

# Setting Up A Performance Benchmarking Network

**ABSTRACT** Industry is faced with the challenge of adopting best practice in business processes. To identify best practice it is necessary to measure the performance of business processes in enterprises. The ENAPS project seeks to accomplish this through setting up a performance benchmarking network to span all European countries. This paper describes the three-stage process used in ENAPS; (1) identifying dimensions of performance, (2) defining generic business processes and sub-processes and (3) defining performance indicators for each process and sub-process along each dimension of measurement. A European-wide network has been established to apply the performance benchmarking methodology. The set-up and functioning of the network is outlined in the paper. Finally, the communications architecture necessary to implement such a methodology is described. Altogether the paper outlines a feasible approach for setting up a performance benchmarking network either on a regional, national or international level.

**KEY WORDS** Benchmarking, benchmarking network, performance measurement, business processes

Bjørn Andersen, The Norwegian University of Science and Technology, Department of Production and Quality Engineering, N-7034 Trondheim, Norway,  
Bjorn.Andersen@protek.unit.no

Paddy Jordan, University College Galway, CIMRU, Galway, Ireland, Paddy.Jordan@ucg.ie

## 1. Introduction

This paper is based on the content of and results achieved so far in the ESPRIT project ENAPS - European Network for Advanced Performance Studies. The ultimate objective of ENAPS is to establish a benchmarking database operated by a permanent network of so-called agents present in most of the European countries. The network, the benchmarking database, and the operation of these will be described in more detail later in the paper. However, it should be pointed out at this stage that the benchmarking database of ENAPS will contain numerical performance data for a number of business processes in a number of European enterprises.

An operational definition of benchmarking is:

*“Benchmarking is the process of continuously measuring and comparing ones business processes against comparable processes in leading organizations to obtain information that will help the organization identify and implement improvements”* (American Productivity and Quality Center, 1993).

Different types of benchmarking can be defined, both based on the status of the organizations used as benchmarking partners and the object of the benchmarking study. Related to a benchmarking database, especially the last issue, what is being benchmarked is of importance.

Mainly three types of benchmarking can be defined (Andersen and Pettersen, 1996):

- Performance benchmarking is comparison of performance measures. Usually, the purpose is to determine ones status compared to other companies, identify areas or processes in need of improvement, and setting realistic targets based on performance levels achieved by others.

- Process benchmarking is comparison of methods and practices for performing business processes. Usually, this type is combined with performance benchmarking, where process benchmarking offers more verbal descriptions of how specific processes are carried out to achieve the documented performance level.
- Strategic benchmarking is comparison of the strategic choices and dispositions made by other companies. This type is more rarely used, and the purpose is usually collecting information to improve ones own strategic planning and positioning.

Benchmarking is normally carried out in individual projects, often termed benchmarking studies. There exists a high number of different process models describing the steps of a benchmarking study. One such model is the benchmarking wheel (Andersen, 1996), as displayed in **Error! Reference source not found..**

The main content of each of the five phases in a typical benchmarking study is:

1. Plan; planning the benchmarking study and laying the groundwork for the coming phases, including selecting the process to be benchmarked and thoroughly understanding how that process is performed within one's own organization.
2. Find; identifying benchmarking partners and obtaining acceptance for their participation in the study.
3. Collect; performing the same thorough documentation of the benchmarking partners' process as was done for ones own in the planning phase.
4. Analyze; finding gaps between the performance of ones own process and that of the benchmarking partners, as well as determining what the differences in practice are that creates the performance gap.

5. Improve; implementing improvements based on the findings from the observation and analysis of the benchmarking partners.

Each of these five phases poses different challenges for the benchmarking organization, and all of them are vital elements in a complete benchmarking study that eventually will generate the sought improvements.

The existence of a benchmarking database with performance data can aid the benchmarking study in several ways:

- Either as an integral part of the benchmarking study or as a naturally preceding improvement planning activity, prioritization of an organization's improvement efforts is often difficult. Without knowing the performance levels of comparable organizations for different business processes or areas of the enterprise, it is often difficult to pinpoint where improvement is needed. Being able to perform an initial performance benchmarking against a number of other enterprises through the benchmarking database can assist this decision.
- Experience has shown that one of the difficulties encountered in many benchmarking studies is the identification of relevant benchmarking partners. Not in the least is it often difficult finding enterprises known to have a higher performance level than the benchmarking company, i.e., that has something to offer in the way of learning. Again, a benchmarking database can aid this task through functioning as a clearinghouse.
- Both in the implementation phase of benchmarking and generally when implementing changes, targets that are ambitious, yet realistic, can inspire extra effort. By being able to

determine performance levels achieved by leading organizations, important input is gained for the task of setting improvement targets.

Thus, as benchmarking is becoming more and more widespread among European companies, there should be a need for a benchmarking database. The methodology for measuring performance as well as the process for setting up the database itself and the surrounding network to operate it, should be sufficiently general to be used by others setting out to set up their own database. While ENAPS covers Europe as a whole, there might be a demand for similar services on a more detailed national level within European and other countries, as well as for databases covering other parts of the world.

## **2. A Business Model with Generic Business Processes**

One of the main tasks in setting up a benchmarking database is to develop appropriate performance indicators to assist an enterprise in improving performance within their business processes and to allow comparison between enterprises with similar processes. There are three major steps involved in the development of such a set of indicators:

1. Identify the dimensions of performance to be measured, for example, cost, time, quality etc.
2. Build a generic business model and a set of generic processes and sub-processes.
3. Define performance indicators for each dimension of measurement and for each process and sub-process where appropriate.

## 2.1 THE DIMENSIONS OF PERFORMANCE

Within an enterprise, there are a variety of aspects of performance that need to be measured. In the past enterprises concentrated on cost as the main dimension of measurement. Although cost is still of great importance it is becoming increasingly evident that other dimensions of performance are crucial to the success of an enterprise (Bredrup, 1995).

Recently, many enterprises are concerned with the dimension of time. Such issues as delivery times, product development lead times and customer-complaint response times are becoming crucial. Customers now expect short lead times and hence time is a very important dimension of measurement. Quality has become established as a crucial aspect of competitive advantage for enterprises. To ensure improvement of processes, the dimension of quality should be measured. With the increased desire for variety and the uncertainty that this causes, enterprises are becoming increasingly aware of the need for flexibility within their business processes. The processes must be capable of handling variety and uncertainty and thus it is crucial to measure performance in terms of flexibility. Finally, governments and customers are becoming more aware of the need to protect the environment. It is now becoming increasingly important to measure performance related to environmental-friendliness.

In summary, then, the five important dimensions of measurement are:

- Cost.
- Time.
- Quality.
- Flexibility.
- Environment.

It is not absolutely necessary to have a performance indicator for each dimension - the dimensions are used as a guideline to ensure that each process is focused on the improvement of an enterprise in all the important aspects of performance - but is *not* a rigid framework that must be followed for all cases.

## **2.2 A GENERIC BUSINESS MODEL**

The Extended ENAPS Business Model is shown in **Error! Reference source not found.** This model is based on the concept of the extended enterprise (Browne et al., 1994). This model identifies the various functions within an extended enterprise including links to the customer, supplier, recycler, and service provider.

There are three types of flow identified in the model: The flow of material, the flow of technical information and the flow of business information. Material, in the form of raw material, components, manufactured product, and recycled product flows in the chain from supplier through the customer to the recycler and service provider. Technical information flows from the customer back to marketing and design within the enterprise in the form of requirements. There is also an exchange of technical information between the enterprise design group and manufacturing and suppliers in the form of design specifications for the purpose of co-engineering. The main flow of business information comes from the customer in the form of a customer order, which enters the enterprise through the production planning and control function, which then passes instructions to suppliers, manufacturing and assembly.

From the extended business model, a generic set of business processes within an extended enterprise can be derived. These are identified as:

1. Product development: All activities involved in researching, designing, engineering and releasing products to manufacturing.
2. Obtaining customer commitment: All activities involved from market analysis to sales.
3. Order fulfillment: All activities from receipt of an order until the customer has received and paid for the product.
4. Customer service: All activities involved in providing after-sales service including product take back.

The breakdown of these processes into a generic set of sub-processes is shown in Figure 3.

The secondary processes include the support processes and evolutionary processes. The support processes help to provide the essential infrastructure within which the enterprise can operate effectively. The evolutionary processes seek continuous improvement of the enterprise performance over time.

### **3. Performance Indicators and Measures**

To ensure improvement in each of the business processes and secondary processes an indicator for each dimension of measurement and each process is derived. In ENAPS each of these indicators is a numeric value represented by a ratio calculated from measurements taken in an enterprise, as shown in **Error! Reference source not found.**

A full list of the ENAPS performance indicators and the associated performance measurements required to calculate the indicators can be obtained by contacting the authors or through the ENAPS Internet home page, <http://rexel.ucg.ie/projects/enaps/enaps.htm>.

The ENAPS performance indicators are focused on the business, support, and evolutionary processes within an enterprise. Some examples of such process-oriented performance indicators are warranty costs of new products/sales of new products, number of new customers/total number of customers, cost of preventive maintenance/sales, and cost of all improvement projects/sales. There are also performance indicators, based on the Du Pont model, available for the enterprise level. Some of these are profits/equity, value-added per employee, and debt ratio. These indicators reflect the importance of financial and other *top level* performance. ENAPS does not provide low level performance indicators for the monitoring of the low level processes in an enterprise (for example, monitoring of machine set-up times etc.).

#### **4. The ENAPS Network**

As was mentioned earlier, the ENAPS project is funded by the European Commission through the ESPRIT programme. The project consists of ten partners, five academic and five industrial. During the funded period, the partners have been and are developing the performance measurement methodology presented earlier, the database structure, the communication modes, training and instructional material, etc.

From the beginning of the project, a number of so-called agents have been attached to ENAPS. Further recruiting has taken place during the first part of the project, and the total number of agents today is twenty-three. Some of the agents are also funded by the European

Commission, while some are working in the project for the prospects of future business. Once the funding ceases and the development work has been completed, in the middle of 1998, the ENAPS network will consist of these agents. Some of the partners might change status to agents as well, but the network is totally depending on a high number of active agents. In addition to aiding the development work in the project, the single most important function of the agents is to run the network as a commercial service.

During the second half of the funded period, the database will initially be filled with as much performance data as can possibly be collected by the agents through a specific task of the project. Once the network becomes operational, the benchmarking database will function as follows:

- Each agent will act as a node in their home country, or region of the country if more than one agent is present in that particular country. The agents will market the ENAPS database and attract client enterprises.
- Based on the ENAPS performance measurement methodology, the agents will measure the performance of the clients, either for the entire business or for parts of it, and either as a one-time event or on a regular basis.
- The performance data is fed into the database, either anonymously or open, depending on the client's wishes. By volunteering its performance data, in addition to paying the agent for these services, the client is given the right to perform queries into the database through the agent. A number of querying options will be made available to facilitate the extraction of as useful information as possible.

- As the database volume constantly grows and is being updated, the attractiveness of the database increases and it can provide even higher value to the clients. As such, it should become a self-reinforcing system, constantly growing and becoming more attractive.

As the ENAPS methodology for performance measurement, database structure, and network communication has already been developed and is public knowledge, other groups attempting to set up a similar service on a national basis or in other parts of the world need not incur costs for these activities. Thus, the main challenge will be to form a solid network of agents that can operate a benchmarking database. It is the authors' firm belief that even without any research funding, setting up other benchmarking databases based on the ENAPS concept should be feasible. If the result should be a truly worldwide cooperation of networks centered around a number of benchmarking databases, this would open up very promising opportunities in terms of benchmarking partner searches and best practice information access.

## **5. The Benchmarking Communications Infrastructure**

Once the network has been established and a methodology and a set of performance indicators has been derived, the next step is to implement the information technology architecture to facilitate downloading of software and collection, storage, and benchmarking of data, as shown in **Error! Reference source not found.**

In the ENAPS project, software is downloaded using FTP across the Internet. The collection of data is achieved through an electronic questionnaire based on spreadsheet technology. The storage of the data is achieved using a relational database. The benchmarking task is achieved by remotely querying the database to download data relating to a set of enterprises. These three elements of the IT infrastructure are shown in. The steps are as follows:

1. The questionnaire is downloaded from the ENAPS World Wide Web page using the FTP protocol. This enables password protection.
2. FTP is again used to upload the enterprise data to an incoming directory on the ENAPS server. Once the data arrives at the incoming directory, it is validated with some simple checks for completeness and accuracy of data, and the data is then appended to the ENAPS relational database.
3. Once the enterprise data is received by the ENAPS server, a password is given to the agent for that enterprise. This password can then be used to access the ENAPS benchmarking World Wide Web page. On this page, the agent, on behalf of the enterprise, may send a query to the database selecting a set of enterprises with whom to benchmark. The query parameters include number of employees in the enterprise, industrial sector (according to the NACE classification), country and manufacturing typology (make-to-stock, assemble-to-order, make-to-order, or engineer-to-order).
4. The query is submitted to the server and the results are obtained at the server end. The results are checked to ensure that there is a sufficient amount of data to maintain anonymity of all enterprises where required. Once the security of the data is guaranteed in this way the data is downloaded to the agent in the form of an relational database. The agent can then use the ENAPS benchmarking tool software to analyse the data and benchmark the enterprise's processes against all the enterprises selected by the query.

The technical infrastructure for ENAPS enables an easy-to-use benchmarking approach while also maintaining the security and anonymity of enterprise data.

## 6. Conclusions

Through the ENAPS project the basic infrastructure for a performance benchmarking network has been created. This includes:

- A set of appropriate performance indicators.
- A network of agents (within Europe).
- An IT infrastructure for the collection, storage and analysis of benchmarking data.

Through the selection of appropriate performance indicators, which are focused on business and secondary processes within the extended enterprise, ENAPS has created a modern approach to performance measurement and benchmarking which will continue to be useful and relevant to industry for many years to come. The network of agents throughout Europe will help make ENAPS a self-supporting distributed network which allows enterprises in all European countries to evaluate their performance with similar enterprises in any country within Europe. The IT infrastructure is developed to support this network by automating many of the functions and thus minimizing the human effort required to maintain the database.

This infrastructure will be tested by ENAPS in the near future but is currently available to the public domain and can now be used by other groups attempting to set up a similar service on a national basis or in other parts of the world.

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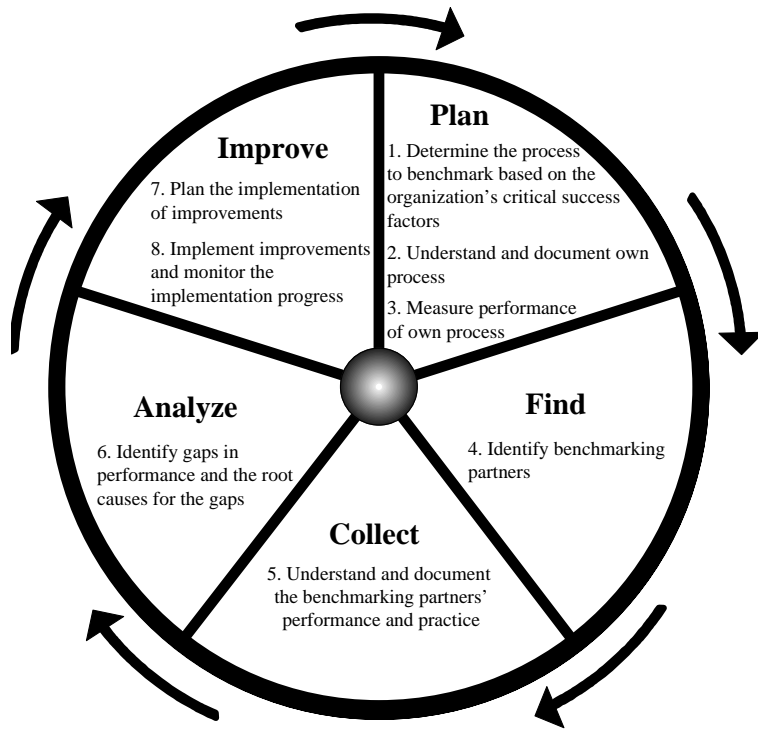


Figure 1

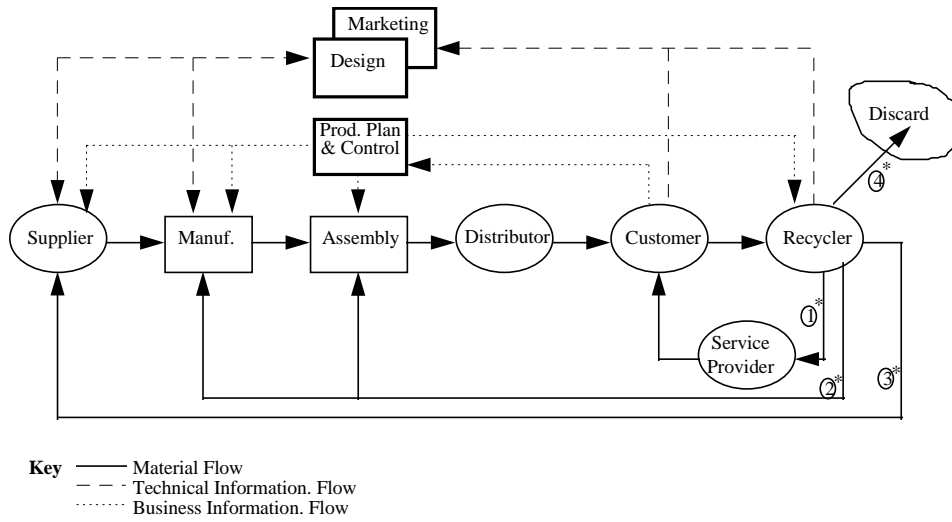


Figure 2

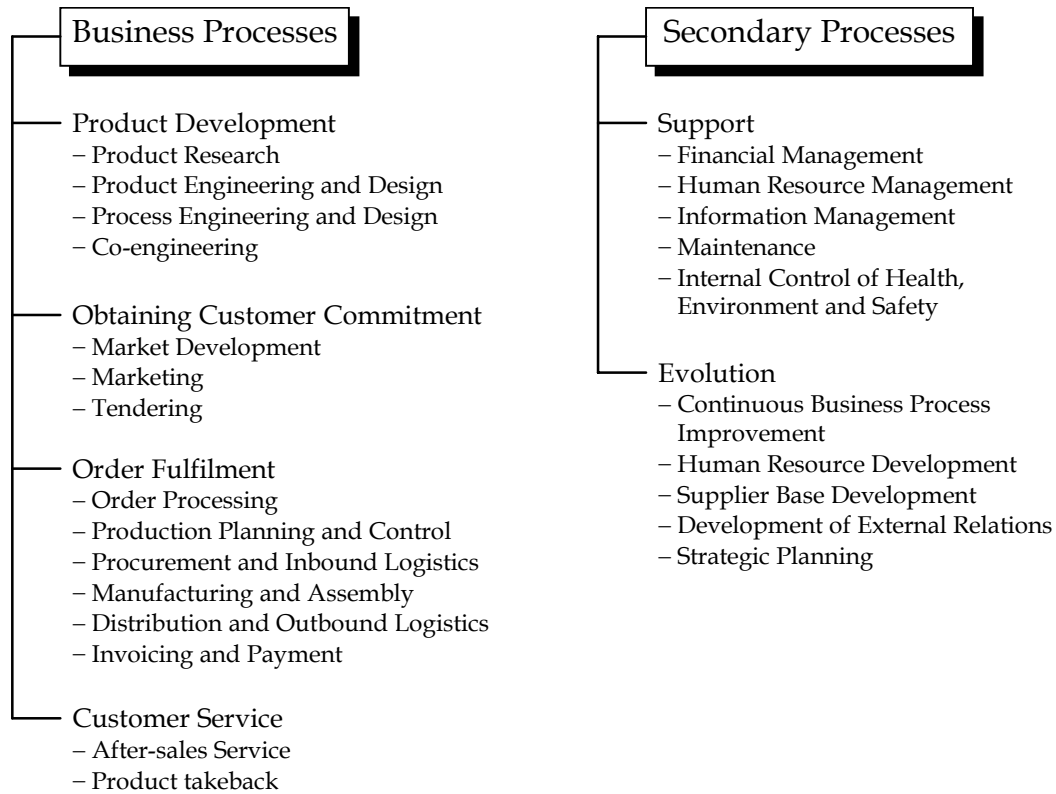


Figure 3

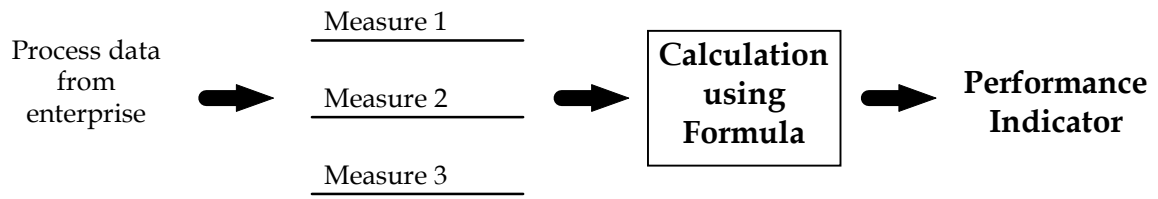


Figure 4

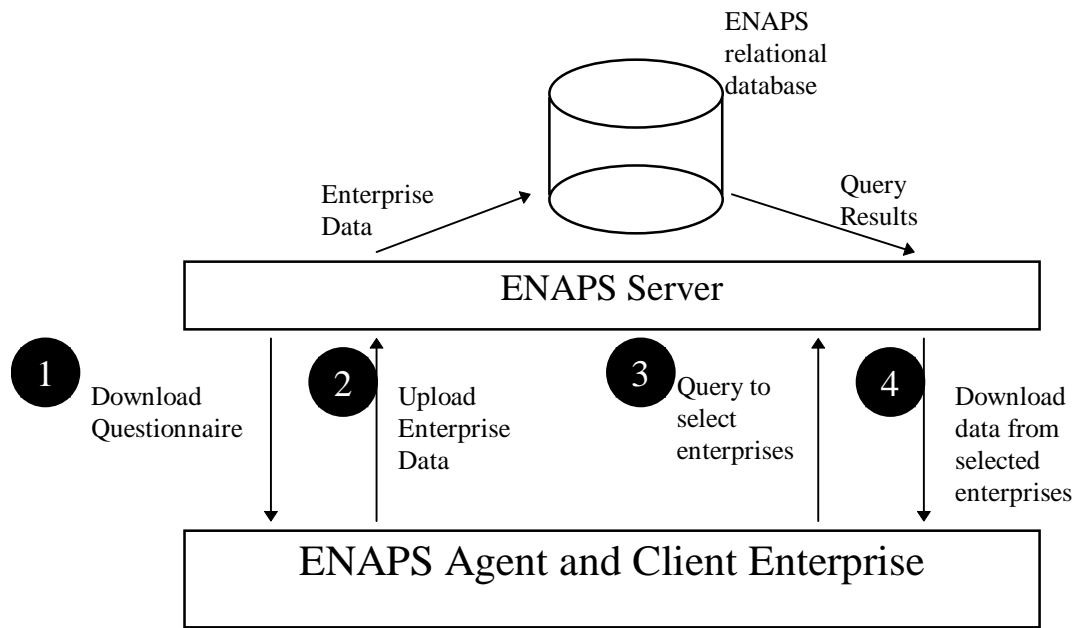


Figure 5

Figure 1. The Benchmarking Wheel

Figure 2. The Extended ENAPS Business Model

Figure 3. Breakdown of the ENAPS Generic Processes

Figure 4. Calculating Performance Measures

Figure 5. The ENAPS IT Structure

Bjørn Andersen obtained a Master's degree from the Norwegian Institute of Technology (NTH) in 1991. The degree was centered around the fields of production management and quality engineering. In 1995, he got his Ph.D. degree at the Department of Production and Quality Engineering at NTH, after having worked under TOPP, a large Norwegian productivity program for manufacturing industries. During his studies, he spent eight months at Rochester Institute of Technology working on his research. His Ph.D. research focused on the tool of benchmarking, more detailedly, studying the results of benchmarking and designing a new benchmarking process model called the benchmarking wheel. Bjørn Andersen is now working as an associate professor at the Norwegian University of Technology and Science. He has co-authored several books and papers, both nationally and internationally. Over the last years, he has been involved in several research and implementation projects on benchmarking, productivity, and material and production management.

Paddy Jordan completed his Master's degree in 1992 in simulation of production systems. He is currently working as a research assistant for CIMRU on the ESPRIT project ENAPS. He has worked closely with small local industries while developing and implementing production planning software. His main interests include simulation, development of applications for small manufacturers, and performance measurement.