and barriers identified that limit the implementation and upgrade of sustainable public procurement practices. Accordingly, the following significant challenges have been analysed in significant areas through the numbers of studies on developing countries (Walker & Brammer 2009; Interagency Procurement Working Group, 2006; United Nations Environment Programme, 2010; Roos, 2012; McCrudden 2004; Mosters 2010; Barth et al. 2005).

**Economic**
The SPPP is often perceived as more costly which leads to pressure to buy the cheapest goods and services. Higher initial investments for sustainable products, tight budgets, and inflexible budget systems and accounting practices often pose an additional financial burden. There is also insufficient information on whole life cost of products and the relative cost of environmental friendly products and services.

**Political**
There is often a low awareness of the benefits of sustainable products and services which causes a lack of political commitment. Conflicting priorities can result in a lack of alignment of sustainable policies with national development objectives and organizational goals.

**Legal framework**
Interpretation of public procurement legislation is not always straightforward and procurement officials do not necessarily infer that the most economically advantageous tender should be the one with the lowest whole life cost. Hence, developing countries may need to modify their legislation to be able to incorporate sustainability criteria. Also, the legality of national legal provisions on SPPP may be challenged under international, regional or bilateral trade agreements if considered discriminatory.

**Cognitive**
In general, there is a lack of competence in sustainability matters and in establishing sustainability criteria. There is a further lack of practical tools and information, and training. The environmental and social issues are new issues for the officers in the field of traditional procurement in their purchasing decisions. Many public procurement professionals are unfamiliar with sustainable development principles such as whole life costing and calculating externalities (cost caused to the society) and they lack the legal knowledge on how to incorporate social and environmental criteria into tender specifications. Furthermore devolved or decentralized purchasing structure makes it even more difficult to manage SPPP across the board in all product areas.
Regulatory policies

There is discussion whether Public PP, or SPPP, is a cost efficient policy tool and whether it affects competition. This is compared to the use of economic policy tools that permanently change framework conditions such as taxes, subsidies, fees or emission permits. The literature argues that the consideration of environmental and social criteria is incompatible with the general principle of using only award criteria that are relevant to the procurement decision. These concerns include that SPPP would reduce competition, result in higher public expenditure, could be subject to misuse and increased corruption, and it could increase the administrative burden in particular for small and medium enterprises.

Accordingly the list of potential challenges and barriers was compiled by using the general barriers identified above. Hence through the literature incorporate some issues considered to play a role in developing countries such as high initial cost, lack of capacity, market readiness, and the negative impact on small and medium sized local companies to allow for individual inputs.

06. Remedies for the challenges of the “SPPP”

The implementation of SPPP will certainly not be without challenges there will be hurdles to be surmounted. However, the remedies outlined in this section address the implementation challenges. The challenges arise from the areas of Economic, Political, Legal framework, Cognitive, and Regulatory policies as discussed in previous chapter. Accordingly through the literature the challenges were summarised as getting a reasonable budget for the SPPP; availability of SPPP compliance officers; legal framework; budget holders; suppliers and contractors; entities; politicians. Considerable amount of funds need to implement the SPPP agenda. These can be sourced from government’s own funds or from the funding agencies. Further found that due to the benefits expected to accrue to the world at large funding agencies willing to support SPPP projects. For SPPP to work effectively there should be a class of officers to monitor and carry out audits to ensure compliance. This is a challenging task. Experts will have to be hired to train the officers. Country procurement laws need to be amended to introduce sustainability issues. Closely linked is the ability to integrate the SPPP issues into the Procurement Process itself. Experts can be outsourced to undertake this task (Walker and Brammer, 2010; Steurer et al. 2007; McCrudden 2004; Williams, 2007).

Further, it is pivotal to understand and remove challenges and barriers to have a successful transition process. The challenges to implementation of the SPPP can be removed through use of emerging Good Practices and implementation experiences from both industrialized developed and developing countries. The following elements of the capacity development framework are used by the developed countries and United Nations Development Programme (UNDP) to structure the remedial for challenges (United Nations Development Programme, 2010).

1. Possible root causes for challenges should be identified to determine possible actions.
2. The core issues of institutional arrangements, leadership, knowledge, and accountability, identified by developed countries and UNDP should be used to categorize ways to overcome challenges.
3. The situations where specific functional and technical capacities are central to remove challenges are indicated. These include capacities to engage stakeholders, assess a situation and define a vision and mandate, formulate policies and strategies, budget, manage and implement, and evaluate.
4. Management approaches that support the SPPP such as systems, concepts and tools are identified to complete the analysis.
5. Management approaches that support the SPPP such as systems, concepts and tools are identified to complete the analysis.

The literature found that in order to overcome challenges and barriers should be addressed to their root causes. Accordingly the following core issues need to be addressed: institutional arrangements, leadership, knowledge, and accountability (McCrudden 2004; Interagency Procurement Working Group, 2006; Steurer et al. 2007; United Nations Development Programme, 2010).

Institutional arrangements

Institutional arrangements have to be in place to perform the SPPP related tasks. Tasks include the find out required financial facilities and management of the SPPP mainstreaming process with dialogue of stakeholders. At the national level it may require legal and regulatory reform, the adaptation of existing tools and guidance material to the country situation, and support to public entities and suppliers in implementing the SPPP practices. Support arrangements may include the SPPP helpdesk, streamlined certification procedures, the financial facilitation of crossagency and donor funding agencies. Furthermore development of the SPPP training modules in cooperation with training institutions and similar management arrangements shall be placed at the procuring entity level.
Leadership
There needs to be strong leadership to understand and promote the concept of the SPPP. Leadership should establish the SPPP targets and manage results, provide resources and infrastructure, provide incentives, support overcoming bottlenecks, initiate innovation such as e-procurement, lead the dialogue with donor funding agencies and development partners, facilitate multi-agency cooperation, create conditions for new ways of doing things, and encourage behaviour changes and continuous learning.

Knowledge
The knowledge management is important to raise awareness on sustainable development and the SPPP to the general public. Knowledge management may include dissemination of information on the SPPP policy and action plans, and the provision of training for procurement practitioners, finance officers and the private sector. Knowledge management may also include access to external resources such as consultants and technical experts, the establishment of a credible training framework, and development of guidance material for practical use such as defining what inputs are needed to calculate whole life cost. The facilitation of other knowledge tools such as networking, best practice sharing, and websites is also important.

Accountability
The accountability ensures clear mandates and processes as remedy for identified challenges. Further the accountability ensures verification of sustainability requirements, value for money procurement, ethical rules to fight corruption, a system of rewards and sanctions, results measurement, reporting and rule enforcement.

Hence, the actions to remove or reduce challenges may need to address several issues depending on the actual situation and the root causes identified. Therefore the step by step should be followed in order to introduce and implement the SPPP by addressing challenges and barriers.

07. Status of “SPPP” in construction industry in developing countries

The current global procurement system in construction industry is aim to promote the standards of living and economy by providing output as desired by the stakeholders with the special attention on the requirement of end users. Hence, activities of the Public PP in developing countries are identified as key features of sustainable economic development in line with the current developing features of environment sustainability, social inclusion, regional competitiveness other than the traditional considered features of time, cost and quality achievement.

The construction industry is identified as an open system, hence, which is very sensitive to change with the needs and requirements of the stakeholders; further, its characterization throughout the world is determined by the operating external environment, which consists of subsystems such as economic, political, financial, legal and technological. This has leaded the industry to be in a challenging state in addressing the changes forced by the subsystems in an efficient and effective manner. Thus, the construction industry in developing countries is striving to tackle these changes through the new and innovative ways of construction, efficient resource utilization and better organisation of projects. Consequently, the Public PP practiced in the construction industry has also been subjected to changes resulting in many newly innovated procurement systems that could be used to meet contemporary requirements (Turin, 1973; Hillebrandt, 1984; Ofori, 1990; Rameezdeen, 2002; Walker and Brammer, 2010).

Therefore, the Public PP in construction industry in developing countries should give equal weightage not only to the traditional elements of time, cost and quality but also to the contemporary elements of social, environment and economical when acquisition of goods, works and services with consideration of value for money in line with the requirements of the stakeholders and the global needs (Interagency Procurement Working Group, 2006; Steurer et al. 2007; McCrudden 2004; Williams, 2007). Further it was identified that the Public PP in construction industry has committed itself to sustainable development practices of the country and funding agencies have generated procurement policies and practices which encourage the sustainable development and dissemination of environmentally sound goods and services. Although procurement policies exist in developing countries, very little is known about the extent to which sustainable procurement policies and practices are embedded within the practice of officers in both public and private sectors.

Findings suggested that there are several practical implications for the government policy makers in developing countries to successful implementation of SPPP. At the initial stage, the policy makers should focus more on “buy from small and local suppliers” as well as retain an environmental focus and address future policy iterations. Further the government also carried out investigation and feasibility studies to provide sufficient financial support, introduce
sustainable procurement guidelines, and implement the awareness raising programs about sustainable procurement opportunities. Finally, the assistant should be obtained from the funding agencies and developed countries in continuing to develop and refine policy responses to the sustainable procurement challenges ahead (Walker and Brammer, 2010).

The literature fund that some of the government organizations in developing countries adopted few elements of sustainable procurement e.g. ensuring the safe incoming movement of product to an organization’s facilities, purchasing from local suppliers, ensuring suppliers’ location are operated in a safe manner, purchasing from small local suppliers and ensures that suppliers comply with child labour laws (Interagency Procurement Working Group, 2006; Walker and Brammer, 2010).

08. Conclusion and way forward

The aim of this paper was to identify the best practices of the SPPP to the construction industry with special emphasis to the developing countries in order to bridge the challenges and gaps of the existing Public PP in line with requirement of the stakeholders and the global needs.

As mentioned previously findings revealed that the SPPP has number of challenges and gaps to adapt to the developing countries. Further through the literature it was identified that numbers of practicable remedial measure to address the challenges and gaps of the SPPP as per the previous experience of developed countries in line with the requirement of the stakeholders and the present global needs (The Commonwealth Procurement Guidelines, 2005; Raymond, 2008; Walker and Brammer, 2009). Hence through the literature identified the feasibility of adopting the SPPP to the construction industry of developing countries with consideration of the aspects of social, environment, and economical while carrying out the public procurement activities as a best practice in order to promote the standard of living and economy. Further sustainable actions expedite the achievement of short terms target in order to facilitate to achieve the sustainable development of the country in line with the global requirements (World Bank, 2010; Murray, 2009; Larson, 2009).

**LITERATURE REFERENCES**


Roos, R. (2012), Sustainable Public Procurement: Mainstreaming sustainability criteria in public procurement in developing countries, Centre for Sustainability Management, Leuphana University of Lueneburg, Scharnhorststr, D-21335 Lueneburg.


