

## METHODOLOGICAL PRINCIPLES: PRODUCTIVITY MEASUREMENT AND ENHANCEMENT SYSTEM (ProMES) AND SELF-TRAINING AND ASSESSMENT GUIDES BY COMPETENCIES (STAG)

These two methodologies are centred on learning processes that directly involve working personnel. The stress laid on workers does not mean that the rest of the organisation is left aside. Middle managers are essential in operating the model. They have to learn how to train workers and follow up the improvement proposals that may be made. Some studies have shown that learning on the job may be facilitated or hampered by: a) the organisation of work and the assignment of enriched tasks; b) the social climate of the work environment (Eraut *et.al.* 1997).

Application of the proposed model implies a cognitive, attitudinal and emotional learning process for middle and upper managers.

Cognitive learning refers to the technical aspects of managing the model, application of its analytical capabilities for studying problems, preparation of training materials and sessions and the adoption of commitments.

The attitudinal learning process of middle managers begins by recognising the importance of contributions by workers and accepting, if justified, their criticism of middle management. They must be able to strike a balance between the objectives of the organisation and those of the workers. They have to handle and channel the requests of workers.

They have to accept the fact that workers can take over some of the tasks so far performed by middle managers. All this demands of them an inclination to

devote energy and time to the job, and accepting that their role has to change from supervising and implementing to facilitating and training. Socially, it requires an attitude of preaching with the example in everything concerning personal safety implements and respect for safety standards, as well as cleanliness and order in working areas.<sup>11</sup>

The emotional learning process of middle managers is their capacity for encouraging workers to learn, motivating them to take part in feedback board meetings and to study training guidelines. It is also their capacity to control their repressive and negative emotions towards workers in everyday activities, establishing an atmosphere of mutual trust and direct communication with them. Middle managers must be sensitive to the feelings of the workers in their charge, and react to them in a way that may reconcile their expectations to the values of the organisation.

These two methodologies coordinate training with the improvement of productivity in different manners. The **Productivity Measurement and Enhancement System (ProMES)** begins with participative group monitoring of productivity and employment quality indicators. From such reflections actions emerge that have direct bearing on group processes and performances. In periodic meetings of critical analysis of results, training processes emerge based on explicit and tacit knowledge. Informal learning occurs in non-predetermined training contents, and also in the fact that the critical issues at each board meeting are not always shared and analysed by the same personnel. The formal component is expressed through the programming of feedback board meetings, the periodical measurement and follow-up of the improvement commitments adopted.

The advantage of ProMES is that it starts almost immediately at the level of operational workers. Short term impacts are generally achieved through improvements in procedures and communication resulting from organisational learning. The disadvantage is that there is no follow-up of individual learning and performance. A personal commitment is not generated in each worker for the development of the competencies required in the necessary depth. In the case of sugar mills, ProMES does not guarantee that each worker will know how to interpret correctly critical process parameters (pressures, temperatures, speeds) or will be aware of the consequences of any parameter being outside the allowed range.

11 “The development of middle and upper managers usually emphasises motivation, productivity and evaluation but pays little attention to supporting the learning process of subordinates, the organisation of work, assignment of tasks and creating a work environment that may promote informal learning. This imbalance may derive from lack of knowledge about real and possible learning in the workplace” (Eraut *et.al.*, 1997).

**Self-training and Assessment Guides (STAG)** are based on training in explicit knowledge, derived from productive practices, and aim at developing competencies individually. They are complemented by performance assessments. The sum of the two plus associated knowledge develop the required competencies in workers. In a second stage, STAGs are combined with indicators of organisational productivity improvements, and with proposals for upgrading processes, to consolidate the impact of training on the organisation and secure constant feedback into the learning process.

Informal assessment is involved because the way in which guidelines are handled and the date and manner of the assessments are not predetermined. The formal part are the coded contents of the guidelines and previously devised checklists.

The advantage of guides is that they allow for individual follow-up of the workers' learning process and in consequence the commitment of each worker to the learning effort. The disadvantage is that start-up is slow, because the design of instruments takes a long time. Several months usually elapse, sometimes one year, before getting through to workers. Another disadvantage is that organisational learning is not always ensured. It is relatively easy to concentrate on the learning of each individual, overlooking the solution of common problems. For example in sugar mills the care and handling of tools is first of all an organisational problem requiring new rules of collective behaviour (placing tools in visible and accessible places, not removing them from the plant, not keeping them in personal boxes). It cannot be resolved individually or by means of study guides or performance checklists.

The two methodologies are proposed for an effective training that may affect and modify the work culture in the direction of a learning organisation. Effective training is based as much on the needs of the organisation as on those of its personnel. "Understanding the results expected by the personnel is understanding why they do what they do. When we have managed to change their expectations, we will have changed their behaviour. Training must be explicit as to what employees must *stop doing*, *begin to do* or *continue doing* to contribute to the organisation's strategy" (Latham, 2001). Undertaking a process of that kind is not a theoretical problem, but above all a cultural one.

The culture of work is the way in which employees act out and understand the everyday reality of work and their role in it, on the basis of common aspects that generate similar behaviour patterns *vis-à-vis* specific situations. It is also the way in which enterprises visualise personnel within their strategy. This view is conditioned by the existing work culture, eg. by the values, beliefs, tacit conven-

tions, cognitive structures and explicit strategies that involve a number of shared meanings among personnel, which allows for the “building of a social reality” within the enterprise embodying a system of “mental habits” in its personnel (Schoenberger, 1997). But it also depends on the strategy that enterprises pursue. Corporate strategy and work culture are interrelated dimensions.

Work culture and communication cannot be conceived as separate phenomena within an organisation but as indissolubly intertwined. Which means that attempting to change the work culture implies changing the forms and contents of communication in the organisation. Communication oriented towards knowing how to listen and to mutual commitment. This proposal is the axis round which the ProMES proposal and application of the self-training and evaluation guidelines revolve.

Changing the work culture aims at meeting new market needs, technological and organisational innovations. It means attempting to change the values embedded in a solid and consistent network of beliefs and notions that tend to maintain the *status quo* (Schoenberger, 1997). Consequently, it is not a rapid or straightforward process, as it meets various levels and types of resistance.

Management of change in the work culture breaking up with accepted trends implies knowing how to identify and counteract areas of resistance.<sup>12</sup> This is an important task in managing the all-inclusive learning model. The important thing here is to achieve a lasting change of attitudes, where persuasion by knowledge is not enough (or direct action by punishment or sanction). “If there is no conviction or true change of attitudes and values, long-term lasting behaviour can hardly be achieved. (...) ways of influencing attitudes and values are connected with participation schemes. The problem is that such schemes are slower to implant although they ensure better long-term results, as they are the foundation for personal improvement and development in the organisation” (Ronco, Lladé, 2000).

The two methodologies are distinguished by having their moment of truth, the point at which they strike a chord that operates coactively but at the same time wears down resistance to the effort and fear of learning. ProMES, systematic measurement and follow-up, build up collective pressure in the direction of compliance and improvement, relying on *esprit de corps* or competitions between groups or shifts of workers. For example, in sugar mills, the groups themselves

<sup>12</sup> Work culture is not static, nor is it always resistant to change. It is in a process of fluency and constant transformation as a result of new problems, contradictions and trends. It has a power and conflict dimension, and the type of change selected depends on how conflicts are solved in practice. Processes of change in the work culture always have a component that derives from the path that was being followed, and another one that breaks away from that path (Schoenberger, 1997).

pressure members to use personal protection equipment (helmet, gloves) because omission to do so is directly reflected in the scores they are awarded.

In the case of guides and performance assessment instruments, self assessment helps to allay fears and resistance and is also an initial moment of truth in developing a commitment with learning. Subsequent assessments and follow-up encourage learners to persist in their efforts, as they clearly perceive that they are necessary. At the same time, the procedure is coercive as it immediately detects attitudes of personal resistance and brings negative consequences in the organisation for the individuals concerned.

There is still an important question pending, that relates to the whys and wherefores of these methodologies. How is the culture of work before and after the changes? To answer this question we must clarify that the culture of work is not static, it is constantly undergoing a process of change along a certain path (Schoenberger, 1997). The change that we mean here is a change of path.

The answer to this question depends on the view we have of the characteristics of learning in a competitive enterprise in the present-day context. The broad view of “before and after” stems from the dysfunctionality and lack of effectiveness of rigid and unilateral hierarchical structures, direct supervision and repetitive tasks requiring routine skills, where knowledge is created in a disciplined and coded manner, and validated by a disciplined community. The nature and progress of information and computer sciences, and of biotechnology in the case of agribusiness and pharmaceutical industries, the increasing occurrence of unforeseen situations and the demands of markets for meeting customer needs more explicitly, have eroded the effectiveness of this model of organisational learning.

The “after” is the picture that should provide an answer to these new requirements. It is self-governed teamwork, with personnel equipped with generic competencies or qualifications of a higher level, capable of working in an environment of learning and generation of contextual knowledge. That is to say, an environment in which knowledge is produced because it is useful for a concurrent work situation. The sources of specialised knowledge are various and manifold, but significant contexts for their application are defined by market processes. This calls for an “educated” labour force, having learned not only skills but “right” attitudes, dispositions and inclinations – and in this context the term “right” refers above all to flexibility (Usher, 2000).

### a. ProMES Model

The Productivity Measurement and Enhancement System (ProMES) was originally developed by Pritchard and co-workers of the Psychology Department of Texas University (Pritchard, 1990).

The ProMES model is based on the assumption that if the personnel in an organisation adequately modify their attitudes, productivity increases. This assertion is based on another more general assumption, eg. that the behaviour of personnel in an organisation has an important impact on productivity. In the last resort, it is the personnel that puts technological and administrative systems to productive use.

How can behaviour be modified? And, in what direction does it have to be modified? Changes in motivation, information and knowledge modify behaviour. The direction of that change embodies the objectives to be pursued by the organisation and its different departments, channelling individual efforts towards a collective result.

A sustained improvement of productivity based on changes in personnel behaviour is not the result of a single action but of a process of interlocked actions. Behaviour is not changed in one fell swoop. It is rooted in mental representations and their respective meanings, in customs and routines, beliefs and power relationships. A change of behaviour is a process that follows a course with rate and direction, which does not necessarily mean linear progress: there are reversals, detours and hitches along the way.

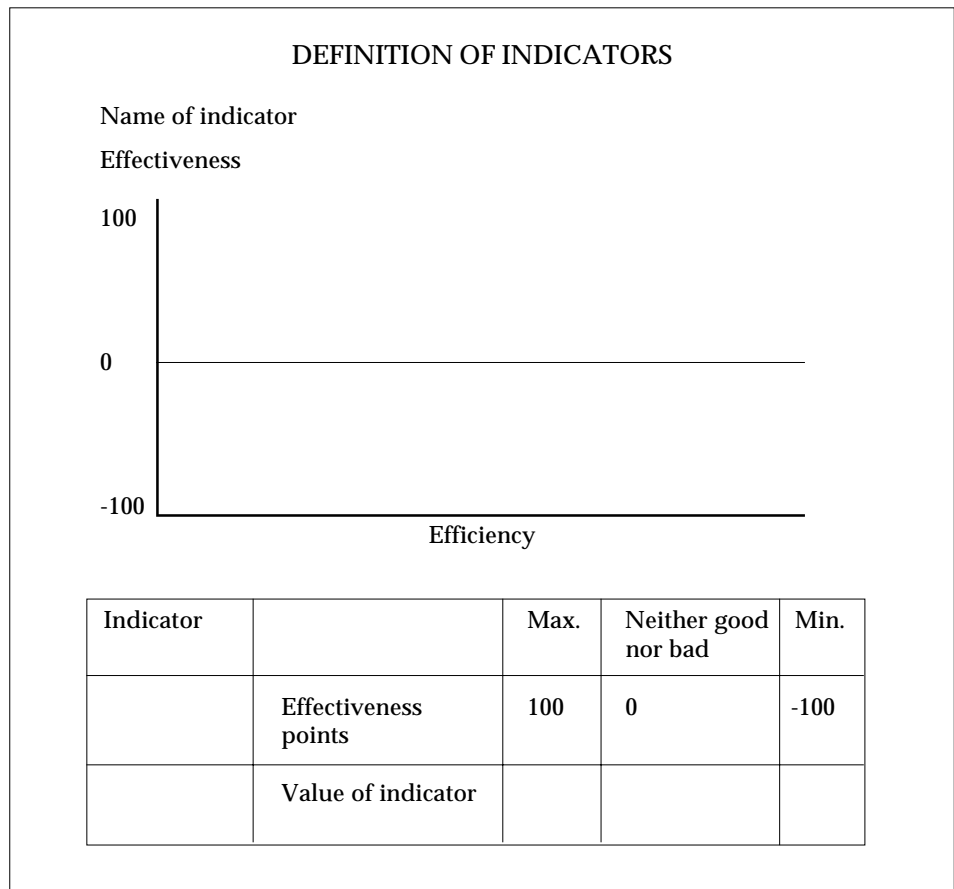
Regarding the *rate* of changes in behaviour, the challenge for organisations is to find anchors preventing the process to go back, and propelling it forward. Changes have to be institutionalised as organisational policy and culture, and also go deeper in the modification of behaviour. This can only be attained through the assimilation of new knowledge. To begin with, this is done by sharing good practices and know-how with co-workers, middle and upper managers. At a subsequent stage it will be necessary to analyse problems at their very origin, using a methodology that taps knowledge beyond what exists in the organisation. The methodology implies that the proposal resulting from an analysis has to be corroborated in practice, with the consequent readjustments that will in turn have to be evaluated, until a point is reached when the process can be closed, or when it remains in the same position, with the support of constant monitoring.<sup>13</sup>

<sup>13</sup> The Toyota Company developed a scientific method that is applied at workers' level to analyse and solve problems and take advantage of opportunities. Its cornerstone is experimentation, that is in turn the basis for organising learning (Spear; Bowen, 1999).

Regarding the *direction* of behavioural change, the challenge for organisations is getting all their collaborators to work and learn in line with their manifest strategic and social objectives. For objectives to become an instrument of motivation, it is necessary but not sufficient that collaborators know about them and are kept informed about their progress and problems. All aspects of the objectives that collaborators may influence and control will have to be singled out and focalised. All important aspects of each area or function will also have to be underscored, for human attention tends to concentrate on what is measured. For example, when quantity, quality and accidents at work are important, all three aspects will have to be measured and results integrated into a single total or general indicator, denoting whether progress is being made. In this manner it becomes an instrument that motivates without deflecting the path of the process (Ibidem).

In its most elementary expression, productivity is the relation between input and output. In the case of personnel, the input is human energy. Productivity is higher in proportion to the intelligence, knowledge, ability and attitude with which that energy is applied, which results in performance. It is important to point out that producing more by consuming more human energy does not result in higher productivity, but in higher labour intensiveness. What ProMES seeks is to direct and process human energy so as to improve the outcome of labour, in terms of objectives achieved.

The generation of human energy applied to the work process is not unwavering. Mental and cognitive processes intervene that enhance it differently in people, both qualitatively and quantitatively. Such processes are directly related with learning and motivation. For that reason, success in managing the ProMES model depends on the capacity for exerting positive influence on workers, and promoting their willingness to make a constant learning effort.



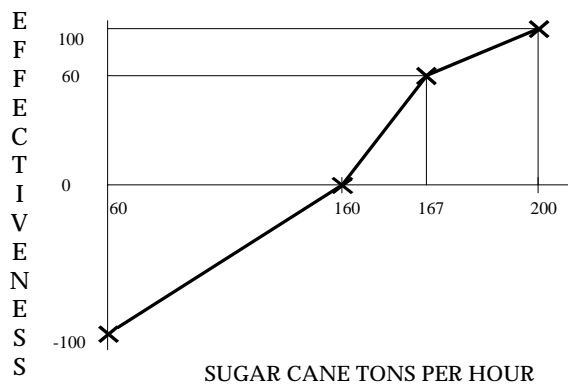
**Methodological aspects of ProMES**

For the model to have a sustained impact on personnel motivation and learning, several methodological aspects have to be complied with. The first one is that it must be circumscribed to aspects of organisational productivity that workers can control. This is a fundamental point, because it enables the feedback of measurement results to induce commitments to change in personnel behaviour.

## EVALUATION OF MEASUREMENTS

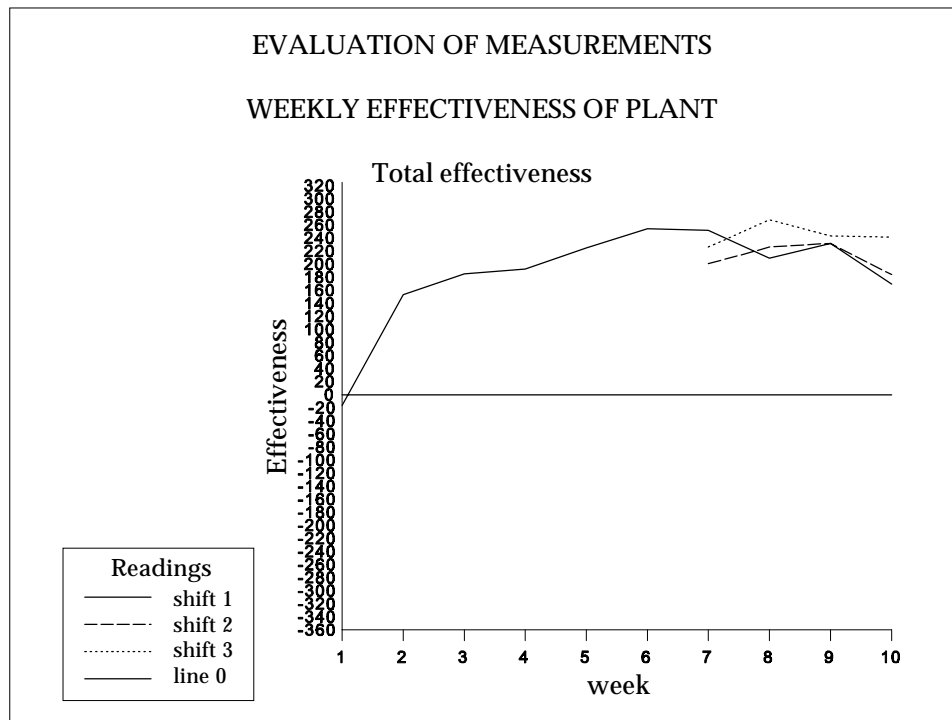
How do we reach intermediate points?

Once the extremes and point "0" have been set, members of the group are asked how they would assess an improvement from 160 tons/ an hour to 167 tons/ an hour. The group will answer according to the degree of difficulty and on the basis of their experience. In this case, they awarded it 60 points. This means that the relationship between effectiveness and the indicator need not be linear.



The second methodological aspect is that the different objectives of the function to be performed by workers have to be measured. There is a tendency for workers to focus on what they are measuring, and pay less attention to tasks they are not measuring but that are nonetheless important. For that reason, measurement indicators must cover main personnel functions, that in the case of sugar refineries include not only qualitative and quantitative operational parameters, but issues of cleanliness, order and safety.

The third methodological aspect is that there should exist the possibility of assessing the measurement of indicators in some non-linear fashion. In other words, the relationship between efficiency and effectiveness is not necessarily linear; there may be different gradations according to the degree of difficulty for focusing energy on a given objective. For example, instead of concentrating all their energy on achieving the maximum possible reduction of fuel consumption in boiler areas, workers also strive for the conservation of steam power generation, as well as maintaining cleanliness, order and safety.



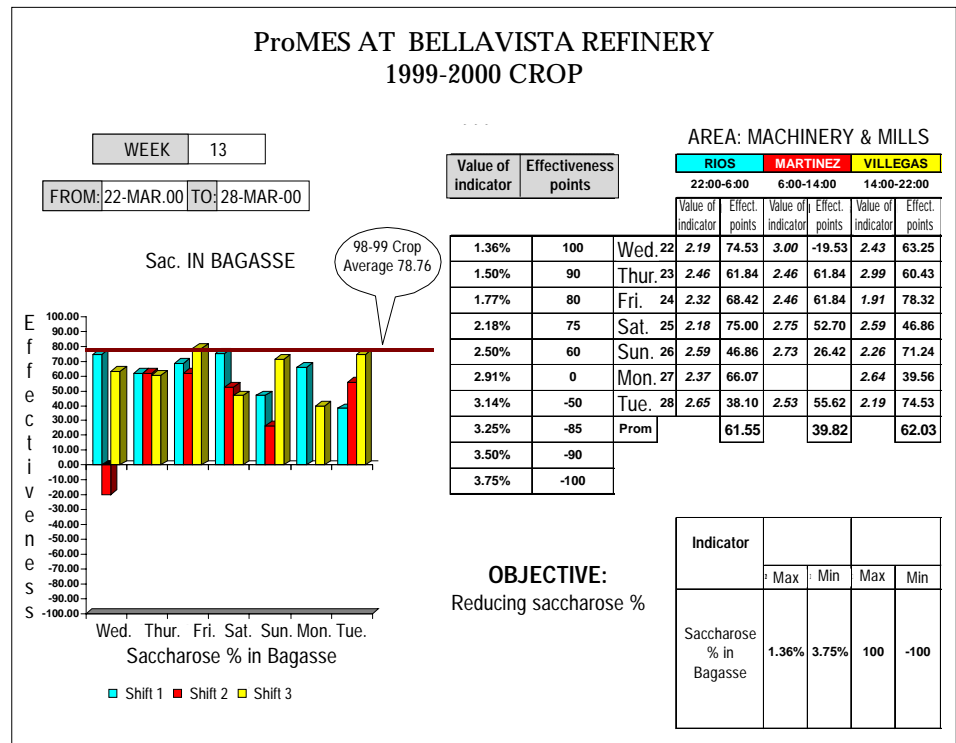
The fourth methodological aspect regarding motivation is that there should exist the possibility of building a principal or aggregate indicator summarising progress in personnel performance, considering different and sometimes contradictory objectives. For example, maximising quantity and quality simultaneously is not a linear equilibrium; there will be a point where quality is jeopardised by producing more. In the case of ProMES this summarising indicator is constructed by standardising measurements on the basis of a single reference: effectiveness. It provides a standard showing how far the different objectives of the organisation are being met.

FOLLOW-UP OF IMPROVEMENT PROPOSALS					
<b>ZUCARMEX</b> CIA. AZUCARERA LA FE, S.A. de CV.		FIRST FEEDBACK MEETING	DATE CROP <u>01 AND 02 MARCH</u> <u>2001-2002</u>		
Nº	PROBLEM	SOLUTION	RESPONSIBLE	DEADLINE	Implementation
1	VARIATION IN CANE FEEDING RATE	STANDARDISE CRITERIA EXPLAINING INSTRUCTIONS MORE CLEARLY	FOREMAN-WORKMAN TEAM	01-Mar.-02	
2	TIME LOST DUE TO DAMAGES IN N°4 CANE LEVELLER	PROPOSAL: REMOVE LEVELLER & PUT IN STAND IN N° 3 CONVEYOR TO PUSH CANE	Mr .JORGE	13 Feb.-02	
3	BLADES DAMAGED BY STONES & TRUNKS	INSTAL FOG LIGHTS TO IMPROVE VISIBILITY	Eng. BERNARDO	08 Mar.-02	
4	DIRTY AREA: SCRAP IRON & MAGNET PIECES	PLACE CONTAINER FOR SCRAP IRON etc.	Eng. IGNACIO & WORKTEAM	06 Mar.-02	
5	UNEVEN CANE FEEDING TO CONVEYORS	PLACE MARKING ON CONVEYORS	Eng. ADRIÁN	04 Mar.-02	
6	TRASH ON FLOORS	PLACE TRASH BINS IN MACHINES & MILLS AREA	Eng. IGNACIO & WORKTEAM	08 Mar.-02	
7	LACK OF CLEANING RAGS	SUPPLY CLEANING RAGS TO ALL AREAS	Eng. BERNARDO	03 Mar.-02	

The aggregate indicator shows synoptically the progress made in time and compares the performance of different groups of workers in the same or different departments. In sugar refineries comparisons are made between shifts in the same department, which induces “healthy” competition and is an extra motivation to those inherent in the model. However, this competition needs to be controlled to prevent “cannibalism” among workers of the same area or company.

The fifth methodological aspect is simple adaptation or change of indicators whenever necessary. This makes it possible to keep the system updated and to renew it without much difficulty, adapting it to changes of strategy. Readjustments of the model are also useful for sustaining the interest and motivation of workers.

In the sixth place, the model is straightforward and easily handled. This enables all workers to understand what is being measured and to take part in the daily collection of data. The model can be rapidly incorporated into the work culture and has immediate results. It can also be used in a variety of technological environments, from small workshops to large concerns.



The seventh aspect is the opening up of minds to critical reflection and systematisation through the feedback of measurements. A precondition for effective learning is a systematic effort of interaction, reflection and implementation of proposed improvements. Processing measurements with a standardised benchmark that permits comparisons in time, structures the learning process and lays the foundation for systematic efforts. Critical reflection through the cross-examination of operatives and middle managers is an important step in significant learning, that must be supplemented by other actions like the understanding of processes (concepts and generalisations), concrete experiences and evidence from the application of concepts to new situations. The follow-up of pro-

posals for improvement and the commitment to adopt them is the anchoring mechanism through which learning materialises into action. This mechanism is an essential part of the model, for it documents and administers implementation of the proposals. It also helps to prioritise the activities to be undertaken.

### **Key sub-processes in the implementation of ProMES**

Five key sub-processes have been identified.

The first one is to secure the support of high management, trade unions and middle managers for starting up the model. They have to be explained the principles of the model, the way in which they will take part, and the expected results.

The second process is to lay down a basis of personnel identification and confidence in the model, for example through the method of visualising the problem and its possible solutions. This methodology enables workers to voice their opinion and criticise working procedures, practices and conditions, especially communication mechanisms. This opening up of management to the workers gives legitimacy to the start-up of the model.

The third process consists of determining in which area application will begin. The objectives of this area or working group are identified, its respective indicators are established, and the scale of values for each indicator.

The fourth is systematic measuring, the processing and analysis of information and commitments by workers and management to achieve ongoing improvement.

The fifth step is adopting mechanisms for extending the model to other areas and ensuring its continuity.

These are the main stages for *expanding* the model. However, it must also be developed *in depth*, otherwise it runs the risk of stagnating and making no significant contribution to improved productivity.

The ProMES model aims at creating a shared mental representation of the objectives that the group of workers of the area in question must pursue. It includes all personnel in that area; it is not just a matter of sharing information and guidelines “from the top down” but precisely in the opposite direction, from the “bottom of the ladder upwards”.

The methodological rationale of learning at ProMes feedback board meetings is similar to what is known as *Action Reflection Learning*, the principle of which is that group members are in a position to draw their own conclusions and get to conceptualisation and learning through reflection on action taken and problems to be solved. They share experiences and learning achievements. The implicit and explicit commitments stemming from that knowledge in turn lead them to a new cycle of activities, that constitute the object of further reflection. In this way the learning model is consolidated.

Individual and organisational learning alternate in ProMES in a “natural” manner, which has contributed to the acceptance and support of the system by all concerned (management, trade union, workers). It is worth noting that in individual learning the process of reflection has resulted in modifications of what some authors call the hidden curriculum (Usher, 2000). The environment and flexible dynamics of board meetings –where persons are taken into account as such, and workers are asked to give their opinions, critical comments and suggestions– promote in persons an attitude of collaboration, understanding, mutual respect and even adaptability to the changes that crop up.

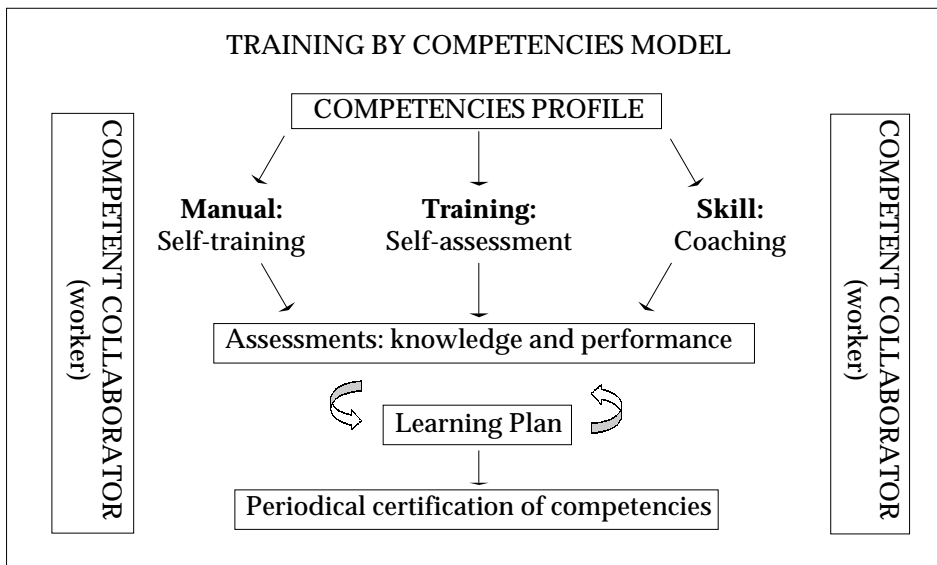
However, after a while, the dynamics of ProMES at feedback boards may tend to decline through lack of blending of the knowledge derived from experience, socialisation and explanation, with that acquired rationally (from implicit to explicit knowledge). The proposal for counteracting this premature depletion of the model is going deeper at board meetings. This is similar to what is known in the literature as the *Research-Action* technique, complementary to *Action-Learning* and not unlike the problem-solving methods used at the Toyota Company (Solbek *et al*, 1998).

This proposal requires supervisors to play a qualitatively different role as coordinators or facilitators at board meetings. They are expected to prepare the meetings, which initially they were not supposed to do. They are also asked to focalise meetings on a single aspect or problem so as not to confuse or tire out workers. Instead of offering a technical explanation of a problem or process, the practice used at feedback boards is to ask questions centring on that problem or process, so that workers may voice their opinions and socialise knowledge, and action commitments may become standardised into a format. A structuring element is thus introduced into the knowledge generated at the meetings, although the planning dynamics will basically continue to be unstructured, as it will focus on current problems generally emerging in everyday work.

We are now getting closer to what is known as *double loop* learning processes, that focus on innovating in the existing situation. Different conceptual approximations, experiences, objectives and available means shared by the group are

compared and evaluated, in order to reach a new knowledge base or reference. Normative assumptions are questioned and analysed and even established objectives are open for discussion (Weggeman, 1997).

The problem with double loop learning is that learning processes are generally conservative and tend to confirm existing frames of reference, apart from the fact that they are a continuation of accepted knowledge. Double loop processes are not readily accepted by workers, who normally require some external motivation to enter that phase (Ibidem). External motivation may come from market dynamics and especially from external audits by clients, as has been the case in sugar mills.



## **b. Self-training and assessment guides by competencies**

### **1. *The training by competencies model***

Self-training and assessment guides by competencies are based on the following model that comprises identification of the competencies and skills profile, training strategy, assessment of knowledge and performance, and certification.

It starts by identifying a competencies' profile or standard. Profiles can be more or less elaborated. For the garment industry in the Dominican Republic and Mexico a straightforward profile including general qualifications (providing customer satisfaction, safety at work, contributing to gender equality) and specific skills (attaching trouser hip pocket) was worked out. For sugar mills we developed a whole functional map, with competency units and elements, using a standardisation scheme of the performance and knowledge required by the function.

Irrespective of the degree of detail of a profile, the way in which it is built is the most important aspect. For profiles to reflect the strategy of organisations (what they are currently doing and what they intend to do in the future) and existing good practices, it is advisable that they should be jointly devised by high management, middle managers, technicians and some expert workers. This will help to secure the necessary support for implementation within the organisations themselves; the more persons involved, the better.

The involvement of technical groups of middle managers and expert workers has proved effective in developing profiles. The results depend to a good extent on the group dynamics technique. We recommend beginning in a holistic way, identifying the company's objectives and area as well as its strengths and weaknesses. This exercise will yield the competencies (qualifications) connected with the objectives and dysfunctions that the company will have to address. The following step is to trickle them down and specify them through tasks' analysis. This path avoids starting by individual tasks in each work post, which subsequently hinders aligning tasks with strategic objectives. It also precludes evolving a profile for each work post, which would be useless in practice for training purposes.

Group techniques vary. *Amod* ("a model", technique derived from *Dacum* – curriculum development-) focuses on "brainstorming" participants to establish the main performance procedures, that are then ordered in a curriculum or learning path: where to begin and what follows (Mertens, 2000). A profile is subsequently developed on the basis of such critical performances. Groups can also

work directly on the respective profile formats and standards. When descriptions of processes are available – for example in organisations with ISO quality systems – we recommend beginning by reviewing such standards to take advantage of what the company already has.

COMPETENCIES PROFILE – SUGAR REFINERY		
<b>Main purpose:</b> producing increasing amounts of good-quality sugar at low cost and in environmentally favourable conditions	1. Operating equipment/ machinery	1.1 Operating equipment
		1.2 Controlling process
	2. Maintaining equipment/ area	2.1 Supporting maintenance
		2.2 Keeping area clean and orderly
	3. Lubricating equipment/ machinery	3.1 Lubricating mechanisms
		3.2 Maintaining levels
	4. Interpreting measurement parameters	4.1 Pressure gauges
		4.2 Speed gauges
		4.3 Rotameters
		4.4 Thermometers
	5. Complying with health and safety specifications	5.1 Utilising safety equipment
		5.2 Operating equipment in accordance with safety standards
	6. Working by objectives and developing improvements	6.1 Working by objectives
		6.2 Proposing improvements
	7. Contributing to teamwork	7.1 Keeping good communication
		7.2 Helping to solve problems
8. Welding parts and components (optional)	8.1. Doing electric welding	
	8.2 Doing autogenous welding	

The time it takes to evolve a profile varies, depending on the degree of detail required for the standardisation process. In the case of the garment industry, we worked out the profile in two hours. For a food industry, we developed profiles in two stages: the first one for preparing a draft version (which took three eight-hour days) and the second one for corrections and adjustments (which took the technical team another day's work). In this instance the resulting profiles pro-

vided a much more detailed and accurate reference than in the garment industry. The objectives and contexts of the organisations account for the differences in drawing up profiles.

The profile that we developed for sugar mills embodies an in-depth dimension of the learning process. The competencies *operating* and *maintaining* equipment broadly envisage what workers must be able to do in every department for the refinery to work and meet its specified objectives. Knowing how to operate and maintain comprises two key sub-competencies that are applicable in all areas: knowing how to measure and to lubricate. These are included in the profile and add depth to its architecture. They are more easily transferable to other branches of economic activity than the skills of operating equipment in mills. Knowing how to measure and lubricate are qualifications required in many industrial processes, whereas operating a steam turbine or a *pachiquil* (juice separator) are more specific to sugar mills.

Another possible architecture consists of the focalised projection of the organisation's strategy onto the profile. For example, taking the structure of the organisation's or area's *balanced scorecard* ("balanced strategic map") and turning it into competencies. In the case of the food industry mentioned before, the supervisors' competencies' profile to a large extent reflects a *balanced scorecard* of the area, as it includes: final objectives (results, in quality and quantity), technological and administrative processes for reaching final objectives, development of qualifications and technologies as dynamic support of objectives.

The dilemma concerning profile architecture is not merely a question of greater or lesser detail. It has more complex underpinnings that are not often investigated, overlooking an opportunity for relating competencies to productivity from the very start. To continue with the above examples, a profile's dimensions can be categorised as follows:

In the simplest category profiles can be described as one-dimensional, when all competencies are of the same level. Bi-dimensional profiles have generic and specific competencies; generic or in-depth competencies, or else competencies reflecting a balanced scorecard. A three-dimensional architecture combines generic qualifications with specific and in-depth ones; or else, competencies reflecting a balanced scorecard in combination with generic, specific and in-depth qualifications. This last arrangement is not easy to be found as it implies a high level of complexity. It would be difficult for organisations to convey a three dimensional profile to their workers in a clear and consistent way.

Profiles are developed in detail from a previously defined format (Format 1) that in the occupational competencies terminology is known as "standard". At

sugar mills we worked with the format used by the Mexican Conocer (Spanish acronym of the Council for the Standardisation and Certification of Occupational Competencies) that consists of the following categories: performance criteria; evidence by product and performance; evidence of knowledge; field of application by class and category; attitudes and evaluation instruments.

Format 1: Competency.....	
Performance criteria — — — — —	Evidence by performance — — — — —
Field of application — — — — —	Evidence of knowledge — — — — —
Attitudes — — — — —	Evaluation instruments — — — — —

In practice, this model has turned out to be laborious and not easy to build. For adequate implementation, it requires great efforts of abstraction by the team developing the standard, which are not necessarily useful for subsequent stages of the process.

A simpler and more practical model includes only the categories describing performance and evidence of knowledge (Format 2). In the course of the process, this format can be supplemented with the categories considered in the first one, if organisations think it necessary to standardise competencies more precisely. Application of this format has made it possible to channel the organisations' energy much more directly in the development of training and evaluation instruments.

Format 2: Competency.....	
Performance descriptors — — — — —	Evidence of knowledge — — — — —

The experience of organisations in Great Britain, where application of competencies' models is more developed, goes in the same direction. "Perhaps the most important thing learned from the experience of organisations is that this stage of the design should be short, focalised and not too ambitious. It is still

common practice to take eighteen months to two years in designing a profile” (Rankin, 2001).

A format based on performance levels has been used for jobs depending to a large extent on attitudes and empirically learned skills (for instance, salesmen) (Format 3). Levels are as follows: what must not be done (basic performance of the job or function); standard performance (the sort of performance most workers can attain); outstanding performance (only attained by a few workers), and evidence of knowledge.

Format 3: Competency....	
Standard performance	Outstanding performances — — — — —
	Evidence of knowledge — — — — —
	What must not be done — — — — —

This classification was done with a twofold purpose. The first purpose was pragmatic. An evaluation of attitudes calls for accuracy in the description of expected behaviours in order to avoid ambivalence. Nonetheless, as opposed to technical qualifications, the required attitudes are not always easy to describe. The ones that are definitely not wanted are clearer, as they totally contradict the organisation’s objectives and values. That is the reason why international enterprises started to include undesirable indicators in their competencies’ profiles (Rankin, 2001).

The second purpose was to focalise the learning plan for each worker. If they have shown negative performances (what must not be done) they are recommended to start by the basics. After that, the next step is for them to master standard competencies. Finally, they are encouraged to aim at outstanding performances covering the whole learning path.

A point to be elucidated for bi-dimensional profiles – generic and specific qualifications – is how to deal with areas in which the two “overlap”. Let us take, for example, the competency “complying with safety standards”. It has a generic dimension and a specific one. In the case of sugar mills, the competencies for operating equipment and machinery comprised specific safety aspects, while the

more general aspects were included in the generic competency called “working under safety standards”.

Something similar occurs in sugar mills profiles of competencies relating to maintaining quality and communication, and with in-depth qualifications like knowing how to measure and lubricate, that “overlap” with the competency of operating and maintaining equipment and machinery.

We recommend involving high management in the profile-building process in order to precisely establish the project’s objectives and identify essential aspects that profiles must include in the strategic view of the organisational pinnacle. Besides, high management has to be committed to supplying the necessary resources for supporting the project. Once the profile has been developed by the technical team, it is submitted to high management for validation and prosecution of its subsequent stages.

Profiles are the reference for structuring and giving consistent contents to the following instruments:

- *Self-training manual with contents related to performance.* Contents are derived from practice and centre on critical aspects, in order to focalise the training effort and follow up generated and desired impacts.
- *Performance self-assessment guide, that is the basis for practical training.* This guide also concentrates on critical aspects and is not just a checklist to verify what is already known in the organisation. It is a reference guiding workers along their learning path, specially for generic competencies.
- *Development of specialisation.* Coaching by a skilled operative, supervisor or technician is carried out with the help of the manual and the self-assessment guide, so that workers may specialise in their job or function. For example, in the case of the garment industry, the jeans assembly line was grouped into six clusters of key operations. Each cluster represented an operation with varying degrees of specialisation. The manual and self-assessment guide explain all critical aspects for each specialised skill. However, without the coaching of a master operative or supervisor workers can hardly acquire the specialisation, as it requires a high proportion of tacit knowledge.

This stage consists of laying down the strategy of training based on occupational competencies or qualifications. In the particular case of sugar mills, training by competencies meant meeting at least four conditions: 1) approaching training from the critical problems existing in the factory (a problem may be critical because it is very important in the process and/or workers find it difficult to

master); 2) promoting the development of abilities workers have shown in practice; 3) transferring training from the classroom to the workplace, by making workers master competency standards; 4) encouraging workers to take over their own training through the self-assessment of their technical and social abilities, which in turn promotes the creation of informal training environments.

ASSESSMENT

Take a tour of your work area with the evaluator. He will ask you to show him what is explained below. The evaluator will take down the scores and make the necessary comments to help you improve your performance.

Knows

Does not know

Mention four pieces of personal protection equipment you must use in the plant.

Indicate when or in what circumstances you must use safety equipment and what protection it affords.

Show that you know how to use that equipment, placing it in the part of your body where you need it.

Give some examples of the possible injuries or accidents you may suffer for not using the equipment.

Show that you keep your personal protection equipment in good condition.

To whom must you report problems with your personal protection equipment?

How have you promoted the use of personal safety equipment among your colleagues?  
How can you prove it?

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The next step in the model is the evaluation of knowledge and performances. The fact that each worker keeps his own “evidence” file is what makes the difference with traditional evaluation. Instead of all responsibility devolving upon the evaluator, the evidence record turns the worker into leading player in the process. This makes it more feasible in practice for middle managers to take on the role of facilitators and evaluators of the competencies of workers in their charge.

#### ASSESSMENT

The evaluator will oversee you at your workplace and will ask you to show the performance of a number of operations. He will also ask you the questions included here, that you must answer.

The evaluator will grade your demonstrations and answers in a scale from 1 to 5:

1. **Beginner:** does not know how to perform or answer
2. **In training:** can answer and perform up to a point, but needs support to reach standard.
3. **Standard:** can answer and perform the required minimum, but needs support to solve unforeseen situations.
4. **In development:** can perform and answer fully and solve unforeseen and difficult situations.
5. **Professional:** has developed fully and can teach other persons.

At the end of every section there is a space for the evaluator to include his comments, which will guide you in all aspects of your future development. You are also asked to sign your conformity with the results of the evaluation.

Organisations generally keep their middle managers busy in a variety of tasks and functions. Assigning to them the additional role of facilitators/evaluators will only be in order if the administrative aspects of the process do not take up too much of their time. For the technical part of explaining contents, facilitators can rely on expert workers to help out colleagues requiring special support. Facilitation thus becomes a shared function rather than the sole responsibility of middle managers.

Knowledge assessment is based on compliance with the instructions of self-training guides. The instructions and exercises provide guidance for study of the manual. Trainees will find the answers further on in the manual, and can look them up when they perform requested exercises. The degree of difficulty found in the guides will depend on the schooling and education of workers and on the level of responsibility assigned to them in their job.

Performance assessment is done with a checklist of observations and outcomes. Workers' individual self-assessments are taken into account insofar as they fit in.

Evaluators are generally supervisors but they can also be master workers or specialists. In assessing both knowledge and performance they have the support of a verifier or referee, a person from outside but well versed in the competency.

The scale of application of assessments is a point for debate. Some maintain that competencies can only be judged in two ways: workers are either competent or incompetent. That was the criterion adopted in sugar mills.

Evaluating in this manner has several disadvantages. Firstly, it is not always evident that workers are competent or otherwise in their performance. Secondly, both workers and organisations are interested in knowing how near (or far) they are from expected standards, for reasons of motivation and the resources that will have to be devoted to achieving competency. Thirdly, it is also useful to know in what competencies workers rise above expected standards, for that can constitute a resource for training other workers or balance out the process according to individual abilities. For all those reasons, in the garment and food industries mentioned before we opted for a scale of more points (5 and 4, respectively).

LEARNING ACTION PLAN				
Competencies to develop	Action to engage in	Support needs	Deadline	Action undertaken

Signature of worker \_\_\_\_\_ Signature supervisor \_\_\_\_\_

Signature verifier \_\_\_\_\_

The results of assessments provide the terms of reference for learning plans. For example, in the garment industry we opted for two assessments a year. After each assessment, workers and evaluators established individual learning plans, in accordance with the needs unveiled by the assessment and the organisation's priorities. During the period preceding the next assessment, workers provide evidence that they are complying with the learning plan, using such evidence as the main input for the subsequent assessment.

For the garment industry in the Dominican Republic and the transport workers of the food company in Mexico we decided to certify personnel once a year. When certification took place each year, workers had to show that they were able to keep up their competency. The certifications' content may vary from one year to another as instruments are refined and new items are incorporated or prioritised by the company.

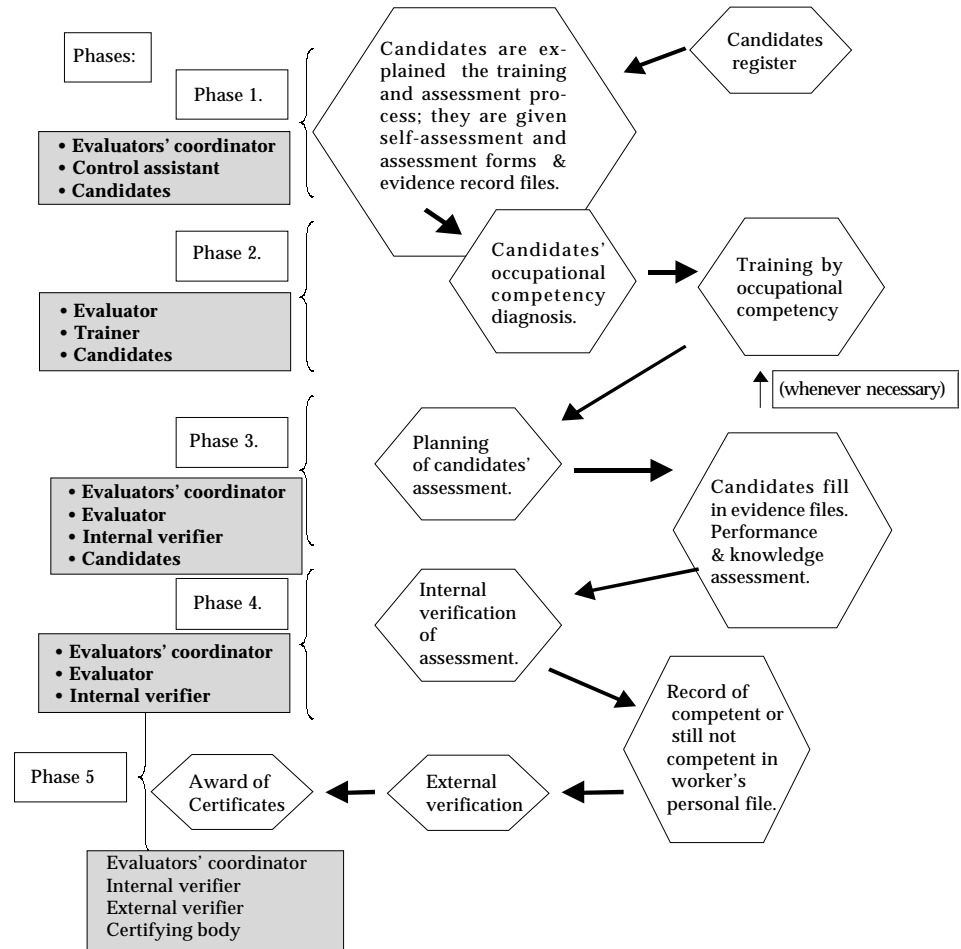
In sugar mills, workers give proof of their competency at the end of the assessment process by complying with established criteria. Subsequent assessments refer to other competencies or qualifications. Only when there are significant changes in technology, in the organisation or its priorities, are workers evaluated anew for competencies that had already been assessed.

In the occupational competencies' model instructors and supervisors also play the role of facilitators and evaluators. To achieve consistency and quality in the application of the various instruments, facilitators should be previously trained as facilitators/evaluators. This trainers' training focuses on understanding and implementing the manual of procedures for application of training/assessment instruments. In addition, it is a training that balances formal and informal aspects and is effected through classroom induction, coaching and follow-up in practice.

In the case of the food company we specifically developed a manual for the training of facilitators/evaluators. In designing it we followed the established principles of training by competencies' manuals. Its contents are not confined to procedures but refer to concepts relating to training by competencies and explain how to apply instruments. It also includes a competency profile of facilitators/evaluators and verifiers which enables to evaluate facilitators/evaluators and internal verifiers further on in the process with a view to ensuring overall quality.

Certification may be internal or external. The food company opted for internal certification. In the clothes-making industries of the Dominican Republic certification is conducted externally by the National TVET Institute (Infotep).

## GENERAL ASSESSMENT / CERTIFICATION PROCEDURE (sugar mills)



In the case of sugar mills, certification is also external through a certifying body created as part of the National System of Competencies promoted by *Conocer* in Mexico. Sugar mills have been accredited as evaluation centres by the external certification body. A fundamental aspect of this accreditation is the preparation of a manual of procedures of the assessment and internal verification processes. Once the manual has been issued, evidence must be provided that evaluators and internal verifiers are trained to apply it. After some experience, they have in turn to assess and certify themselves as evaluators and internal verifiers.

Benefits identified for the whole organisation as a result of application of a competencies' model in personnel selection and development:

- *Personnel happier in the exercise of their duties.*
- *Improved productivity, as operatives have the basic competencies for adequate performance of their function.*
- *Higher performance standards.*
- *Better service to customers, as employees can interact more effectively and efficiently with them.*
- *Lower personnel turnover.*
- *Workers feel motivated and responsible for developing their abilities and knowledge, using competencies' profiles to identify areas of opportunity in their individual careers plan.*

(Parker, 2001)

It is up to the organisation – sugar mill in this case – to maintain its accreditation as evaluation centre, by following the observations of external audits made by the certifying body, and taking the necessary corrective action.

After these steps, how is the cycle closed by improved productivity and working conditions? There is no mechanism directly ensuring a contribution to enhanced productivity and working conditions. It is difficult to isolate the impact of learning through the above mentioned instruments, or through other determining factors such as technology and organisation.

However, it is possible to relate learning efforts to enhancement of productivity and working conditions, in an indirect manner. The simplest way is a longitudinal comparison of some key productivity and working conditions indicators within a given area. Rather more complicated are comparisons with control groups to which the instruments have not been applied.

In both cases, readings are not linear or direct. Analysis starts in the surrounding environment to isolate external factors affecting the results. Once they have been identified and their impact has been evaluated, comparisons can be made over time or between groups.

A decline of the indicators does not necessarily mean that the learning effort has been in vain but it is a warning for reviewing its effectiveness. Inversely, an improvement of the indicators does not necessarily result from application of the learning instruments, but is a sign that the process is yielding positive results.

In a pilot project with a group of salesmen of the food company, we related performance assessment by competencies with productivity results in a given area, both longitudinally within that area and comparatively with a control group. Over a six month period we achieved sufficiently impressive results for the company's management to decide to extend the project to other areas.

This does not mean that all results were higher than those of the control group. Even if all indicators had shown better results than those of the control group, that would not have necessarily convinced the company's directors. Experts know that results depend on many factors, and there are ways of boosting them in the short term (for instance, a sales promotion campaign).

What persuaded directors was the consistency of the model and the objective explanation of results by facilitators, showing the pros and cons of the experience. Enterprises do not expect spectacular results, for they know they can vanish as quickly as they came up. What they do want are sound and consistent proposals showing positive results, both in quality and quantity in favourable and unfavourable situations; proposals that are likely to last, and not just meaningless routines from the point of view of learning and ongoing improvement.

#### TRAINING AND ASSESSMENT GUIDE

Your name:

\_\_\_\_\_

Date of delivery of guide:

\_\_\_\_\_

Dates of assessments:

\_\_\_\_\_

#### UNIT 5: COMPLYING WITH STANDARDS OF HEALTH AND SAFETY AT WORK

The objective of this training and assessment guide is that you apply and follow standards of health and safety at work.

How to use the guide:

1. You must read it carefully.
2. You must fill in the **self-assessment** spaces, that is to say, you yourself must indicate what you can and cannot do, what you know and do not know.
3. Once you have finished your self-assessment, go to your chief and review it with him, to see what you lack for being considered a **COMPETENT WORKER**.

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Ingenios Santos / ILO / CIMO

## **Building Self-training Guides (Manuals)**

Self-training guides are the basic learning element of the proposed model. In some cases, when attitudes and behaviour patterns are essential for performance (eg. salesmen), performance evaluation instruments have played that role. However, this does not detract from the importance of performance assessment instruments. It stems rather from the tradition of how training is delivered in organisations. Workers and organisations themselves feel safer and more comfortable when performance assessment is accompanied by a tangible instrument with explicit knowledge, like a manual.

However, not just any manual is acceptable and organisations have become more demanding about the cost-benefit relation of training manuals. They question their usefulness, specially when workers have a low level of formal training or their job consists of simple and repetitive tasks. They want manuals not to deviate from concrete work situations and at all moments respond to the changing learning needs of workers and enterprises. The other side of such expected benefits is the cost incurred.

The cost of learning instruments is a key aspect for organisations nowadays, a costly instrument in design and/or application will come up against objections from the very beginning and will be out of line with the sign of the times for organisations. This does not mean that organisations are opposed to investing in learning instruments, but they expect the investment to decrease in relation to the learning activities undertaken. According to this rationale, the amounts invested may grow in time depending on the results obtained, providing learning outcomes are proportionally more fruitful. How can this be achieved? By ensuring that organisations make instruments and procedures their own, part of their daily working routine. This is the challenge faced by training by competencies projects like the one we are submitting.

In view of these demands and requirements by organisations, we devised a self-study guide where contents are derived from concrete work, reflecting normal situations and contingencies. Visual references are connected with real and recognisable working conditions. They thus contribute to generate a safe and reliable atmosphere, which helps workers to assimilate and adopt the guide, preventing them from seeing it as an instrument removed from their everyday functions.

The self-training guide is an instrument with structured contents, to be applied informally in diverse situations and not just in the classroom.<sup>14</sup> The instruc-

<sup>14</sup> We are referring to the printed guide. It was also turned into an interactive multimedia instrument where both versions (CD and printed guide) complemented each other.

tor need not be one single person; the learning process may be helped along by different people and/or facilitators that are not always recognised beforehand as such. Informality implies that neither the place nor the form or persons taking part are predetermined. It is not reflected in the contents of the learning process but rather in its application, which includes various modes of self-study.

Guides are based on the context in which subject contents are applied. They intend to stimulate learners by contextualising contents, and combining different (self)assessment techniques that lead candidates step by step in their learning, alternating reflection with practice and related technical aspects.

Guides may be used in groups or individually, with the help of a facilitator or instructor, that varies in each case. After finishing their self-assessment, learners (workers) ask the evaluator to assess them.

The contents of guides are predefined as well as the situations in which they are applied. However, the assessment process may include non-coded contents when evaluators interact with candidates beyond the evaluation format. The purpose is then to turn evaluation into an open-ended training process.

The object of assessment is the knowledge associated to performance. In the case of the sugar mills and the garment industry each module of the manual ends with an evaluation guide that integrates knowledge and performances into a single instrument. In the food enterprise we opted for separating knowledge from performance evaluations. The knowledge assessment instrument refers to the quality of the response generated by each module in self-assessing. The performance assessment instrument is a checklist of observations and products. The checklist envisages first a self-assessment followed by an assessment.

Development of manuals is a construction process comprising the selection of contents, self-assessment techniques and decisions about the degree of depth and detail intended.

The main steps of manual building are as follows:

Once the profile of key competencies and their respective sub-competencies have been established, the SCID format is applied to the latter (SCID, Systematic Curriculum Instructional Development) (Mertens, 1997c).

### MAKING REAR PIPING\* CORRECTLY

Show the following to the evaluator, or answer his questions about it. Depending on the results, the evaluator will give you a score in the box, according to the scale.

Describe the steps you take to make the piping,  
show how safety is ensured  
in the operation and how the pieces are ordered in sequence.

Show how you use machines and tools carefully.

Show the needles you use for the operation.

Show that you know how to thread, change needles and  
put bobbins in place.

Show that you keep your working area and machine clean and  
always place a cloth under it, even during recesses.

What unforeseen situations can occur, and how do you solve them?

What are the typical errors, and their consequences?

Show how you protect yourself during this operation (safety).  
What is the evidence that you always do so?

What do you report, and to whom? What is the evidence?

What negative attitude must you avoid?  
What is the evidence that you actually avoid it?

What positive attitude must you show?  
What is the evidence that you actually show it?

Action plan and commitment:  Average score

Worker's signature \_\_\_\_\_ Evaluator's signature \_\_\_\_\_ Verifier's signature \_\_\_\_\_ Date:

\* Piping: ornamental trimming on clothes' seams (jeans in this case)

This first step is a coding or illustration of the knowledge applied in connection with the competency in question, consisting of the performance of routines, solving of typical contingencies, related knowledge, safety aspects and attitudes, as well as “negative” indicators (what must be avoided or not done). It includes some open, uncoded spaces for the tacit elements of competencies. The depth is contemplated in the design of the exercises that have to reflect the complexity of the job and refer to real work situations based on the analysis of “expert” workers, supervisors and directors.

I. SELF-ASSESSMENT

CLIENT SATISFACTION

- WHO ARE OUR CUSTOMERS?
- WHAT DO OUR CUSTOMERS EXPECT?
- WHICH ARE THE MOST COMMON ERRORS WE MAKE THAT AFFECT QUALITY?
- WHAT MUST WE DO WHEN WE DETECT A QUALITY PROBLEM?

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At this stage it is important to establish which are the critical contents to prevent the guides from becoming operational manuals (information about operations) instead of learning instruments (transforming information into understanding). Focusing on certain critical aspects makes it possible to steer the instruments towards their specific impact. It also brings down the cost of developing and applying them, and marks out the efforts to be made both by workers and evaluators in their implementation.

A second important aspect is the balance between the knowledge already existing in the organisation, based on its good practices, and the new knowledge coming from the environment and the path the organisation wishes to follow in the immediate future. External knowledge may also be incorporated owing to the need to deepen existing know-how.

## GUIDING CRITERIA FOR DEVELOPING SELF-TRAINING MATERIAL

### Contents' dimensions

1. Describing the expected behaviour standard in relation to the subject dealt with.
2. Establishing basic functions and principles (routines, procedures) in a real work context.
3. Developing subject on the basis of critical aspects in a real work context.

### Development

4. Establishing modular structure according to the competencies defined.
5. Referring to the problems that crop up in work in connection with the subject in question.
6. Explaining *whys and wherefores* on the basis of examples, using graphic material and images.
7. Describing and explaining what happens if the operation is not done, or the procedure is not followed correctly.
8. Including exercises (real situations, simulations, theory) and games.

### Assessment

9. Formulating self-assessment schemes.
10. Describing aspects and conditions of personnel assessment.

### Principles

The teaching material is just an approximation to expected performances. It will only make reference to critical aspects. The link between the two will be established in practice.

**This must not become an operational manual.**

Selection criteria become apparent here once again, as we are not trying to produce a replica of a book on engineering or human behaviour in teamwork, but to explain enough for workers to understand why some actions have to be carried out and how. We will only go into more complex and/or deeper levels of understanding when necessary.

A third aspect is the placing of contents within a given context. We cannot start by explaining specific technical or social aspects. What organisations want

nowadays is that their operational personnel should be aware of the *reasons* for their job and tasks. That they should be acquainted with, the objectives and priorities of their own area and organisation, and know how to contribute to such objectives from their microspace in the enterprise.

One of the overall objectives that many organisations pursue is client satisfaction. What must every worker show or prove? How is a contribution to client satisfaction made evident? (internal or external customers) How does it generate added value for clients? The answers to these queries and proof that they are being met are requirements of the latest version of ISO quality systems.

Including this point in the initial part of each sub-competency has a twofold purpose. In the first place, it brings the sub-competency into line with objectives and priorities, which is in turn a selection mechanism as it is difficult to specify its contribution to the objectives and its inclusion in the manual has to be analysed more carefully. Secondly, it makes workers and facilitators aware that the sum of particularities does not necessarily lead to the objectives, unless each one of them has incorporated them basically in their development.

The second stage is the preparation of the training guides. In our first experiences we began to ask ourselves what were the characteristics of a manual or teaching guide by competencies. We had the intuition that most of the manuals that organisations were using to train their personnel had not been designed with a competencies' approach. Nevertheless, it was not so clear why this was so and no criteria had been defined that manuals had to comply with to be based on competencies.

In order to be consistent, we have chosen some criteria based on the literature and experiences that we recommend following in the drafting of manuals. This is not an exhaustive or definitive checklist but a proposal open to improvements. These criteria help positioning manuals by competencies *vis-à-vis* traditional ones. They also make it possible to visualise and understand the modifications and improvements incorporated into the model in the course of time. Consequently, they constitute a reference for managing institutional learning about training by competencies.

### USING PERSONAL SAFETY EQUIPMENT

- **You are competent when:**
  - You use your safety equipment;
  - You keep your safety equipment in good condition;
  - You promote the use of safety equipment among your colleagues;
  - You know how to utilise the factory's industrial safety equipment;
  - You explain the protection afforded by each personal safety item;
  - You explain to others the protection that the personal safety equipment gives you;
  - You explain to others the visual safety signs in your working area.

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A typical course for the preparation of manuals is the following:

1. As title for the module we can take the name of the qualification, for example, in the case of sugar mills, "Using the personal safety equipment".
2. We specify the performances and knowledge workers must show to qualify for the competency. For instance: "Keeping your safety equipment in good condition". If there are different performances and/or evidences of knowledge, or if we want to go deeper into one of them, we can opt for several sub-modules.
3. We continue by developing the self-evaluation section. Here we can use various knowledge assessment techniques like, for example, open-ended questions, multiple choice problems, associations, hits and misses in images, crossword puzzles, completion of sentences, etc.

The ideal solution is to mix several techniques to prevent tiredness, but we can opt for a routine of questions that are repeated for each competency. We did so for the garment industry and it enabled us to make much faster progress

in building our manuals. In the Dominican Republic, using that scheme we developed two manuals for two different enterprises in two weeks' time.

Contents include two kinds of knowledge: a) knowledge directly associated with a given performance: *eg.* what must I do to keep my personal safety equipment in good condition?, what must I do when steam pressure exceeds the allowed limit? (such knowledge enables workers to understand the expected behaviour); b) knowledge aimed at developing cognitive abilities, and referring to the principles of phenomena, and cause-effect relations, *eg.* explaining the risks of steam pressure exceeding upper limits.

A just balance will have to be struck between these two areas of knowledge in the construction of manuals. This applies to the four key moments of learning in a labour context: a) routines and procedures in "normal" operation conditions; b) action required of workers in unusual or contingency situations; c) typical errors to be avoided; d) improvements workers may suggest about procedures, processes, human relations, working conditions and the manuals themselves.

**SELF-ASSESSMENT**

Give some examples of safety equipment in bad condition.

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Belt.: _____	<div style="border: 1px solid black; padding: 5px; display: inline-block;">Point out what you do to keep your safety equipment in good condition</div>	Apron.: _____	
Goggles.: _____	→	Boots.: _____	
↓			
Gloves.: _____	Helmet.: _____	Raincoat.: _____	Mask.: _____

**TO WHOM DO YOU REPORT YOUR PROBLEMS WITH YOUR PERSONAL SAFETY EQUIPMENT?**

Indicate with XX to whom you <b>must necessarily</b> report.	Indicate with X to whom <b>it is advisable</b> to report.
CMU	Field director.
Head of Industrial relations.	Head of laboratory.
Head of another department.	Shift leader.
Equipment manager.	ProMES Board.
	Head of procurement.

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This last point opens up new vistas for organisational knowledge. It is important that employees know not only what their organisation expects them to know, but also what its dysfunctions or opportunities may reveal from a productive point of view or reality. Direct operation of the process and concrete experiences in it are constantly generating new knowledge in workers. For such knowledge to turn into organisational learning and know-how, socialisation and reflection mechanisms are required. Manuals provide one such mechanism by including spaces for critical reflection.

4. In the technical information section workers will find explanations of the subjects dealt with in the self-assessment section. Answers are included there to many of the questions and exercises posed in the self-evaluation. This is part of a self-information strategy. Whenever they require, workers may check whether they have understood the topic and answered questions correctly. Sometimes there is more than one answer to the same question, depending on the underlying technology and organisation.

### TECHNICAL EXPLANATION

To whom do you report problems with your personal safety equipment?



XX. To whom you must **necessarily** report

X. To whom it is **advisable** to report.

CMU **XX**

Head of Industrial relations **X**

Field Director

Head of another department..

Shift leader **XX**

Head of laboratory

Equipment manager.

ProMES Board **X**

Head of procurement **X**

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The proposed link between self-assessment and technical explanation is based on the following assumptions:

- The challenge of answering questions and doing exercises connected with their job motivates workers.
- The relationship established enables workers to use the manual at their own rate and when they do not necessarily have the support of a facilitator.
- The visual presentation of the material and the answers and exercises provided in the technical explanation, act as references and examples that make the manuals accessible even for persons of low schooling level.
- The modular structure with sub-modules and exercises enables trainees to keep abreast with their learning, and prevents them from despairing and losing motivation.
- The transparency of the process, that consists of answering questions and doing exercises with the answers to hand, allays the workers' fears of being in evidence for lack of knowledge. They have to rely on their own judgement, which gives leverage to their learning, provided that they consider the contents valid and attainable.
- The development of information technology, that makes it possible to access databases with drawings and graphs and to incorporate digital pictures, places these manuals within the reach of most organisations. They are flexible instruments, easily adapted to changing circumstances and/or new learning demands that may emerge.

Their modular design and self-assessment/technical explanation structure makes them liable to multi-media adaptation (eg. an interactive CD) or learning via *Internet or Intranet*. In the case of the food enterprise we used an interactive CD as a complement to the printed manual and group exercises.

Preparation of the technical explanations has several difficulties.

The first and perhaps most important one is the natural conflict between knowledge derived from practice and that derived from the coded science of books and other media. This conflict surfaces through persons with different hierarchical positions in the organisation. Practical knowledge is more frequent among operatives and coded scientific knowledge among technicians and directors.

A balance of the two is struck by participants in the project that come from different spheres and positions in the organisation. Project leaders should be aware of this conflict and implement effective facilitation to achieve a balanced structure.

Another frequent side effect is the following. What happens when the project leader, technician or director is changed? The newcomer's temptation to review the manual and go through the building process again may be exceedingly great. We can easily imagine he will find defects and faults, particularly because his predecessor took part in the design. If at a given moment there is no clear-cut leadership because the project has been assimilated or taken over by the organisation, the problem is how to maintain the balance with the new authorities. Many projects have come to a complete halt for that reason, at least for a while.

The attitudes and emotional intelligence to be developed in middle and upper managers are circumscribed to competencies:

- Motivating and inspiring collaborators, by establishing goals and setting a direction.
- Making conscious and effective efforts in support of workers' development towards significantly better performances.
- Communicating with a clear vision of collaborators.
- Identifying, facing and solving problems that come up in the group of collaborators.
- Being prepared to learn from collaborators.
- Taking collaborators' concerns as one's own and conveying them to upper management.
- Whenever necessary, breaking unpleasant news to workers but keeping their performance at desired levels.
- Scrutinising assumptions, procedures, processes and generating imaginative, innovative, creative and practical concepts to solve problems.
- Showing enthusiasm and commitment to tasks.
- Identifying the strengths of collaborators, and delegating tasks and responsibilities to them.
- Periodically reviewing the individual performance of collaborators and providing feedback to them.
- Consulting with workers for decision making, and involving them in the process.
- Learning about the feelings of collaborators and supporting them emotionally if necessary.
- Controlling anger, disappointment and despair; keeping calm and maintaining a respectful relationship with collaborators.

*Competency, various issues. IRS, London, 2000-2002*

The problem of balancing the two types of knowledge has complex underpinnings and cannot be solved only with an instrumental approach. It requires a process of social analysis and interaction to modify attitudes and develop the emotional intelligence of middle and upper managers.

They are seldom inclined to listen to workers and collaborators and accept their knowledge as valid. The same as in the ProMES model, in order to be successful this proposal for guides requires that middle and upper managers should understand the meaning of the process and accept their role in it. But above all, they should acquire different attitudinal and emotional competencies from those of traditional management.

Traditionally, middle and upper managers of organisations in Latin America have considered that leadership means “having the last word”, and have imposed their will in an authoritarian fashion. They frequently confuse their commanding position with the attributes of a social ruling class and underestimate their subordinates or deal with them in a paternalistic way. Such attitudes do not favour the creation of a learning atmosphere, whatever the instrument or techniques applied.

The *second* problem is the degree of depth with which each subject is considered. The criterion followed is that work needs will dictate how deep we must go. In fact, this occurs in practice because progress is made in the construction of the manual when participants make a selection demarcating depth, according to how they imagine the material in hand may be of use to workers.

#### INTEGRATION PRINCIPLES OF MANUALS

- Examples
- Conducted and open-ended exercises
- Ludic (games)
- Graphic
- Real imagery, recognisable and familiar situations
- Use of well known locutions or popular philosophy language
- Alternation of typefaces and colours
- Constantly changing feelings and associations in presentations (surprise element)

Despite curricula are derived from practice, we must be aware of the fact that practical views are subjective and topics might be considered in depth not necessarily because practice requires so, but because the organisation's technician that is in charge masters a particular topic. A way of counteracting such deviations is requesting a review of the material by several of the organisation's technicians and directors and, if possible, asking for the opinion of outside experts. Another method – not the only one- is following up the application of the manuals and asking learners and evaluators what areas need further elaboration. In the manual we prepared for drivers of heavy-duty vehicles of the food company we included paragraphs in each module asking workers and evaluators to say what subjects needed to be treated in more detail. After such answers are inventoried, a selection is made and a new version of the manual can be issued.

The *third* problem is to achieve creativity in the design of exercises and technical explanations. Organisations generally lack that capability. Persons charged with the drafting and preparation of manuals need to be trained in the use of knowledge evaluation techniques. The most successful method is through examples and coaching in relation to the manual they are constructing.

The most difficult thing is to unlearn the concept prevailing in organisations (sometimes unconsciously) about the way in which adults learn. The traditional scholastic path of beginning by basic principles and developing them in a se-

#### KNOWLEDGE ASSESSMENT TECHNIQUES

- **CONSTRUCTED ANSWERS:**
  - RESTRICTED ANSWERS (give two reasons why...)
  - EXTENDED ANSWERS (explain importance of service for the client...)
  - STRUCTURED QUESTIONS  
(description of a process, plus specific questions)
- **SELECTION ANSWERS:**
  - MULTIPLE CHOICES
  - MULTIPLE ANSWERS
  - ASSOCIATION-RELATIONSHIP
  - MATRIX OF ANSWERS
  - ALTERNATE ANSWERS (true or false)
  - HIT OR MISS – REASONING (true or false, and why?)

quential and linear manner, is not the most appropriate method for training grownups. Adults want to associate new knowledge with their concrete life experiences. Pressed for time in studying a manual, lacking reading habits and leaning towards learning by practice, workers need to find incentives in the contents and design of manuals in order not to be put off after the first couple of pages.

To support manual construction we have made a checklist of possible techniques for evaluating knowledge.

Incorporation of such techniques into manuals is based on the assumption that adults expect, on the one hand, a clear-cut structuring of subjects, which enables them to visualise their progress and, on the other hand, a similarity of the contents with the complex reality of their work experience. Work processes are far removed from linear, programmed sequences of activities. They rather resemble the simultaneous existence of different realities: what we must do according to standards, and what experience tells us; errors to avoid and what to do in contingencies; the information we must look up to make decisions; safety aspects to be observed. All these factors and several others (communication, attitudes, emotions) are present at the same time but on different planes. Routine operation will prevail at one moment, communication and decision the next.

Contents are represented on those various planes coming near to the realities of job performance. Not all of them are always present, depending on the importance ascribed to each one. A differentiated presentation of the same subject area induces learners to associate planes dynamically with their own life experiences, without feeling compelled by a linear, monotonous sequence.

The *fourth* problem is the cost of reproduction of manuals. All workers are supposed to have their own manual, where they do exercises and jot down anything they may consider important. Manuals thus turn into evidence of what workers have thought about the contents, through the quantity and quality of their answers to exercises. Manuals are also instruments that prevent knowledge from vanishing and refresh workers' memory whenever required.

Issuing a manual for each worker is not always within the possibilities or priorities of an organisation, particularly when personnel turnover is high. In the case of sugar mills, we opted for printing manuals by parts and in black and white, to bring down the cost of reproducing more than 100 pages. Copies were bulky because we used large typeface and many photos and pictures to make them easier to understand.

The issue of costs is both relative and real. Manuals of a length and quality generally meeting the expectations of workers and employers can be reproduced

at costs ranging from US\$ 25 and 35 per unit. The problem is that organisations consider it as a cost and not as an investment. It can indeed be a cost when the model does not generate a process of learning and improvement in the organisation. Scepticism prevails among most managers of Latin American organisations, which is quite understandable. When they buy machinery or equipment by the specifications they know what theoretically is the costs/benefit ratio, i.e. the evolution of the demand for the product or service and the expected operation of the installed equipment.

In the case of training based on manuals and the evaluation of performances, the cost/benefit relation is more difficult to establish. Firstly, because the organisation has no information about the shortcomings of each worker *vis-à-vis* the competency required by the job. Secondly, even assuming that we managed to get that information through knowledge and performance assessments, it would be difficult to calculate the impact training might have in levelling workers' competencies for productivity, owing to the influence of other factors, as already pointed out in this document. Thirdly, there may be undesired qualitative impacts in an unfavourable labour atmosphere, bad communication, human relations, that have their own weight and cannot be assessed in terms of money. Fourthly, organisations lack a culture of relating training with productive processes and productivity and both of them have been traditionally seen as separate compartments.

However, relating training to expected impact is not a senseless endeavour, therefore, we must establish what we mean by benefits. On one hand, there are tangible benefits, directly linked to the organisation's financial results (costs, sales). On the other hand, gains can be intangible, such as client satisfaction, successful teamwork, a good labour climate, the ability for reacting in contingencies and innovating; *esprit de corps*, participation and personnel enthusiasm; communication, workers' satisfaction with their job.

These intangibles may lead to very tangible effects, such as personnel stability, reduced accidents and absenteeism, better quality processes, response times, etc.

There are also institutional benefits insofar as training through manuals and performance evaluation instruments shows that organisations are meeting the demands of the market or the State. For example, ISO 9000 standards include personnel training as a requirement organisations must comply with for qualifying internationally. In the food industry, the international standard of safety and good manufacturing practices (HACCP - *Hazard Analysis Critical Control Point*) requires proof of personnel training and competence in the matter. In sectors

where there are risks for the population, like motor transport, States require employees to comply with the required knowledge. In some countries (like Mexico, for example) organisations are required by law to have training plans for their personnel and to provide evidence of their training action. In others (like the Dominican Republic) they must pay a percentage of their payroll to a training fund or institution, and may get support from them when submitting a personnel training plan.

For manuals and their respective performance evaluation instruments to yield concrete results (tangible, intangible or institutional results) they have to be established before they are applied. This means guiding the process, providing feedback during implementation, evaluating it periodically and making proposals for upgrading it. It is also useful for the operational area to make the project its own, by coordinating it strategically and organically with its technological, administrative and systems' processes, so that the project will contribute almost naturally to the organisation's objectives.