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BUSINESS SUSTAINABILITY FRAMEWORK FOR EUROPEAN MANUFACTURING SMES

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Abstract. *SMEs find it difficult to deal with environmental issues due mainly to their limited resources in terms of money, people and time. Our research also identified other barriers to engaging SMEs in environmental improvement activities, such as lack of awareness of their impact on the environment, belief that any measure regarding improvement of environmental performance means higher cost and insufficient access to environmental information, tools, training, information on available funding and incentives. In response, the FutureSME team has developed the Business Sustainability framework which is intended to support manufacturing SMEs in four key areas: cutting costs, gaining a competitive advantage, being compliant with legislation and finding new business opportunities, whilst improving their environmental performance. The framework includes an environmental toolkit, which comprises an environmental training programme and a set of environmental tools. This paper describes the Business Sustainability framework for SMEs.*

1 INTRODUCTION

Small and Medium Enterprises (SMEs) play a fundamental role in the European economy and are the backbone of European society. In Europe, SMEs make up 99% of businesses operating within the member countries, and account for 67% of total employment [1], [2]. The 23 million SMEs that operate in Europe act as incubators of entrepreneurial culture, and provide 100 million jobs [3] and a wide range of products and services [4].

Many owner/managers of SMEs do not believe that their business operations have a negative impact on the environment [5]. A recent survey conducted in the UK indicated that the majority of businesses operating there believe that their operations have no effect on the environment. However, when questioned further, 46% of the businesses surveyed, actually did carry out business related activities that were harmful to the environment [6]. Cumulatively, their effect is considerable. A recent report on EU SMEs and the environment [7] shows that SMEs contribute 64% of the environmental impact (energy use, CO₂, SO_x, NO_x, PM₁₀ – particle matters of 10 micrometers or less, nmVOC – non-methane volatile organic compounds, waste and hazardous waste) in the European Union. The companies with the highest impact are large SMEs with more than 50 employees, which act in high polluting industries such as manufacturing of chemicals, plastic, food, paper, energy production, transport and construction. It is envisaged that this segment is more likely to invest in environmental tools and solutions, due to business opportunities through cost reductions and/or compliance with environmental legislation. However, the study found that only 16-17% of the large SMEs (and a lower percentage (3-4%) of the micro companies) actively promote actions to reduce their environmental impact.

Sustainability and SMEs are already on the European agenda [8]. In line with the EU policy, our research team is aiming to make manufacturing SMEs aware of their impact on the environment and of the opportunities that the environment can offer: cost savings, new products, new markets. In this respect, we are offering the Business Sustainability framework to help European SMEs to be sustainable.

The research presented in this paper is conducted with the aim of discussing in detail the Business Sustainability framework – and associated toolkit – and their advantages for European SMEs.

The research is being carried out as part of the FutureSME project funded by the European Union under the Seventh Framework Programme (FP7). The primary aim of the project is to develop a set of tools and methodologies for manufacturing SMEs in Europe, which will enable them to adapt to the changing economic environment and will lead them towards an adaptive business model.

The research has been organised in three steps:

1. Literature review, survey of SMEs, focus groups and interviews to identify SMEs' challenges and needs, in particular those related to the environment
2. Development of Business Sustainability framework to suit the SMEs' needs and test it in manufacturing SMEs
3. Refinement and validation of the framework (and toolkit).

The first step has been completed and the research team is currently working on the testing of the framework. It is being tested in manufacturing SMEs in Europe within the FutureSME project.

2 SMEs' CHALLENGES AND NEEDS

Despite the increasing consumption of limited resources, market saturation and high pressure on manufacturers, both from customers and from legislation [9], [10], [11] to reduce the impact of their products on the environment, SMEs are still not prepared to deal with the environmental issues [12]. This is due mainly to their limited resources in terms of money, people and time [13]. Small businesses cannot be managed in the same way as larger ones. The organisational structure of a large company is commonly departmentalised into areas such as finance, human resources and so on. In an SME, the owner/manager tends to have responsibility for all areas [14]. This includes environmental issues and compliance with regulation.

But these are not the only reasons for SMEs not to engage in environmental improvement activities. Our team has done an extensive research to identify other challenges for SMEs. The study was carried out in three stages – for more details see [15]. The first stage was to perform a survey on the 13 SMEs within FutureSME consortium. The second stage was focus groups organised in various partner countries and finally, to complete, a more in-depth interview with two of the partner SMEs was carried out. These two SMEs were chosen based on the facts that they were in the same country and were willing to participate within the required timeframe. Our findings can be summarised as follows [12], [15]:

- Lack of SMEs' awareness of their impact on the environment
- Lack of awareness of the importance of sustainability
- Lack of awareness of the potential benefits of environmental improvements and the business opportunities the environmental/life cycle thinking offers
- Their business culture, which doesn't include an approach to the environment

- Increasing cost being one of the main drivers of SME activity
- Belief that any measure regarding improvement of environmental performance means higher cost
- Insufficient access to environmental information, tools, training, information on available funding and incentives.

The research has also identified SMEs' needs for support in areas adjacent to the environmental performance [16]:

- Mechanisms to identify partners suitable for SMEs in terms of collaboration
- Methods to allow businesses to scan their external environment for current and future opportunities and threats
- Methods for making decisions about the implications and change the business accordingly
- Methods to reduce energy costs by improving production efficiency.

In summary, most SMEs are concerned about some environmental issues but mainly in relation with their economic performance. Therefore, to encourage green practices within SMEs, the research team has decided that initial approaches to SMEs should focus on cost savings and competitive advantage, together with demonstration of successful cases from their peers.

3 FUTURESME BUSINESS SUSTAINABILITY FRAMEWORK

The Business Sustainability framework developed by the FutureSME team is designed to help SMEs to build sustainable businesses. Sustainability should be part of the company strategy:

- In order to build a sustainable business, the company should commit to sustainability principles: it will ensure that all processes, products and manufacturing activities adequately address current environmental concerns while maintaining a profit and creating value for its employees, the local community and its customers.
- Set sustainability goals and regularly check performance in order to ensure continual improvement.
- Scan the environment to ensure preparedness for future threats but also to identify opportunities and take advantage of the current environmental situation.

The framework for building sustainable SMEs includes an environmental toolkit, which comprises an environmental training programme and a set of environmental tools. The main constraints that apply to the Business Sustainability framework, which stem from the characteristics of SMEs (poor users of technology, limited resources – people, time and money) are:

- Simplicity and ease of use, quick results
- Low cost and low risk
- Compensating for lack of resources and knowledge
- Respecting confidentiality
- Focusing on cost saving and competitiveness
- Practicality, direct application to product/processes
- Meeting SMEs' needs.

3.1 The Framework

The framework (see Figure 1) addresses four SME issues identified during the first stage of our research:

- 'Reduce my cost'
- 'Get informed: environmental legislation'
- 'Gain a competitive advantage in new or existing markets'
- 'Identify opportunities for a new business (long-term)'.



Figure 1: Business Sustainability framework.

The four processes are likely to be very useful for two user classes associated with the application of the Business Sustainability framework. These are:

- SME managers/owners, who need to be shown how the environmental and social area can be leveraged for competitive advantage and who need support as they are responsible for compliance with regulations and integration in the community
- The responsible staff members within the company for environmental compliance. They need to understand processes and standards such as EMAS and ISO 14000, methodologies and tools such as Design for Environment (DfE), Life Cycle Assessment (LCA), Life Cycle Costing (LCC), Product-Service System (PSS). They need to know how to apply and assess these tools/methodologies and where to get help.

Table 1 provides an overview and description of each process, listing typical tools and training recommended at each step.

Process	Main features	Tools/training recommended
Reduce cost	Provide a process for reducing company cost based on reducing environmental costs related to product/activities	<ul style="list-style-type: none"> • Audit • Life Cycle Costing • Case studies
Get informed: environmental legislation	Provide a process for scanning the business external environment in order to identify environmental trends and legislation issues related to the environment	<ul style="list-style-type: none"> • European environmental legislation • Case studies
Gain a competitive advantage	Provide a process for evaluating and improving the environmental and social performance of the product/company; use these as a competitive advantage	<ul style="list-style-type: none"> • LCA • DfE • Carbon footprint calculator • Social responsibility • Environmental Management Systems • Case studies
Identify opportunities for new business	Provide a process for generating and evaluating new product/service/business starting from sustainability principles	<ul style="list-style-type: none"> • PSS • Case studies

Table 1. Four processes to help SMEs to build business sustainability.

3.2 The Business Sustainability Toolkit

The environmental toolset for SMEs comprises a number of tools which are recommended at different steps of the framework, as Table 1 suggests:

1. Life Cycle Assessment (LCA) tools for evaluating the environmental performance of a product/process/activity and identifying opportunities for improvement
2. Life Cycle Costing (LCC) tools for evaluating the cost of a product over its entire life cycle and identifying cost saving opportunities
3. Design for Environment (DfE) tools for evaluating the compliance with legislation or customer requirements and identifying areas for improvement
4. Audit tools for evaluating the energy and the water consumption and the waste produced by the company; opportunities for improvement and cost savings are identified
5. Carbon footprint calculators for evaluating the company footprint; recommendations are suggested for reducing the company's carbon footprint and its costs
6. A social responsibility tool for helping companies to identify their social impact and to communicate it to public and employees
7. A Product-Service System (PSS) tool for servitisation (e.g. adding services to the offering, transition to a leasing/renting system).

Most of the tools (except the social responsibility and the PSS) are proposed in two versions: simpler tools that can be used by SMEs without intervention from a FutureSME expert and more sophisticated tools which require a facilitator. An example of a simple DfE tool is presented in Figure 2.

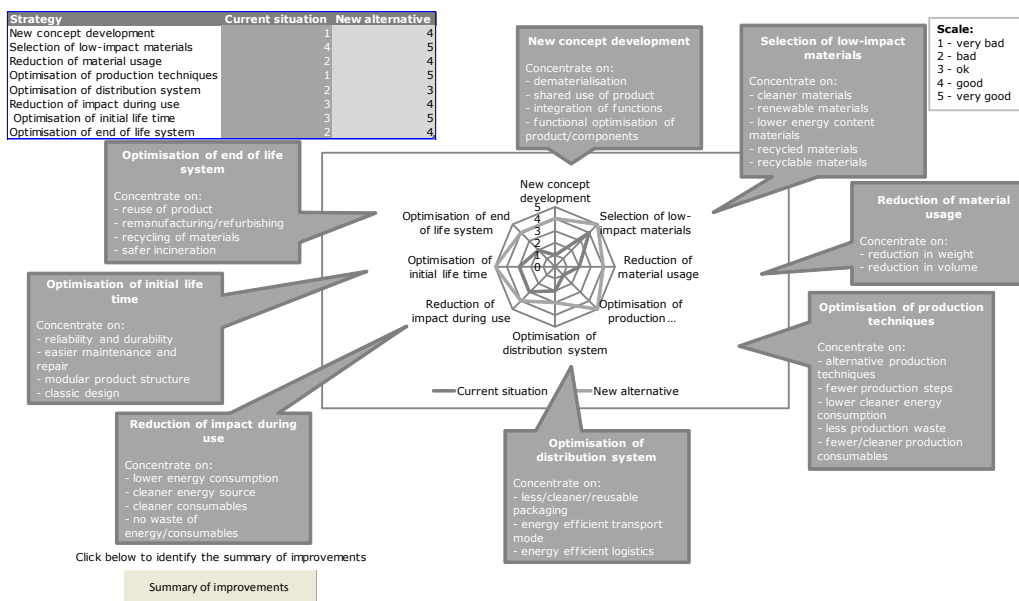


Figure 2: Screenshot from the LiDS tool.

All these tools have been developed according to a 5-step methodology, as in Figure 3. At the end of each step there is a stage gate review when content and presentation are tested and feedback is given to the subject matter expert via checklists.

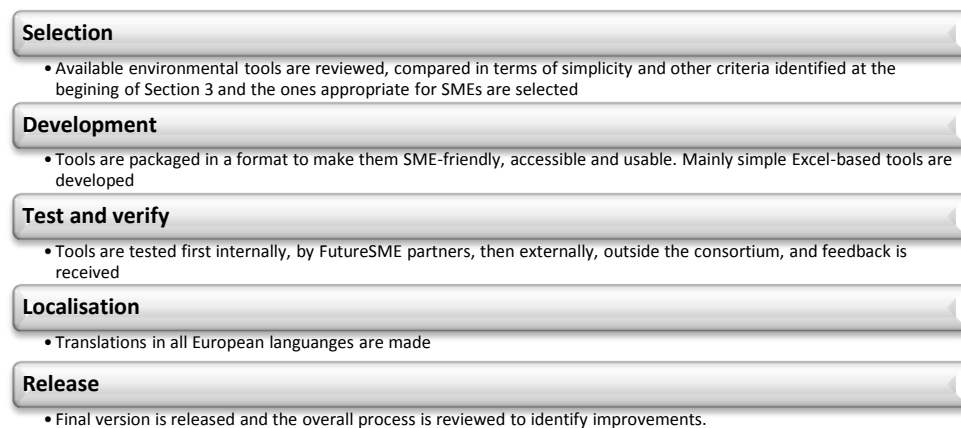


Figure 3: Five steps for developing the environmental toolset.

The environmental training programme covers areas of interest for manufacturing SMEs – such as EU environmental legislation or Environmental Management Systems for SMEs – as well as specific methodologies (such as LCA or LCC) that can support the application of the tools recommended at various steps of the methodology. The environmental training programme covers 6 topics:

1. Overview of environmental legislation for managers
2. Life Cycle Assessment (LCA) – a tool to measure environmental performance
3. Life Cycle Costing (LCC) – a tool to enable cost savings
4. Design for Environment (DfE) – a tool to improve environmental performance, to enable customer and legislative compliance
5. Product-Service System (PSS) – a source of competitive advantage and improved environmental performance
6. Environmental Management Systems (EMS) – the basics of ISO 14000, EMAS and eco-labelling.

The training programme is designed to suit any type of learner. It uses an Articulate platform which facilitates video, audio and notes – see Figure 4 for exemplification. The programme has a common look and feel and permits the learner to get and apply knowledge.



Figure 4: Screenshot from the DfE lesson.

Each of the six topics has been developed according to a 5-step methodology, as in Figure 5. At the end of each step there is a stage gate review when content and presentation are tested and feedback is given to SML/Dev via checklists.

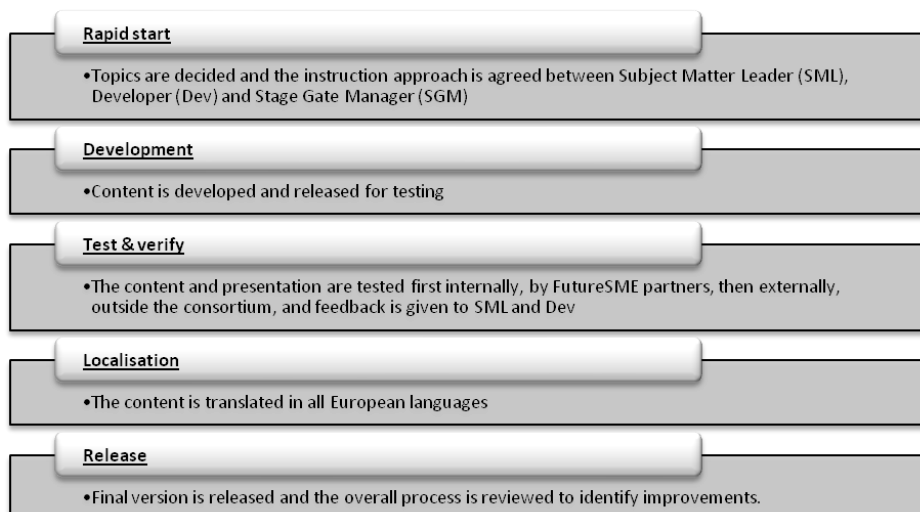


Figure 5: Five steps for developing the environmental training programme.

3.3 Test and Validation of the Business Sustainability Framework

The test and validation process follows four stages:

1. Review of the framework by R&D partners of the FutureSME project and End User partners (SMEs)
2. Test of the environmental tools and training material in SMEs within the FutureSME consortium
3. Test of the environmental tools and training material in SMEs outside the consortium
4. Test of the full framework in SMEs within the consortium.

The Business Sustainability Framework was reviewed and received positively by both R&D partners and SMEs within the FutureSME consortium. Standardized evaluation forms have been used to collect feedback. The approach to environmental issues, mainly via economic performance, was considered best for SMEs and matched their needs as identified in the initial research phase.

The testing of environmental tools and training material is still in progress. The research team is currently conducting the second phase of the test and validation process. Initially all tests are conducted in Irish SMEs, with a researcher acting as a facilitator. Once the process is refined and the team can be assured that the tests can be carried out by SMEs themselves, the tools and training material are to be reviewed by SMEs in other countries of the partnership. Feedback is collected via evaluation forms, which permits the prototype tools and training to be ranked, as well as allowing additional comments to be added. This feedback is then used for further refinement of the tools and training material.

4 CONCLUSIONS

This article has presented the FutureSME Business Sustainability framework for SMEs, designed to help European SMEs to become more sustainable. The authors have shown how the framework has evolved from SMEs' needs identified during a comprehensive research study, have described the framework and identified its benefits. As SMEs are mainly considering the environmental issues in relation with their economic performance, the Business Sustainability framework is approaching the environmental performance as related to four areas of interest to SMEs:

- cost reduction
- compliance with regulation
- gaining a competitive advantage
- new business opportunities.

The framework has been well received by the SMEs in the FutureSME consortium. The feedback received so far from testing tools and training material is also positive. SMEs have appreciated the tools, which are simple and easy to use and they can relate to the case studies presented in the training material, which opens their minds to further possibilities. The training material has been considered useful as it brings new information to the company, explains important environmental concepts and helps to apply the tools properly. The fact that the e-learning material suits all types of learners is also appreciated by the SMEs.

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REFERENCES

- [1] European Commission, *Putting Small Business First*, Publications Office, Publications.europa.eu, 2008.
- [2] D. Audretsch, R. van der Horst, T. Kwaak & R. Thurik, *First Section of the Annual Report on EU Small and Medium-sized Enterprises*, 2009.
- [3] European Commission, *Enterprise and Industry Small and Medium Enterprises*, 2008, Retrieved April 20, 2010 from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0394:FIN:en:PDF>.
- [4] A. Madrid-Guijarro, D. Garcia, & H. Van Auken, Barriers to Innovation among Spanish Manufacturing SMEs, *Journal of Small Business Management*, 47 (no. 4), pp. 465-488, 2009.
- [5] R. Hillary (ed), *Small and Medium-Sized Enterprises and the Environment*, Greenleaf Publishing, Sheffield, UK, 2000.

- [6] NetRegs, NetRegs SME Environment 2009, Retrieved May 17, 2010 from http://www.netregs.gov.uk/static/documents/NetRegs/NetRegs_SME_Environment_2009_UK_summary.pdf.
- [7] C. Constantinou, S. Y. Sørensen, P. B. Larsen & S. Alexopoulou, *SMEs and the environment in the European Union*, PLANET SA and Danish Technological Institute, European Commission, DG Enterprise and Industry, 2010.
- [8] European Commission, *COMMUNICATION FROM THE COMMISSION, COM(2010) 2020, EUROPE 2020 A strategy for smart, sustainable and inclusive growth*, Brussels, 2010.
- [9] M. Abramovici, F. Bellalouna & J. C. Goebel, Towards Adaptable Industrial Product-Service Systems (IPS2) with an Adaptive Change Management, *Proceedings of the 2nd CIRP IPS2 Conference 2010*, Linköping, Sweden, pp. 467-474, 2010.
- [10] E. Westkämper, L. Alting & G. Arndt, Life Cycle Management and Assessment: Approaches and Visions Towards Sustainable Manufacturing, *CIRP Annals Manufacturing Technology*, 49, pp. 501-522, 2000.
- [11] A. Neely, The Servitisation of Manufacturing, *ESRC seminar 'The Servitisation of Manufacturing' on 15th January 2009*, Cranfield University, 2009.
- [12] A. Dimache, P. O'Dowd & S. Mitchell, *Threats and Opportunities from Environmental Regulations and Legislation*, Research Module 4, FutureSME WP1, Galway-Mayo Institute of Technology, Galway, 2009.
- [13] B. Cleaver, *Environmental Management Systems for SMEs: A Short Guide to Environmental Management for the Smaller Company*, British Standards Institution, UK, 2001.
- [14] J. A. Welsh & J. F. White, A small business is not a little big business, *Harvard Business Review*, July-August, 1981.
- [15] S. Mitchell, P. O'Dowd & A. Dimache, Environmental Challenges for European Manufacturing SMEs, *Proceedings of IMC Conference*, Galway, Ireland, 2010.
- [16] R. Horbal, & M. Eisler, *WP1 Report*, FutureSME WP1 report, Lean Enterprise Institute, Poland, 2010.

