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# Longitudinal study of the results of continuous improvement in an industrial company

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## Abstract

**Purpose** – The purpose of this paper is to show a real experience of how a scheme of continuous improvement has been gradually transformed, from a very unsuccessful start, passing through different phases and finally delivering results for the firm.

**Design/methodology/approach** – The authors analyse the evolution of the formal programs of continuous improvement of a firm in a traditional sector (food). The data for the research were gathered by means of participatory observation over the course of 18 months spent in the firm attending the meetings of the improvement teams.

**Findings** – Both programs (individual and group) have proved to be very profitable for the company. However, there is no magic formula for the correct operation of the system of continuous improvement. The existing system has to be continually improved, correcting faults and trying always to contribute something new to re-launch the system regularly.

**Practical implications** – This study has also permitted the authors to highlight the importance of continuous improvement in the firm from both the economic point of view and that of worker development.

**Originality/value** – The investigation aims to help to cover the lack of longitudinal case studies of continuous improvement.

**Keywords** Continuous improvement, Performance management, Cost reduction

**Paper type** Viewpoint



## Introduction

The current environment in which many industrial firms operate is characterised by intense competition (Bond, 1999), with an increasingly predominant role of new technologies (Garcia-Lorenzo and Prado Prado, 2003). In this context, continuous improvement is a weapon for maintaining and improving competitiveness, making use of the knowledge and the involvement of the firm's workers (Garcia-Lorenzo and Prado Prado, 2003; Prado Prado, 1998; Terziovski and Sohal, 2000; van Dijk and van den

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Ende, 2002; Wood, 2003). Although continuous improvement may be originated by the ideas or proposals of managers, technicians or consultants, it can also be encouraged by the creativity and involvement of the workers (Bodek, 2002; Fairbank and Williams, 2001; Garcia-Lorenzo and Prado Prado, 2003; Grütter *et al.*, 2002; Kerrin and Oliver, 2002; Lloyd, 1999; Prado Prado, 2001). In this sense, suggestions systems and improvement teams are some of the tools that enable continuous improvement to be set in motion utilising workers' ideas.

Many authors have considered continuous improvement as one of the basic tools for implanting systems of production based on total quality management, Lean Production or World Class Manufacturing (Bacdayan, 2001; Bonavia Martín and Marin-Garcia, 2006; Bond, 1999; Frese *et al.*, 1999; Grütter *et al.*, 2002; Marin-Garcia *et al.*, 2006; Schonberger, 1996). However, continuous improvement can be used as a tool for the functioning of any organisation, even if it is not based on these advanced methodologies (Rapp and Eklund, 2002). We should not forget the importance to the firm of implementing small improvements of a cumulative character, which in the end produce important and lasting results (Bond, 1999; Choi *et al.*, 1997; Fairbank and Williams, 2001).

Among firms' principal motives for implementing continuous improvement, we can highlight the improvement of productivity or efficiency (Grütter *et al.*, 2002; Rapp and Eklund, 2002), quality (Grütter *et al.*, 2002), the reduction of production costs (Bond, 1999; Modarress *et al.*, 2005; Terziovski and Sohal, 2000) or of time of manufacture (Grütter *et al.*, 2002). We must take into account that these benefits are not always achieved immediately and some time must pass before the incremental improvements take effect (Rapp and Eklund, 2002). However there are very few empirical studies that analyse the long term impact of continuous improvement (Grütter *et al.*, 2002). It is therefore necessary to undertake studies to evaluate the results achieved in long implementations.

Our study aims to help to cover the lack of longitudinal case studies of continuous improvement (Grütter *et al.*, 2002). In it we will identify phases that the continuous improvement program goes through in a firm, the results obtained and the differences in the implantation of the systems of suggestions and of improvement teams. Furthermore, our analysis is carried out in a Spanish firm in the food industry, of medium size, mature, family-owned and with traditional systems of manufacture. That is to say, in a context very little explored in the scientific publications that focus on the application of continuous improvement in firms.

### **Continuous improvement**

Continuous improvement can be defined as small incremental changes in productive processes or in working practices that permit an improvement in some indicator of performance (Grütter *et al.*, 2002), that do not require big investments in order to implement them, and in which all members of the firm are involved (Terziovski and Sohal, 2000). The themes most frequently analysed are the improvement of the quality or costs of manufacture, though matters of health and safety at work are also common (Terziovski and Sohal, 2000).

Continuous improvement is based on the Deming cycle, consisting of four phases: studying the current situation, gathering the data necessary to propose the suggestions for improvement; setting in motion trials of the proposals selected; checking whether

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the proposal tested is giving the expected results; implementation and standardising the proposal with the necessary modifications (Bond, 1999; Terziovski and Sohal, 2000)

There are various ways of implementing continuous improvement in the firm. The best results are obtained when the improvement originates from a group, either through permanent groups such as quality circles (García Lorenzo and Prado Prado, 2001; Grütter *et al.*, 2002; Kerrin and Oliver, 2002; Rapp and Eklund, 2002; Sillince *et al.*, 1996) or through multifunctional or self-regulating work teams that incorporate the continuous improvement activities among their responsibilities (Kerrin and Oliver, 2002; Rapp and Eklund, 2002); or through improvement teams of predetermined duration (García Lorenzo and Prado Prado, 2001; Grütter *et al.*, 2002; Kerrin and Oliver, 2002; Marin-Garcia *et al.*, 2006; Rapp and Eklund, 2002).

Individual suggestions systems can also be implemented (Prado Prado, 2001; Rapp and Eklund, 2002; Schuring and Luijten, 2001; Sillince *et al.*, 1996), though they only obtain results comparable to groups if they are exceptionally well managed (Rapp and Eklund, 2002).

In our study we will focus on programs that add a parallel structure to which workers dedicate only a part of their time (de Lange-Ros and Boer, 2001; Sillince *et al.*, 1996). In this sense, we can consider that the programs that first appeared in firms were suggestions systems, followed by quality circles and, later, improvement teams were introduced (Garcia-Lorenzo and Prado Prado, 2003). In a recent study of Spanish firms with more than 25 workers, the degree of use of these systems clearly inclines towards improvement teams (present in 74 per cent of firms) and suggestions systems (present in 64 per cent of firms), whereas quality circles are becoming less common (30 per cent of firms) (Garcia-Lorenzo and Prado Prado, 2003). We believe this situation is not exclusive to Spain and the maintenance of the popularity of suggestions systems alongside the progressive substitution of quality circles by improvement teams can also be seen in Australia (Terziovski and Sohal, 2000) or in the United States (Lawler *et al.*, 2001).

We will now describe in more detail these two more popular types of programs for continuous improvement.

Individual suggestions systems offer a procedure for collecting and evaluating ideas provided by the firm's employees (van Dijk and van den Ende, 2002). They also allow the procedure for rewarding the workers for their ideas to be formalised (van Dijk and van den Ende, 2002). Normally, the workers make their suggestions through a suggestions box (Schuring and Luijten, 2001), filling in a paper or electronic form. Traditionally, once the worker has presented the idea, he or she has no further connection with the process and the responsibility passes to a committee that selects the winning ideas, the amount of the prize, and the persons or groups that will be charged with implementing the ideas approved (Frese *et al.*, 1999; Lloyd, 1999; Schuring and Luijten, 2001).

Improvement teams, moreover, share several characteristics with quality circles: they are formed by a small group of workers who meet periodically to identify, analyse and propose alternative solutions to problems related to their area of work. These groups only have autonomy to propose ideas, which are then evaluated by a committee of managers who decide which ideas should be implemented. Normally the people in the group take charge of the implementation of the ideas. The meetings are usually scheduled in working hours and no direct rewards are offered for belonging to these

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groups. Nevertheless, the ideas are usually rewarded depending on their utility to the firm. These prizes are awarded to the group for it to decide how to distribute them or spend them (Barrick and Alexander, 1987; Buch and Spangler, 1990; Greenbaum *et al.*, 1988; Griffin, 1988; Kerrin and Oliver, 2002; Lawler, 1991; Li-Ping *et al.*, 1988; Rapp and Eklund, 2002; Sillince *et al.*, 1996). However, improvement teams differ in that the members may not participate voluntarily, but be chosen by the management, and they usually belong to different areas of work or levels of the hierarchy. This composition propitiates complementary points of view and the discussion of problems that affect different areas. Furthermore, they are not usually structures as stable as quality circles as regards their duration and the membership of the team (Garcia-Lorenzo and Prado Prado, 2003; Lawler *et al.*, 2001; Prado Prado, 1998).

The degree of success of the implantation of continuous improvement programs has been studied from very different perspectives. There exists a set of studies that analyse the success of the program in terms of the number of ideas generated or implemented and the number of workers involved. Our study will use similar indicators: Number of ideas per employee and year (Rapp and Eklund, 2002; Schuring and Luijten, 2001), degree of implementation of ideas: percentage of ideas implemented out of those received (Rapp and Eklund, 2002; Terziovski and Sohal, 2000; van Dijk and van den Ende, 2002), savings generated by the ideas implemented (in euros) (van Dijk and van den Ende, 2002)

With respect to the evolution of the performance of the improvement programs, there seems to be a consensus that the life cycle of these programs usually lasts between 24 and 48 months. In this cycle we can identify three phases: the initial introduction period, in which participation is limited to a few pilot experiments; diffusion of the experience in the firm; decline (some authors identify this as the “honeymoon effect”), generated by many factors including the resistance of middle managers, the failure of implementation of some of the ideas approved, few ideas proposed because it becomes more and more difficult to find points to improve, or increase in the cost of maintaining the program (Barrick and Alexander, 1987; Lawler, 1991; Sillince *et al.*, 1996; Stohl and Coombs, 1988). In some cases there is a fourth phase, the relaunching of the program (Rapp and Eklund, 2002)

### **Facilitators of the programs**

The list of factors that favour success is common to all the different programs of continuous improvement. One of the first aspects is the active involvement of workers making suggestions (Choi *et al.*, 1997; Fairbank and Williams, 2001; Greenbaum *et al.*, 1988; Sillince *et al.*, 1996) and the involvement of managers (Greenbaum *et al.*, 1988; Grütter *et al.*, 2002; Lloyd, 1999; Prado Prado, 1998; Rapp and Eklund, 2002; Schuring and Luijten, 2001; Sillince *et al.*, 1996; Terziovski and Sohal, 2000), for example in the committees of supervision of the suggestions. Another way to demonstrate the involvement of management is by designating a “continuous improvement leader” whose task it is to coordinate all the actions (Rapp and Eklund, 2002).

Another important aspect is that the firm commits itself by providing training for the participants in continuous improvement programs, showing them the techniques that they need to be able to solve the more complex problems and to keep up people’s interest in the program. It is also necessary for the program to be maintained for a sufficient time so that its results can be appreciated. In the case of group systems, the

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group should meet frequently (Bacdayan, 2001; Greenbaum *et al.*, 1988; Rapp and Eklund, 2002; Sillince *et al.*, 1996; Terziovski and Sohal, 2000; Wood, 2003).

It also helps to underline the importance of receiving a large number of suggestions, and that the proposals should focus on changes that are simple, cheap and easy to implement, as there is always time, money and personnel available to set small changes in motion (Bodek, 2002; Choi *et al.*, 1997; Schuring and Luijten, 2001; Wood, 2003). And it should not be forgotten that the degree of implementation of the suggestions made will affect the motivation to present future proposals (Bodek, 2002; Fairbank and Williams, 2001; Rapp and Eklund, 2002).

The process of evaluation of the ideas must be carried out in a short time, and the authors of the proposals must be kept informed (Fairbank and Williams, 2001; Rapp and Eklund, 2002; Schuring and Luijten, 2001; Wood, 2003). Likewise, the process of implementing the ideas must be rapid and the workers who propose the ideas should participate in it, so it is recommendable that the suggestions for improvement should focus on their own area of work (Schuring and Luijten, 2001; Wood, 2003).

Economic incentives can provide motivation for participating in the program, especially if, as in some firms, good ideas are rewarded even if they are not implemented. Deciding the amount of the rewards is not easy (Kerrin and Oliver, 2002). It may be related to the benefits the idea brings to the firm, though the reward should not be directly proportional to the savings made, to avoid workers focussing on the search for one magnificent idea that will generate a big saving instead of presenting a large quantity of ideas, which is what keeps the system alive (Bodek, 2002; Lloyd, 1999; Schuring and Luijten, 2001). Some firms consider that if the suggestion has been devised in working hours, those hours are already paid by the firm and therefore no additional remuneration should be added. This is the reason why some firms reward only individual suggestions and not those made by groups that meet during working hours (Kerrin and Oliver, 2002).

### **Description of the firm**

The firm FOODSA[1], is dedicated to the preparation and commercialisation of pork and turkey meat products. The firm is Spanish, mature, of small size (though close to medium size), family-owned, and its production philosophy is mass production. It is situated among the largest 10 per cent of firms and with best financial results in its industry and has received the recognition of several public institutions. Currently, the firm is run by the third generation of the family. The products are manufactured against inventory. For this purpose the firm takes into account the historical data, the forecasts of sales for the last month, and the trend of sales of the products. As these are perishable products, the safety stock has to be monitored so that it does not exceed twelve days. It is reviewed every week depending on what has been manufactured and updated periodically. The number of items is close to 200, grouped into three families: cooked products, cured products and fresh products.

The data we present in this article were gathered by means of participatory observation over the course of 18 months spent in the firm attending the meetings of the improvement teams. The data of the study are taken from the firm's archives; from the notes taken at the meetings of the teams and during the evaluation of the proposals; from interviews with the managers and with the firm's continuous improvement leader; and from informal conversations with the members of the improvement teams.

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### **The firm's program of continuous improvement**

The program of continuous improvement in FOODSA began in January 2000, at the initiative of the management, and this initial program laid the basis for the current program of continuous improvement. The proposals must focus on improvements that do not touch on Union matters (wages, categories, working time, collective bargaining ...) or those that are the direct responsibility of the firm's management (public relations, advertising, rights and obligations of the firm ...). Nor can they propose studies or procedures that are already in progress in the firm's areas of activity, nor suggestions that involve changes in sources of supply.

At the beginning the suggestions were placed in a box that was within sight of everybody, and they were collected every week. This method did not encourage the employees to participate. Currently, improvements can be proposed either by individual employees or by groups of employees. The managers and technicians of the firm are excluded from the suggestions system or the improvement teams rewards.

#### *The experience of the suggestions system*

To present an idea or suggestion, a standardised form must be filled in. The presentation of suggestions may vary slightly in format so that the idea is clearly defined, but must reflect the basic requirements for presentation: the name of the author or authors, the date of the proposal, the problem or potential improvement detected, the type of solution proposed (improvement in quality, improvement of productive process, improvement of administrative process, logistical), the solution proposed, diagram of the solution, if necessary, and signature of the authors.

Once the form has been completed, it should be handed in to the department of human resources, which, depending on the purpose of the idea, will send it to the corresponding department for study. The department in question evaluates in the shortest time possible its viability, effectiveness, cost, improvements introduced, savings made, disadvantages ... and makes a report on the proposal. The evaluation report is sent to the department of human resources which transmits it to the person or group who has formulated the proposal. On many occasions, the ideas remained stagnated in the departments, and the evaluation did not take place or was not rigorous. For this reason in 2004 the procedure was changed, and the proposals were assessed by a person tasked with energising the system of continuous improvement.

If proposals are presented that are not viable at the time of their evaluation, but could be within a year of their presentation, the proposal is left in abeyance until the appropriate conditions for setting it in motion occurred. The ideas implemented are published in the firm's monthly information sheet.

The ideas approved receive an economic gratification which depends on the saving calculated in the report on the proposal. Ideas that save less than 3,000€/year are awarded a prize of 6 per cent of the saving, with a limit of 150€. If the saving is between 3,000 and 30,000€/year they receive 5 per cent, i.e. a gratification of between 150€ and 1,200€. Savings between 30,000 and 60,000 €/year receive 4 per cent (1,200€ to 2,100€). Savings greater than 60,000€/year receive 3.5 per cent, with a limit of 6,000€ on the prize.

Furthermore, in the event that an idea does not produce a saving because its implementation requires an investment greater than the profits generated, but the management of the firm considers it appropriate to implement it for some reason

(safety, tidiness, cleanliness, etc.) the authors of the idea are awarded a symbolic gratification of 60€.

The authors of ideas that are not considered suitable (for technical or economic reasons) enter into a draw for a parcel of products. The purpose of this draw is to thank the people in the firm for their effort and their contribution to continuous improvement.

The intellectual property of the ideas implemented and rewarded passes to the firm FOODSA.

*Results of the suggestions system.* In Table I we show the principal indicators of the results of the system. In it we can appreciate that the number of ideas presented is very variable. During 2002 the number of proposals, and the degree of implementation, declined. During 2003 an effort was made by the production managers to enhance the suggestions system. The result was a spectacular increase in the number of proposals presented, though many of them were not accepted. During 2004 the commitment of the management to the continuous improvement program increased and a manager was hired full time to act as “continuous improvement leader”. This manager was hired because the accumulation of unassessed proposals was on the point of causing the death of the suggestions program. As well as systematising the calculation of the savings and the evaluation of the ideas, the continuous improvement leader was tasked with launching a pilot experiment with two improvement teams that ran parallel to the suggestions system and which we will detail in the next section.

We consider it worth noting that in the year 2005 the presentation of suggestions returned to the levels of 2001, but the rate of acceptance of the proposals is very high (78 per cent) allowing an annual saving similar to that of the previous year.

Until 2004, in the suggestions system there was no monitoring of the savings achieved by the system. The calculation and subsequent divulging of the savings produced by the suggestions system in 2004 generated in the workers a change of attitude towards the suggestions program. The workers perceive that the ideas that they put forward are not forgotten about. They also feel involved in the changes and decisions that affect the firm, and feel satisfaction as a result.

Problems have appeared when attempting to quantify the savings from proposals relating to cleanliness, tidiness, ergonomics, etc. To solve them it is proposed to give a symbolic prize (between 12 and 30€) for these proposals. The amount will be determined by the human resources department in view of the creativity of the proposal.

	2001	2002	2003	2004*	2005**
No. workers***	193	170	172	165	179
No. proposals	105	76	325	148	94
Proposals/worker/year	0.54	0.45	1.89	0.90	0.52
% proposals implemented	57%	49%	39%	59%	77%
Savings (€/year)	n.a.	n.a.	n.a.	51.200€	51.600€

**Notes:** \*During this year the suggestions system coexisted with the pilot experiment in improvement teams (the ten workers participating in the pilot experiment have been subtracted from the number of workers); \*\*extrapolating the available data (months from January to May); \*\*\*approximately 50% of the workers have a permanent contract

**Table I.**  
Result of the suggestions system

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Although the managers consider that the suggestions system is producing good results, some undesired effects occur. For example, sometimes the repair of a breakdown is presented as a proposal in the suggestions system. Some proposals lacking in any effort or creativity, whose only aim is to allow the worker to participate in the end-of-year raffle, have also been detected.

#### *PILOT experiment with improvement teams*

In mid-2004 two improvement teams were created. The subjects on which they were to work were: improving the quality of the product, reducing the percentage of wastage, saving time in changes of item and in cleaning, saving machine cycle time, standardisation of operations, increasing productivity or ergonomics.

These teams were formed by coordinators of small groups of workers, i.e. skilled workers. The team members received 20 hours of specific training in the characteristics of improvement groups and their objectives, and the tools for continuous improvement.

Each of the two groups consisted of five people from different areas of the firm (reception of goods, de-moulding, packing, slicing, cooked products, installations, maintenance ...). This enabled them to share complementary knowledge and points of view, understand better the work carried out in other sections, and learn from the experiences of the rest.

The meetings were also attended by the firm's General Manager, to the extent that his schedule permitted, and by the continuous improvement leader, who acted as coordinator of the meetings (convening and moderating the meetings, making written note of agreements ...). The continuous improvement leader participated in the analysis of the viability of the proposals and, together with the firm's managers, selected which ones would be implemented. The meetings took place every two weeks, within working hours, and normally lasted 30 minutes.

At the initial meeting a calendar and timetable for meetings was established. The next meetings were dedicated to completing the steps necessary for filling in the proposals: identification of the areas that needed improvements; analysis of the processes; generation of different alternative solutions; analysis of the costs, advantages and disadvantages of the alternatives (as far as possible each of these aspects was quantified to help in decision making); documenting how the improvements could be put into practice; consulting on their viability with the managers of the sections or departments involved, and summarising all this information on a proposal form.

If the proposal was accepted by the management, it was implemented and monitored for a prudent period to see whether it was as effective as hoped, acting in consequence. At the end of the year, both teams made a presentation of the advances achieved, at a meeting attended by the managers of the firm and a delegation from the board of directors.

Part of the annual savings from each suggestion implemented are devoted to rewarding the members of the improvement team that proposed it. Proposals that generate savings of less than 6,000€/year receive a "gift from the firm" (to be determined on each occasion). If the proposal saves between 6,000 and 15,000€/year, 3 per cent of the amount is awarded to the group as a prize. If the savings exceed 15,000€/year the reward is 6 per cent (with a limit of 6,000 euros).

*Results of the improvement teams.* Each group convened nine meetings, with an overall attendance of 80 per cent of members. 28 proposals were presented, of which 23 were implemented. Following a trial period, it was confirmed that the proposals implemented would bring a saving of more than 105,000€/year. In addition to this some proposals were generated that required heavy investment and were postponed for lack of resources, so they have not been included as proposals implemented. One proposal alone generated savings of more than 15,000€/year, and 17 of the ideas implemented generated savings of less than 6,000€/year each (altogether 39 per cent of the savings). The total amount awarded in prizes, not counting “gifts from the firm”, was 2,500€ (2.3 per cent of the savings).

Despite the satisfaction with the teams’ results, in these months of the pilot experiment some deficiencies have been observed in the system.

For example, there are differences between the gratifications awarded for the suggestions system and for the improvement teams. The teams program attempts to incentivise the generation of highly profitable proposals (saving over 15,000€/year), to the detriment of modest savings (less than 6,000€/year). Problems also arose with the payment of the rewards. These are paid at the end of the pilot experiment, not like those of the suggestions scheme which are paid once the idea has been approved. The reward for the effort is thus collected 8 months after having begun to propose and implement ideas, and loses a large part of its motivating capacity.

Most of the problems and opportunities for improvement were identified by the managers of the firm. The members of the group have not yet fully acquired the capacity to detect the problems or opportunities independently.

The general manager attended the first meetings and the workers perceived the interest of the top management. This produced motivation. However, as time passed, the managers cease to attend and the workers, observing this, come to think that what they say is of no importance and will not be taken into account, with the consequent de-motivation.

However, the presence of the general manager at meetings has not always been positive. At the meetings where he was present, “conservative” behaviour was observed on the part of the workers, with less flow of innovative ideas. Nevertheless, this problem decreased in importance as the workers became accustomed to the manager’s presence.

A lack of communication and coordination between departments also appeared, especially with the department of Research and Development (R&D). In some cases tests of products were duplicated, wasting time and effort, and information that could have been very useful both for the improvement teams and for R&D was not used.

Furthermore, as not much information was made available about the launching of the pilot experiment, some middle managers or supervisors came to think that their functions were being interfered with. Also they considered that any extra activity relating to these teams, for example seeking information in the files, testing a product or collaborating in the implementation of a proposal, was a hindrance to carrying out their “real” work.

Lastly, another problem was that in some departments the authority of the continuous improvement leader was not recognised or his work was considered to be transitory, despite being backed by the firm’s general management, to whom he was

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directly responsible. This caused delays in handing over information available in the archives, which had to be obtained through other channels.

### Conclusions

After a shaky start, an acceptable participation was achieved in terms of number of proposals presented (a number of which were put into practice). In the second year of its existence the “honeymoon effect” appeared (Lawler, 1991), but instead of the program disappearing, it entered into a re-launch phase (Rapp and Eklund, 2002) which has to be encouraged each year: by speeches from managers; by making the economic valuation of the proposals known to workers; by creating new systems like improvement teams and, probably, extending training in tools of continuous improvement (Bacdayan, 2001; Greenbaum *et al.*, 1988; Rapp and Eklund, 2002; Sillince *et al.*, 1996; Terziowski and Sohal, 2000; Wood, 2003). In this sense, the extrapolated data of 2005 seem to indicate an approaching danger of a fresh stagnation for lack of proposals (Bodek, 2002; Lloyd, 1999; Schuring and Luijten, 2001). Although the ones presented are very good, nearly all are implemented and they achieve savings similar to the previous year.

The number of proposals from the improvement teams, the degree of acceptance and the savings generated are strikingly higher than the results of the suggestions system, particularly considering that only 10 workers have participated in the improvement teams and they have been functioning for only six months.

However, we must take into account some factors that differentiate between the two implementations. On the one hand, the maintenance of the suggestions system costs the firm hardly anything, except for a few hours of the managers of the departments evaluating the proposals. However, the maintenance of the improvement teams incurs overheads: the continuous improvement leader’s salary, the proportion of managers’ and workers’ remuneration corresponding to the hours devoted to meetings, and training expenses (Griffin, 1988).

Also, the excellent results of the improvement teams were achieved thanks to the participation and guidance of the managers and technicians who collaborated in the identification of proposals or the generation of alternatives. And, if that were not sufficient, the improvement teams were formed from the workers who had received the highest performance scores the previous year and who acted as coordinators of their co-workers, i.e. the workers who were best prepared and had most experience.

This is not to detract from the merit of the results achieved by the teams, but to highlight that extending the improvement teams program to more workers would not generate results proportional to the current ones: the costs of maintenance would rocket, the managers would not be able to be involved as they have been in the pilot experiment, the workers would not be so capable or motivated as the ten selected for the pilot experiment, the program would no longer be a novelty (honeymoon effect) and at some point they would run out of problems to solve.

Altogether, though it is true that the improvement teams give better results than the individual suggestions systems (Rapp and Eklund, 2002), it is probably not recommendable to start directly with improvement teams, but for this to be the natural evolution to keep alive a system of continuous improvement that starts with suggestions systems (less costly to maintain and easier to implement) (Lawler, 1991).

In Table II we summarise the principal differences in the functioning of the two programs. We highlight the fact that the improvement teams made a summary presentation of the achievements of the pilot experiment to the management of the firm and interacted with managers in the fortnightly meetings. Forming part of the improvement teams, therefore, as well as the personal satisfaction of recognition by the firm's top management and the other employees, could serve as a platform for workers' promotion. This increased the internal motivation for participating and doing it well, which is one of the main requisites for the success of the system (Choi *et al.*, 1997; Fairbank and Williams, 2001; Greenbaum *et al.*, 1988; Sillince *et al.*, 1996).

Variable	Suggestions system	Improvement teams
Degree of formalisation	Consolidated. Five years in operation	Pilot experiment
Participants	All workers in the firm. Voluntary. Individually or as group	"Voluntary" by invitation. Only two groups. Ten participants. Selected employees
Training offered	None	20 hours on group problem solving
Awareness	Program well-known	Hardly known by non-participants
Rewards	Financial. Proportional to the savings generated. Paid after acceptance of the proposal. Rewards for simple ideas that are easy to implement. Symbolic consolation prizes.	Financial for savings over 6,000€. Paid at the end of the pilot experiment. Rewards ideas that generate big savings.
Involvement of management	Not visible	Continuous improvement leader. Attendance of managers at meetings to help identify themes and value proposals
Presentation of proposals	Simple form. Presented in human resources department	Simple form (more complete than for suggestions) filled in from data in the minutes of meetings. The proposal is presented by the continuous improvement leader to the management of the firm
Economic valuation of savings (quantification of proposals)	External committee. Managers of different departments. No uniform criteria. Take a long time to evaluate	Coordinator of continuous improvement system. Valuation of proposals in a short time (one or two weeks). Public criteria
Acceptance/rejection of proposals	Management of the firm	Management of the firm
Implementation of ideas	Immediately after approval. The authors of the proposal sometimes participate	Immediately after approval. Team members nearly always participate
Managers' impressions of the success of the program	Satisfactory. Costs little or no money and generates savings. It is necessary to innovate the system to encourage participation	Very satisfactory. The savings are much greater than the investment in maintaining the program. Managers are thinking how to extend it and make it compatible with the suggestions system

**Table II.**  
Comparison of the two systems

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The system of rewards in the teams was a cause of problems. On the one hand they are harder to obtain as the reward does not depend on the estimated savings, but on the verification of the savings following a trial period. Also the percentages awarded for proposals with small savings (the most numerous) are less than in the suggestions system, and finally, it takes quite a long time to reap the financial reward. These problems are similar to those commented on by Kerrin and Oliver (2002).

Another difficulty was that, although mention was made of the improvement teams in the quarterly internal news bulletin, the workers and middle managers of the factory were not aware of the creation of the teams nor of their attributions. Nevertheless, as the months passed, the information was disseminated, either by word of mouth among their co-workers or by the continuous improvement leader.

In the course of this paper we have seen that there is no magic formula for the correct operation of the system of continuous improvement, but that the existing system has to be continually improved, correcting faults and trying always to contribute something new to re-launch the system every so often. In this sense, our data show a real experience of how a scheme of continuous improvement has been gradually transformed, from a very unsuccessful start, passing through different phases and finally delivering results for the firm.

This study has also permitted us to highlight the importance of continuous improvement in the firm from both the economic point of view and that of worker development. We have been able to observe the important role played by the workers in this type of programs and how gradual progress can be made in making all the firm's personnel (managers and workers) aware of the need for continuous improvement as an essential tool of competitiveness, i.e. to inculcate, in some way, the entrepreneurial culture necessary to carry it out, help it flow and encourage the correct functioning of suggestion systems and improvement teams.

#### Note

1. The name is fictitious, to guarantee anonymity

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### Further reading

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