

To Evaluate and to Improve the Performances of the Enterprise : a Franco-Swiss Benchmarking Project

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Abstract

This paper presents a project of franco-swiss benchmarking gathering 15 enterprises, 4 transfer centers and a research laboratory. To situate our work we first introduce the issue and the objectives of the project, then we remind a description of the main steps of a benchmarking process before the presentation of the different tools currently developed in order to evaluate enterprise intern performance and others tools in preparation.

Keywords

Benchmarking - Diagnosis - Performance - Organization - Knowledge bases

1 INTRODUCTION

This paper deals with a franco-swiss interregional project whose aim is to develop automated tools for a continuous performance improvement in small business.

We propose two types of software :

- a software for an internal evaluation of the enterprise (by characterization and grading of located dysfunctions), which compares the enterprise performance level with standard values.
- a software and a knowledge base which guide step by step a benchmarking process (external performance evaluation).

These tools are completed by a development methodology to realize the different phases of a benchmarking.

The project has three types of partners :

- a research laboratory, "Laboratoire de Logiciels pour la Productique" in Annecy (LLP/CESALP) of Savoy University
- five transfer centers : the "Association Patronale Interprofessionnelle" (API), the "Centre Productique Haute Savoie", the Geneva and Vaud CIM centers, and the "Association Valaisanne pour la Promotion de l'Innovation et des Technologies de Fabrication" (CIMTEC)
- fifteen enterprises located on both sides of the franco-swiss border, representing experimental platforms of the project. These enterprises have quite different sizes and are on various sectors (mechanics, electronics, food processing, ...).

2 ISSUE

For the time being, it is essential for small business to be well ranked in a moving european market. In order to be in accurate shape for this challenge, they turn towards a new certification approach, either imposed by their clients, or initiated within the context of a service improvement policy.

They have then to master all necessary conditions for the quality building and maintenance expected by the customer and that means a large rigor all along their production, the installation of a better adapted organization, and the respect of procedures in all enterprise areas (Lamprecht, 1994). To undertake this continuous improvement approach, small business lack experience.

Indeed, most of the time, an enterprise feels difficulties :

- to identify its strong points and its weak points by evaluating with an accurate manner its current performance level,
- to define believable, ambitious and accessible improvement objectives,
- to determine among potential improvement objectives those which have to be reached in priority
- to define, considering its existent, what corrective actions have to be committed,
- to plan these actions sooner or later while keeping a global vision of the whole to insure their coherence,
- to evaluate organizational changes induced by the installation of these actions,
- to determine the best practices and methods associated to the implementation of these actions,
- to estimate the time and the global cost of the improvement approach.

Among tools that can help an enterprise to overcome these difficulties, the benchmarking is being established as one of the most efficient to allow the enterprise to enter efficiently in a continuous improvement approach (Pôle Productique Rhône-Alpes, 1995). Thanks to American enterprises that are increasingly numerous using it in an intensive manner, the benchmarking has become a complete management tool, well defined and with a well established process. It is therefore natural to let French and Swiss enterprises take benefit from it, whose major current concern is to continually improve whether this is to survive or to become the best in what they make.

3 PROJET AIMS

The first aim of this project is to realize a benchmarking gathering french and swiss enterprises in order to improve their performances.

Benchmarking is a continuous evaluation process for products, services and methods in an enterprise as compared with serious competitors or leaders (Camp, 1992; Karlöf & Partners, 1994). Either the enterprise adopts these practices, or it adapts them with the aim of improving its performance.

The idea of benchmarking is not brand new and plays an increasingly important role in improvement approach used by swiss as well as french enterprises. However, most of benchmarking actions limit themselves to a local and homogeneous partnership (same sector and same geographical area).

One of the short term purposes of this project is to help small business to formulate correctly their improvement needs. Therefore we envisaged to undertake :

- a *franco-swiss benchmarking* which aims to begin exchanges and collaboration between enterprises of different cultures that, even if they often share identical objectives, develop distinct approaches and practices to reach them. These exchanges are necessarily rewarding since they give a chance to each enterprise to discover other know-how and competences.

- a *functional and generic benchmarking* that goes over a simple competitive benchmarking and that consists in comparing an enterprise with others enterprises belonging to the same industrial sector (for example electronics) or having similar process but in various sectors. For example, if the aim of an enterprise in mechanical sector is to improve its inventory turnover, it will be able to benefit from optimal solutions applied in an enterprise of the food sector, managing perishable products.

The implementation of the benchmarking that we propose needs to rely on a certain number of methodological supports and tools. Some of them exist, others will be developed in the context of this project. Our next objective is therefore to lead to the realization of a toolbox supporting the whole steps of a benchmarking process. Finally, our third objective is to generalize previous works by initialing a knowledge base capitalizing results of others benchmarkings that will be undertaken. This objective will be reached with the collaboration of the LLP/CESALP, in which some research works focus on knowledge structuring techniques and on know-how capitalization.

3 GENERAL DESCRIPTION OF THE PROJECT

3.1 Benchmarking

The benchmarking process, as described in (Balm, 1994), is divided in ten steps that we regroup in four phases:

Phase 1: Evaluation of enterprise internal performance level

Step 1: to define activities, clients and results

Each enterprise actor manages at least one activity (its mission or a set of tasks realized under its responsibility) producing some results given to external or internal clients of the enterprise. To perform an improvement approach consists first in making sure that internal

and external customers are satisfied (customer-supplier approach). In fact, a necessary condition, but not sufficient, for external customers to be satisfied of the product or of the delivered service is that all internal clients distributed along the processing chain are satisfied. This first step ends to a precise definition of the main activities of the enterprise, their inputs and outputs, and suppliers and customers of these inputs and outputs.

Step 2: to define good measure

This step consists in defining a system of measures allowing the evaluation of the enterprise activities results (especially through the satisfaction level of customers using these results) and allowing to compare them with other enterprises. These quantitative or qualitative measures have to be sufficiently general shared with benchmarking partners and sufficiently specific to produce a significant evaluation.

Step 3: to revise and improve the current enterprise performance

On the basis of steps 1 and 2 results, an analysis of the current enterprise performance through graphic outputs has to be undertaken. This analysis leads to a diagnosis of principal enterprise dysfunctions and to the proposal of a scheme of corrective actions for these dysfunctions.

Phase 2: Pre-benchmarking

The three steps of this phase aim to target relevant elements that will be subject of a benchmarking.

Step 4: To establish priorities and to select what has to be subject of a benchmarking

All process, all activity or all resource (product or service) can be the subject of a benchmarking. However, one should set up improvement priorities and decide which elements must be subject of a benchmarking at short term, average term, and which of them need a continuous improvement program developed internally on a more long term.

Step 5: To choose benchmarking partners

The purpose for the enterprise is to become the best in a given area, this leads to the choice of the "good" benchmarking partners in area identified in step 4.

Step 6: To define information and methods of collection of this information

The interest of a benchmarking for an enterprise is not only to compare itself with others enterprises, but it is also to make benefit from knowledge on methods and practices of the more efficient enterprises. Concerning the comparison with others enterprises, we must determine the level and the type of data to collect; these data can be very general or highly specialised, quantitative or qualitative. The choice of these data needs to define collection methods. Concerning the capture of information on the best practice, we should refer on the most adequate model for acquisition and representation of the know-how that integrates information often not formalized.

Phase 3: Benchmarking

This phase contains the benchmarking data and knowledge collection (enterprise partners), their comparison with the current enterprise performance and the study of actions to lead for enterprise improvement.

Step 7: To collect and organize information

Information to collect applies not only to realization levels, but also to methods and practices to reach these performance levels. They have to be integrated in an organized knowledge base in order to allow an analysis of performance gaps between benchmarking partners and to let the know-how be reused.

Step 8: To evaluate gaps as compared to the current performance

Steps 1, 2 and 3 have allowed to gather relative data on the current enterprise performance. Steps 4, 5, 6 and 7 have allowed to gather benchmarking data. This step aims to represent gaps between these data.

Step 9: To evaluate the future enterprise realization

On the basis gap analysis, this step defines improvement actions possible to lead.

Phase 4: Post-benchmarking

This phase corresponds to the implementation of improvement actions suggested by previous steps and being able to lean on the best practices suggested by the knowledge base.

Step 10: To fix objectives, action plans and to put in place these actions

This step consists for the enterprise to define average and short term objectives. Results of the benchmarking are the observation of the best performances while objectives express the performance to reach. These objectives are then transformed into action plans that describe how these objectives are reached, how actions to undertake are sequenced and what resources are allocated for them. The implementation of these actions is performed with a permanent cost and delay control in order to detect possible problems as soon as possible.

The benchmarking has to be seen as a buckled process. Indeed, the enterprise has to continuously follow the results of the improvement under way, as well as evolution of the enterprises to which they are compared. That allows to readjust objectives and action plans beforehand defined.

3.2 Internal diagnosis of the enterprise

The "*Quality Guided Scheme*" (QGS) is the reference document to build a benchmarking. It is realized through steps 1, 2 and 3 (phase 1). These steps are essential in the global development and have to be led in a rigorous manner.

Few formalized tools exist to help small business to elaborate this QGS.

The first work of our project (called AIDQUAL project) proposes an aid method to perform a QGS and a software supporting this method. This software is based two complementary approaches :

- the QUIMM method and the associated tools, developed by the "Union des Industries Métallurgiques et Minières", distributed and practised in 2000 small business in France. This method aims to improve the competitiveness of the enterprise by using the ISO 9000 model as organization referential, in order to make it certifiable. This diagnosis gives research directions for improvement in the enterprise with the justification of some costs to reduce.
- the concepts and tools of the OLYMPIOS model (Beauchêne, Haurat, Maire, N'Kongo, Rieu, 1992; Maire 1991) conceived by the LLP/CESALP (Development Laboratory for the Productic environment , in the University of Savoy).
This model is used to represent and analyse the organization of an enterprise in order to detect its dysfunctions (Beauchêne, Maire, 1992; Perruchoud, 1992).

The diagnosis tool of QUIMM method is based on NF X50-126 standard which defines Monitoring Quality Cost (M.Q.C.).

The M.Q.C. is composed of four categories of costs:

- **Internal Anomalies Cost** (anomalies observed within the enterprise but not seen by the customer)
- **External Anomalies Cost** (anomalies detected by customer)
- **Detection Cost** (expenses done to research anomalies)
- **Prevention Cost** (expenses done to act on causes of anomalies).

The calculation of these costs is made essentially with the help of an evaluation of time spent to manage these anomalies and of direct expenses they causes. This evaluation is obtained by interview of superintendents of the main activities areas of the enterprise and is based on a predefined questionnaire.

The diagnosis, that takes less of a day, allows to obtain an evaluation of the four costs categories for the whole enterprise or distributed by large activity areas. We find equally these costs detailed in term of dysfunctions, also evaluated, classified by decreasing value.

Some of the results of this diagnosis are given as examples (Figure 1 through 4).

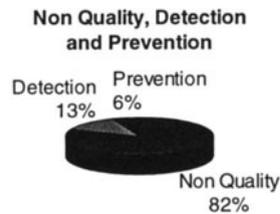
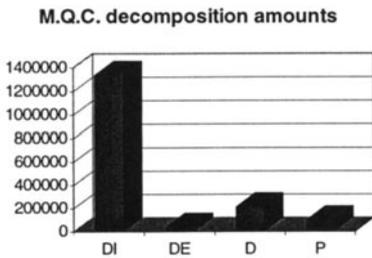


Figure 1 : M.Q.C. Amounts

Figure 2 : Relative parts

Cost analysis in Francs per year					
Anomalies					
Category	INTERNAL Dysfunctions (DI)	EXTERNAL Dysfunctions (DE)	DETECTION (D)	PREVENTION (P)	Total
BUYING	470	0	9 400	550	10 420
SALES	221 250	37 000	18 800	0	277 050
ACCOUNTING	178 610	0	23 475	38 588	240 673
MANAGEMENT	0	0	38 000	0	38 000
PRODUCTION	929 300	1 200	123 350	0	1 053 850
QUALITY CONT.	6 600	825	0	59 700	67 125
Total	1 336 230	39 025	213 025	98 838	1 687 118
% of Total	79,20%	2,31%	12,63%	5,86%	100,00%
% of Turnover	14,80%	0,40%	2,40%	1,10%	

Figure 3 Global cost repartition

Internal Anomalies (DI)				
#	Question	Source	Annual Cost	% cumulative
102	Customer changement queries before realization	SALES	18 800 F	48,2%
103	Further information queries to customers	SALES	8 800 F	70,7%
161	Partial delivery	SALES	7 050 F	88,8%
266	Complaint handling	SALES	2 350 F	94,8%
84	Return from customer cost	QUALITY CON	1 200 F	97,9%
251	Monitoring actions for compensate for complaints	PRODUCTION	825 F	1000
Subtotal (DE) :			39 025 F	

Figure 4. Details of one of the four types of costs

This diagnosis expresses a performance level of the enterprise in term of costs. Among noticed anomalies, those of organizational nature are the most frequent. This is why we complete this approach with a diagnosis of the organization based on concepts and tools of the Olympism method.

The enterprise organization modeling is obtained by constructing Customer-Supplier Information Systems (CSIS) that describe exchange relationships between the main actors of the organization. This modeling, in the framework of a diagnosis action of its organization, is based on the interview of a certain number of its actors.

Each interview follows 3 steps :

a) **ACTIVITIES**

What are activities areas in which you take part ?

For each activity area, what activities are appointed to you ?

b) **EXCHANGE RELATIONSHIPS**

Customer aspect

For each activity

What resources do you need to realize this activity ?

For each resource

Does this resource come down to you ?

If not, who could be or have to be its suppliers?

If yes, who are the suppliers of this resource?

For each supplier

What is your satisfaction level (between 0 and 10) ?

Supplier aspect

For each activity

What are resources that you produce ?

For each resource

Whom do you provide this resource to ?

c) IMPROVEMENTS

For each resource declared as necessary, but not coming or not giving satisfaction (satisfaction level equal or inferior to 6 / 10).

What is the improvement point ?

Do you know its cause ?

Does this anomaly occur very often, often, roughly often, rarely or very rarely ?

Is it according to you very serious, serious, roughly serious, a bit serious, very little serious ?

Do you detect this anomaly always, often, roughly often, rarely or very rarely ?

What are, according to you, the gains to expect from a corrective action on this anomaly ?

CSIS are completely constructed only when the two partners of the exchange relationship are interviewed. At the end of interviews, one has therefore an organization modeling by a set of CSIS partially or completely constructed and connected between them. The verification of the coherence of this representation as compared to the Olympios model allows, on the one hand, to show modeling insufficiency (omissions, multiple-sense, synonyms), and on the other hand, to detect strong points and weak points of the organization. At the end of interviews, 15 types of anomalies can be detected; they are given in (Beauchêne, Maire, 1995).

Many analysis results allowing to evaluate the performance level of the organization can be performed from this diagnosis. Here we give some examples. These are :

- global performance measures of the enterprise with the distribution of satisfaction levels expressed on input of activities (Figure 5), and the distribution of anomalies by "M" ("Machine, Main d'oeuvre, Matière, Méthode, Milieu") (Figure 6).

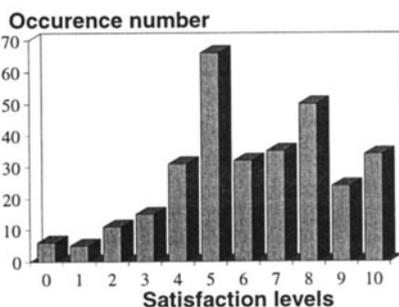


Figure 5 : Satisfaction level repartition

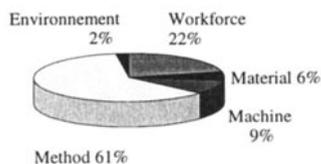


Figure 6 : "M" repartition

The performance of the enterprise is "middle" level (average of satisfaction levels is to 6.51 / 10). The enterprise has got few organization problems (61%, instead of an usual value superior 75%), but suffers of many problems on its workforce (22%).

- performance measures by activity areas

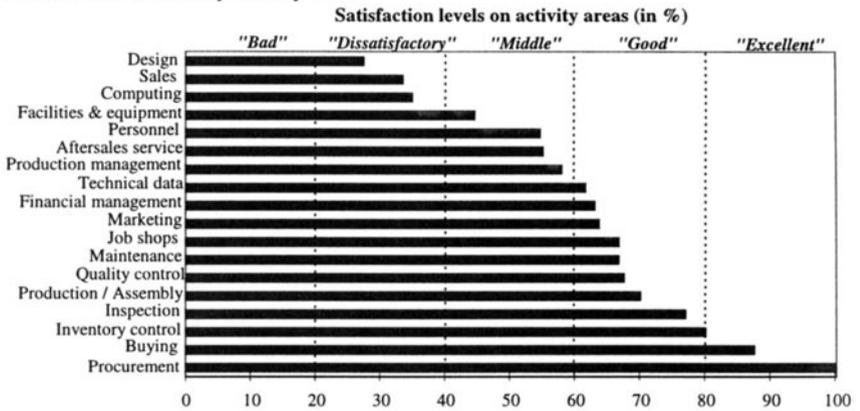


Figure 7 : Satisfaction levels on activity areas

For example, the performance of buying is "Excellent" (users of resources provided by this service have emitted satisfaction levels whose average is equal to 87 / 100) (Cf. Figure 7).

- performance measures by function of a production management

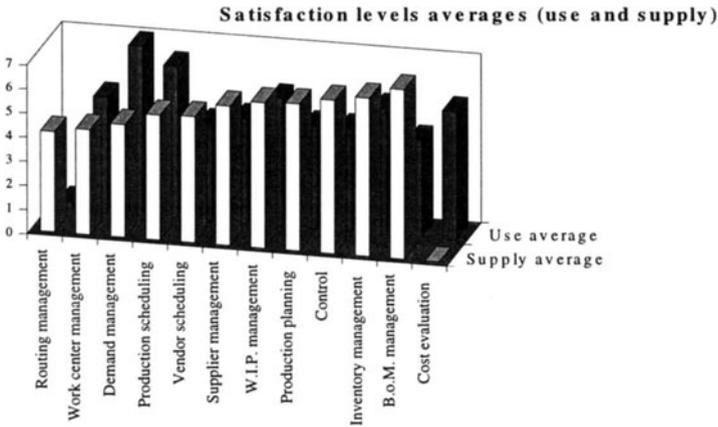


Figure 8 : Satisfaction levels averages (use and supply)

For example, demand management is considered as very unsatisfactory (users of provided resources express an average satisfaction level of 4 / 10) while resources that it uses are judged as satisfactory (7 / 10 level) (Cf. Figure 8).

3.3 Knowledge Base For Benchmarking

The first part of our project consists in developing tools for modeling and diagnosis of 15 partners in France and Switzerland in order to evaluate their internal performance.

Collected information is then grouped in a common knowledge base which structure has to allow the rapid access to knowledge but also the comparison, the analysis and the synthesis of necessary information during the benchmarking process. This knowledge base capitalizes the know-how studied during each benchmarking process performed in an enterprise.

This base is not limited to a list of measure values of "good" performance, but has equally to integrate information on practice and methods used to obtain them. One need to be able to **apprehend the know-how**.

The enterprise know-how regroups a lot partial individual pieces of know-how owned by enterprise actors. To represent the enterprise know-how, we have to structure these individual pieces of know-how with link between one another. To do that, the enterprise organization modeling in CSIS network give us a way to organize individual pieces of know-how between one another. We can thus get back the CSIS structure obtained at end of the internal diagnosis as a structure to organize individual pieces of know-how between one another. Individual pieces of know-how remain to be captured, each one corresponding to one CSIS.

We need therefore to refer to :

- acquisition methods for know-how
- representation and memorization techniques and (storage) for know-how in order to reuse it, accompanied by selective access means to the relevant information, and reasoning techniques on these knowledge.
- modes of durable and rapid learning . The realization of this base implies therefore the use of artificial intelligence techniques allowing on the one hand the representation of these knowledge, and on the other hand an efficient processing of these knowledge.

Among the four families of knowledge representation languages (the logic, rule based systems, semantic systems and frame based systems), we direct our work to semantic systems and frame based systems that allow to structure knowledge. The usable language study is currently under way.

4 PERSPECTIVES

We have especially presented in this article methodology and tools for performance evaluation of benchmarking actors.

The deliverables expected from this project are 3 types :

- methods and techniques associated to each phase of a benchmarking :
 - for the phase 1, an aided method to realize the Quality Guided Scheme,
 - for the phase 2, techniques of data collection for benchmarking,
 - for the phase 3, a gap analysis method,
 - for the phase 4, a method to follow performance evolution,
- two software supporting these methods:
 - AIDQUAL : software for intern evaluation of enterprise performance level delivering a comparative graphic analysis of the enterprise performances as compared to the competitors.
 - BENCH : software for functional and generic benchmarking.
- a knowledge base for benchmarking

Initiated with the help of implementation steps with 15 partners, it will serve as reference for the realization of others benchmarkings with other partners. The maintenance and the exploitation in the long term of this knowledge base will be subject of future research works.

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6 BIOGRAPHY

Sylvain Mahé is preparing a PhD in Computer Science at the University of Savoy which aim is Know-how capitalization and computer support for continuous improvement of small and medium enterprises with benchmarking process. He also plays the role of an organizations adviser for a lot of small and medium enterprises.

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