MODULE A

D4S BENCHMARKING

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6.1 INTRODUCTION TO D4S BENCHMARKING

In most markets, companies - regardless of their size - need to be aware of their peers' activities to maintain and/or to improve their competitive advantage. This is true for most business activities that have a direct or an indirect link to business and consumer markets. This is also relevant for environmental and sustainability issues. Companies need to determine how competitors are performing, where they stand themselves, and what are the industry best practice levels. For such needs, benchmarking has proven to be an effective tool. Benchmarking is the process of improving the performance of an existing product by continuously identifying, understanding, and adapting outstanding practices and processes found both within and outside of the organisation.

Traditionally, benchmarking is applied to processes and strategies rather than to products and services. *Environmental* benchmarking of strategies and processes is more common than environmental benchmarking of products and services. Environmental benchmarking can take place on many levels, and can focus on products/services as well as processes/strategies, both internal and external to a company (see Table 1).

Within this publication 'D4S Benchmarking' refers to activities that focus on products and services (the right column) in combination with a focus on environmental aspects. The D4S Benchmark approach has a strong focus on the profit and planet part of the D4S concept and less on the people part.

	PROCESSES/ STRATEGIES	PRODUCTS/ SERVICES
Internal	Benchmarking a company's processes/strategies against internal targets/goals in order to set/revise goals and rate internal improvements.	Benchmarking products /services against previous models/generations in order to check targets/goals and rate improvements.
External	Benchmarking a company's processes/strategies against those of competitors in order to determine and assess possible future strategies.	Benchmarking products /services against those of the competition in order to generate improvement options and gain competitive advantages.

TABLE 1 ___ TYPES OF ENVIRONMENTAL BENCHMARKING.

D4S Benchmarking is a structured approach to compare the environmental performance of a company's products against competitors' products and to generate improvement options. Since individual competitors often use different solutions to resolve the same design problems – like a different product architecture, components or technology – D4S Benchmarking offers a reflective approach and advises learning from others' products. Experience shows that, in practice, no single product scores high on all criteria and against all other products. This means that benchmarking improvement options can always be generated.

An important element of benchmarking is the concept of best practice: *'those practices that please the customer most'*. The goals of a benchmarking study should be based on customer needs, whether the customers

are internal (departments within an organisation, higher management levels, or employees) or external (consumers, citizens, regulators, legislators, local and national environmental groups or investors).

6.2 BENEFITS OF D4S BENCHMARKING

The goal of D4S Benchmarking is to learn from the best practice of others. It is an incremental improvement tool. Some of the potential benefits include:

> Helping the company understand and develop a critical attitude to its own business processes. Benchmarking helps to overcome complacency ('it is OK the way it is') and convince the 'non-believers'. It also creates awareness about environmental issues inside and outside a company.

> Promoting an active process of learning in the company and motivates change and improvement. Benchmarking can break down ingrained reluctance to change and create momentum — employees become more receptive to new ideas. It also stimulates environmental thinking.

> Finding new sources for improvement and ways of doing things without having to 'reinvent the wheel.' It provides a creative basis to find environmental improvement solutions.

> Establishing reference points for measuring performance and providing early warning for lagging cost structures, customer satisfaction, technology infrastructure and for business processes (see Text Box 1). It can also correct inaccurate perceptions about competitor strengths, weaknesses and strategies. It helps focus more on specific environmental areas for improvement and ensures that environmental activities are embedded in the business.

6.3 D4S BENCHMARKING IN PRACTICE

D4S Benchmarking in *large industries*

Several large companies have used D4S Benchmarking as a means to ensure that environmental thinking is not limited to individual products, which may be labeled as 'green' projects, but more introduced the concept more thoroughly. Philips Consumer Electronics, for example, used D4S Benchmarking as an important element in their EcoVision programme. It provided management with the proper yardsticks on which to base decisions, which was crucial for embedding D4S in existing business processes. The basic idea is that environmental performance information gains value when it is compared amongst products.

CASE EXAMPLE_SONY TV'S_

Sony learned the importance of external benchmarking because of an experience in the mid-1990s. At that time one of Sony's colour TVs in the European market received a 'reasonable buy' rating from a Dutch consumer magazine, in part because its environmental performance fell short of that of competing models. Subsequent to publication of the magazine report, the market share for the Sony model dropped 11.5% in the Netherlands. At the same time, the two competing models that had received 'best buy' ratings garnered share gains of 57% and 100%. This experience spurred Sony Europe to redesign its TVs to be more environmentally sound. Sony's new Eco TV received positive ratings in the consumer test magazines by reducing the use of materials and plastics, decreasing needed disassembly time and by increasing product recyclability.

TEXT BOX 1___ EXAMPLE OF SONY TV'S

D4S Benchmarking in *SMEs in developing economies*

In most developing economies, copying (or imitating) is the prevalent method to develop new products. SMEs often base product ideas on existing products of local or international competitors. Companies typically do not have R&D facilities. Products from (foreign) competitors are analysed, adapted and copied. Various studies confirm that 'replication' of new and increasingly complex products is the primary means through which new technological knowledge is assimilated in firms. Replication becomes a systematic activity and copying is

done from prototypes as well as from blueprints. This process of copying or imitating competitors is in line with the idea of benchmarking - learning from others in order to improve strategies, processes and products.

There are three strategies for 'imitators' to enter the market successfully: offer low prices, make a better product ('imitate and improve'), and use market power against a weaker pioneer. Small companies in developing economies often lack the capacity to improve products, resulting in inferior products from a quality and environmental point of view. The D4S Benchmark approach can be an appropriate response to addressing both of these issues and improving products in the context of developing economies.

6.4 HOW TO CARRY OUT A D4S BENCHMARKING PROJECT?

Light and extended version of D4S Benchmarking

The characteristics and goals of a D4S Benchmark exercise might be different each time it is carried out, depending on the context and capabilities of the company, the goals of the exercise and the targeted industrial sector. For example, SMEs often have limited resources like labour, R&D and finances. As a consequence, they normally carry out a benchmark effort in a simplified 'low-cost' way compared to larger industries. International companies might have the budget to purchase and analyse a competitor's product. SMEs often have to base a benchmark analysis on pictures of the products taken from catalogues and magazines, from internet information (like consumer tests) or by visiting fairs and shops. For example, an IKEA brochure has been used by companies in Asia to 'benchmark' or inspire design to develop furniture products for the export to European markets.

This section presents a standard D4S Benchmarking method for assessing products, irrespective of product category or industry. The method is based on 10 steps which will be explained in more detail below. Depending on the context and needs, the method can be adjusted in two ways:

> **Light** versus **Extended version_** A set of worksheets is available to use for documentation when going through the steps. When a company has experience in carrying out an D4S Benchmark, or when thorough analysis is not possible or desired, the "all-in-one" Worksheet, which provides a "*light version*" of the 10-step D4S Benchmarking method, is appropriate. If more time, staff and budget is available the "*extended version*" could be chosen. In this case, each step is supported by one worksheet (10 in total).

> **Physical** versus **Information_** The D4S Benchmark method can be carried out on *physical* products that are purchased, tested, dismantled and measured especially for the exercise. In case this is not possible, the D4S Benchmark can also be based on *information* collected rather than buying the product (see Step 6 for more information).

	BASED UPON INFORMATION OF PRODUCTS OF COMPETITORS	BASED UPON PHYSICAL PRODUCTS OF COMPETITORS
Light version (All-in-one worksheet)	A	B
Extended version (10 worksheets)	C	D

TABLE 2 ___ TYPES OF D4S BENCHMARKING.

This leads to four different versions of D4S Benchmarking (see Table 2). The light version based on collected information (version A) is more in line with the capabilities of SMEs. The extended/physical version (D) might be more interesting for larger companies. Before planning a D4S Benchmark, the most appropriate approach (A, B, C or D) for the company or project should be evaluated and determined.

6.5 STEP-BY-STEP D4S BENCHMARKING

Each step has a specific goal, question to be answered and worksheet. It is recommended to first print out the worksheet before starting. Figure 1 provides an overview of the 10 steps.

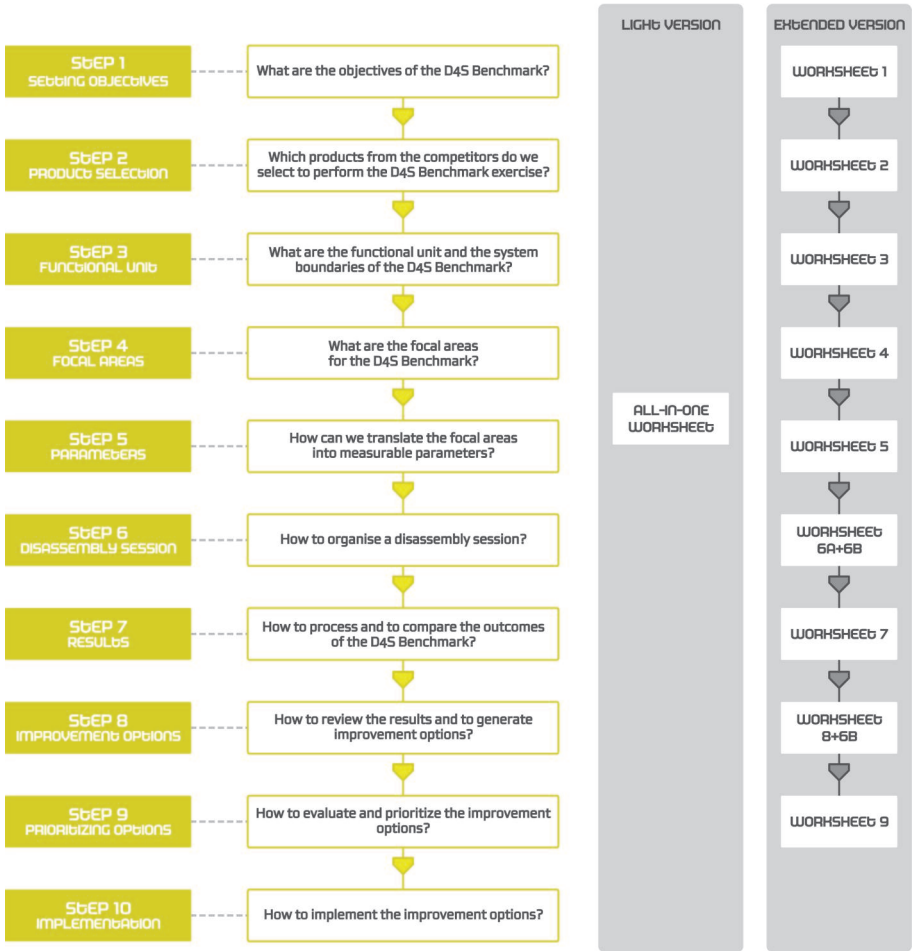

FIGURE 1 ___ OVERVIEW OF THE 10 STEPS OF THE D4S BENCHMARKING METHOD.

Step 1_ What are the objectives of the D4S Benchmark?

There are many reasons to initiate a D4S Benchmark. In the beginning it is essential to discuss the project goals objectives with the team. What will be analysed? What should be achieved? These questions will have an impact on the project design and assist in identifying the products to be studied and the parameters used to make comparisons.

Possible objectives of a D4S Benchmark project could include:

> To *learn from worldwide competition* in order to enter an international market;

> To know how the *product scores* in comparison *to local competitors*;

> To get *inspiration for environmental improvements*;

> To know *where the product stands in relation to specific (upcoming) legislation* like packaging or take-back obligations. What can be derived from competitors in the field?

> To monitor *improvements over time;* and there may be

> Other reasons important to the company.

> *Specify the product to be benchmarked and define the main objectives for carrying out the project.* > ***Worksheet B1***

> *Determine the appropriate type of D4S Benchmark for the company. Light version versus extended version - information versus physical version* > ***Worksheet B1***

Step 2_ How to select products for the D4S Benchmark?

The second step of the benchmark procedure is to select the products to be used. They can be selected from competitors at the international, national or local level. Sometimes much can be learned from the worst performing products in the sector.

1> Identify the *leading products* in the sector (local, regional or international);

2> Select products in the *same specific market* (target group, price/quality etc.); and

3> Identify products that illustrate '*best practice*' in the field.

A more structured approach could involve establishing selection criteria. Be sure to take into account the objectives determined in Step 1. For example, if the objective is:

> To *learn from competition worldwide* make sure to include 2-3 products from global competitors, preferably from top multinational brands.

> To know how the product *scores in comparison to local competitors* make sure to include 2-3 products from local competitors, preferably those that have the largest market shares.

> To get *inspiration for environmental improvements* make sure to include 2-3 products from competitors that have good environmental performance, image, and/or that operate in an environmental niche market.

> To know *where the product stands in relation to (specific) upcoming legislation* make sure to choose products from brands that will be affected by the same legislation and/or products from brands that are operating in markets that already have similar legislation.

> To see *performance improvements over time* within product groups of the company make sure to choose products from the previous generation of the company's own brand. Using several products of the company's main competitor to benchmark rate of improvement can also be useful.

> *Based on objectives, choose the product brands that will be compared in the D4S Benchmark exercise.* > ***Worksheet B2***

The next step is to identify the most appropriate products. It is useful to use identification and selection criteria that are in line with the company's own product. The following criteria can help:

> **Functionality_** Describe the major and specific features of the product. Make sure that the benchmark product does not differ too much from the company's product. If the products are similar in functionality, the results are more appropriate to compare.

> **Manufacturing year_** Verify that the products come from the same product generation. Have they been developed and launched into the market in the same period? It does not make sense to compare the newest model with an old model of a competitor.

> **Retail price_** Check if the products have similar retail prices.

> **Availability_** Make sure that there is not too much difference in commercial availability. Ideally all products should be equally accessible to customers.

The project products will be identified at the end of Step 2.

> *Choose the products and describe their features following the selection criteria.*
> ***Worksheet B2***

Step 3_ What is the functional unit and system boundary of the D4S Benchmark?

The context in which a product will be used influences the results of the benchmark. For example, the intensity of use of a product will have a serious impact on the level of the product's energy consumption during a certain period. To make a clear comparison of products, it is essential to describe the function, the context, user scenario and system boundaries. This is usually referred to as the 'functional unit' and enables a 'fair' comparison. Addressing the following can be useful:

> Identify the perceived function(s) of the product according to the user;

> Describe the average user within his or her context;

> Identify the location where the product will be used and;
> Determine a user scenario describing elements such as the intensity of product use.

> *Determine the functional unit of the product.*
> ***Worksheet B3***

Step 4_ What are the focal areas for the D4S Benchmark?

To determine the main product variables to be benchmarked, it is necessary to identify what issues or focal areas are of 'environmental' relevance. This should be done from a broad perspective. Answers to the questions 'what is environmentally sound?' or 'what is green?' depend on the perceptions of different stakeholders. In practice, this requires at least three perspectives - from scientific, consumer and government points of view.

> The scientific perspective of environment_
From the scientific perspective, the goal is to identify the key environmental impacts of a product during its life cycle. This is usually done by applying some form of a life cycle assessment (LCA) depending on the data availability. For many products, LCAs are publicly available on the Internet. However, it should be noted that much of the data is based on developed country databases and methods, which may not accurately reflect the situation of a product life cycle in another part of the world. In the case that good LCA data are not available, a D4S Impact Matrix (see Chapter 4) can be a practical alternative. Based on these assessments, it is possible to identify which stages of the life cycle are important in terms of environmental impact.

> The government perspective of environment_
From the government perspective, it is important to identify the relevant legal systems for the product(s), as this might highlight additional environmental issues. This will determine the priority items on the government agenda and may not always reflect the same priorities as the scientific perspective *(see also Chapter 2)*.

> The customer perspective of environment_
From the customer perspective, yet another number of relevant environmental issues might arise. These are likely to go beyond the narrow definition of environment and could encompass sustainability in a broader sense. Perceptions of the general public are strongly linked to emotions. Environmental issues related to health and safety (and therefore potential toxicity) score high. Whereas concerns about resources are considered a more long-term issue and thus score low. Concerns about emissions generally score medium *(see also Part I)*.

How to choose focal areas for environmental improvement?

A number of environmental issues will be generated after evaluating the scientific, government and consumer perceptions. The next step is to prioritize these issues. To keep the process short and manageable, a maximum of 5-6 main environmental issues should be chosen. This can be done based on the size of environmental impacts, financial aspects, and/or customer perceptions. Although combining these criteria into a weighted score can be difficult, in practice, the main focal areas will become clear fairly easily, usually targeting energy consumption, material application and distribution.

FIGURE 2 ___ THE FIVE GREEN FOCAL AREAS OF PHILIPS.

As an example, Philips Consumer Electronics decided in the mid-1990s that product development, marketing and sales would focus on five green focal areas: weight and materials application, potentially hazardous substances, energy consumption, recycling and disposal, and packaging. This was internally and externally communicated by using the focal areas as shown in Figure 2.

FIGURE 3 ___ IPRODESA, PRODUCER OF DRIED FRUITS IN COLOMBIA.

IPRODESA, a medium sized food processing company in Colombia, carried out a D4S Benchmark to explore the possibilities to enter the European market of dried fruits. Five international competitors on the European market were selected and used to benchmark the products of IPRODESA. The following five focal areas were the main focus for the D4S Benchmark:

a_ Environmental aspects of the food and packaging;
b_ Protection of the food;
c_ Distribution and retail;
d_ Communication; and
e_ Perception by consumers.

Specific worksheets for food products can be found on the CD-ROM.

> *Determine the focal areas for the benchmark process.* > ***Worksheet B4***

Step 5_ How to translate the focal areas into measurable parameters?

With the focal areas identified, the next step is to translate them into measurable variables. The challenge is to translate these 'qualitative' focal areas into quantifiable variables. Energy is expressed in kWh and materials in grams, etc. In many cases, it might be necessary to use more than one variable to describe one focal area.

> *Describe measurable parameters for the focal areas.* > ***Worksheet B5***

Step 6_ How to organize a disassembly session?

In a 'physical' D4S Benchmark, the next step is to organize a disassembly session to flesh out and collect information on the focal areas. To get the best results out of a disassembly session it is worthwhile to plan well and structure it methodically. Do not forget to weigh and measure the whole product before taking it apart!

Tools including a weight balance, a stopwatch, a multometer (to measure energy consumption) and a camera will help obtain and record measurements.

During the disassembly session, other steps of the benchmark will present themselves. For example the 'smart solutions' employed by competitors and 'silly solutions' in the company product will become obvious. It is useful to write these observations down!

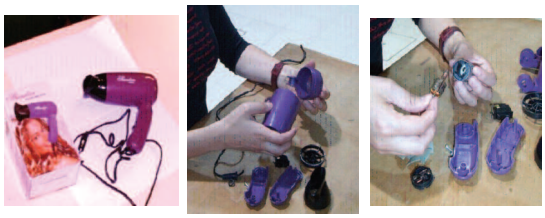

FIGURE 4 ___ EXAMPLE OF DISASSEMBLY SESSION OF AN ELECTRONIC PRODUCT

Where no physical products are available for disassembly (known as an 'information' D4S Benchmark, see Table 1), other information sources are needed to gain an understanding of how competition is solving design issues for the focal areas in the reference product. Often most of the required information can be collected through the internet. There are also more traditional ways of studying the products of local competitors like visiting fairs, observing products in the shop and interviewing customers.

> *Organise a disassembly session following a plan, note all findings and issues that are obvious (like smart and silly solutions).*
> ***Worksheets B6 A and B***

Step 7_ How to process and compare the outcomes of the D4S Benchmark?

After the collection of all relevant information for the D4S Benchmark focal areas, the next step is to process the data. It is advisable to prepare fact sheets for each focal area summarizing the compiled information. From these fact sheets all the measurements for the benchmarked products can be seen at a glance, which makes the information more easily interpretable.

> *Summarize all benchmark findings.*

> ***Worksheet B7***

Step 8_ How to review the results and to generate improvement options?

There are several ways to come up with D4S improvement options. In addition to solutions that the D4S Redesign chapter of this publication might yield, it may be useful to consider:
1> Using worksheet B 6B (Issues that are obvious) to identify smart solutions from competitor's products that can be applied to the company products;
2> Using the same worksheet to identify silly solutions in the company's products that need improvement in comparison to competitor's products. The competitor illustrates that the solutions are feasible, so they are likely to be feasible in the company product as well; and
3> Trying to look for alternatives that have not been considered.

> *Review all results and identify improvement options.* > ***Worksheet B8***

Step 9_ How to evaluate and prioritize the improvement options?

Apart from environmental considerations, a multitude of issues need to be taken into account in evaluation and prioritization of the improvement options that are generated. For each option, the following aspects should be considered:
> *Environmental benefits_* an assessment of whether the improvement option reduces environment impacts along the product life cycle.
> *Consumer benefits_* an assessment of whether the consumer is likely to accept the option as a benefit.
> *Societal benefits_* an assessment of to what extent society will benefit from the proposed improvement.
> *Company feasibility*
  >*Technical feasibility_* an assessment of whether the improvement options are technically feasible (and timely).
  > *Financial feasibility_* an assessment of the financial viability each of the improvement options.

For each criterion it is possible to assign a 'score'. Depending on the weighting factors, an overall score can be derived and the improvement options can be ranked. After improvement options have been generated, ranked and validated, the options need to be implemented and integrated into the company.

> *Select the best improvement options by evaluating them against the potential benefits and feasibility.* > ***Worksheet B9***

Step 10_ How to implement the improvement options?

The previous steps will result in a number of options for product improvement. Behind each improvement option will also be an understanding of why the option is good, beneficial to most or all stakeholders and financially and technically feasible. Connected to the options, are some examples from competing companies that are already applying these solutions and some measure of the potential results from implementing them. The product development and decision making processes are different in each company. However, this information should be very helpful in motivating decision makers to apply or at least consider the improvement options.

6.6 D4S Benchmark for specific product groups

As mentioned in the beginning of this chapter, the characteristics of a D4S Benchmark might be different each time. In some cases not all the steps are needed or the needed steps can be simplified. For example, in the case of a D4S Benchmark for food products, Step 3 (definition of the functional unit) and Step 6 (disassembly session) are unnecessary. In other words, one must always determine if all steps are needed. The format of the D4S Benchmark has to be adjusted for the specific industrial sector in which it will be used.

The website has worksheets for an extended version of the D4S Benchmark for durable products like electronics and an adjusted version for the food sector.

FIGURE 5 ___ EXAMPLE OF RELEVANT STEPS FOR A D4S BENCHMARK FOR THE FOOD SECTOR.