Independent Journal of Management & Production
E-ISSN: 2236-269X
ijmp@ijmp.jor.br
Instituto Federal de Educação, Ciência e Tecnologia de São Paulo
Brasil

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Independent Journal of Management & Production, vol. 4, núm. 2, julio-septiembre, 2013, pp. 391-415
Instituto Federal de Educação, Ciência e Tecnologia de São Paulo
Avaré, Brasil

INDEPENDENT JOURNAL OF MANAGEMENT & PRODUCTION (IJM&P)
http://www.ijmp.jor.br v. 4, n. 2, July – September 2013.
ISSN: 2236-269X
DOI: 10.14807/ijmp.v4i2.76

KEY FACTORS FOR A CONTINUOUS IMPROVEMENT PROCESS

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Submission: 27/04/2013
Revisions: 09/06/2013
Accept: 24/06/2013

ABSTRACT

The goal of this work was to examine the content of continuous improvement processes, taking into account its inclusion in modern organizations´ strategies. Continuous improvement plays an important role in ISO 9000 norms and excellence models.

This paper argues that several specific issues must be taken into account in order to reach successful outcomes.

This work starts with a literature review on the matter. On this basis we designed a survey of a group of 30 large companies, selected according to their billing, its market share, its membership to quality institutions and the existence of a certified management system.

Finally, we compared the development of continuous improvement process in companies with very effective results and with scarce results. Differences that emerged from this comparison enabled us to identify critical factors for achieving a successful improvement process.

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As there are no recent researches on continuous improvement programs in Argentina, this paper contributes to recognizing and systematizing what has been done, comparing it with theoretical framework and uncovering research gaps for future studies. However, further research must confirm these findings and move forward on the analysis of intangible factors, like: internal communications, climate, culture, self reflexion, consensus, etc.

Keywords: Continuous improvement; key factors; management; team work

1. INTRODUCTION

In the approach proposed by Imai (1986), the kaizen or continuous improvement implies a shift in the Taylorist paradigm of labor division. That means, to generate a dual function of work, shared between routine and improvement. That is, everyone in the organization will use a portion of their time to solve problems or develop opportunities for improvement. This will be made applying their experience through a scientific method of diagnosis. This idea is so simple to understand but complex to implement in daily practice.

Some surveys confirm this perception. A study of U.S. firms showed that while 70% of the plants had implemented techniques "Lean manufacturing", 74% of them were dissatisfied with the results achieved (PAY, quoted in ANAND; WARD; TATIKONDA; SHILLING, 2009).

Another study showed that only 11% of companies considered their continuous improvement initiatives had been successful (MENDELBAUM, quoted in ANAND et al., 2009).

Multiple studies have analyzed the continuous improvement processes in companies and organizations of different types. Using a simplified classification, the main approaches are: the analysis of core competencies, barriers and facilitators (MESQUITA; ALLIPRANDINI, 2003; MARIN GARCIA; PARDO DEL VAL; BONAVIA MARTIN, 2008; ALBORS GARRIGOS; HERVAS OLIVER; SEGARRA OÑA, 2009; GARCIA SABATER; MARIN GARCIA, 2009), models (BESSANT; CAFFYN; GALLAGER, 2001; WU; CHEN, 2006), knowledge and learning process (BUCKLER, 1996; MURRAY; CHAPMAN, 2003; DAVISON; GORDON; ROBINSON, 2005; SAVOLAINEN; HAIKONEN, 2007; JABROUNI; KAMSU-FOGUEN; GENESTE; VAYSSE, 2011), quantitative studies of programs in different sectors and countries

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DOI: 10.14807/ijmp.v4i2.76

(TERSIOVSKI; SOHAL, 2000; SCOTT; WILCOCK; KANETKAR, 2009) the relationship of continuous improvement with change management and TQM (CHOI, 1995; JUNG; WANG, 2006), and history and evolution of continuous improvement (BHUIYAN; BAGHEL, 2005; SUÁREZ-BARRAZA; DÁVILA, 2009).

While all of these work together with others not mentioned here, have made important contributions to the understanding of continuous improvement processes, it is still difficult to explain why the teachings of Deming, Juran, Ishikawa and other great teachers have not yet been able to be fully implemented in many organizations? And why it is so difficult to copy the successful systems (for example, the Toyota Production System)? when the concepts they applied are simple and easy to understand.

The objective of this work is to answer questions previously expressed. To do so, from the theory, we analyze the reality of continuous improvement processes in large organizations.

2. THEORETICAL FRAMEWORK

A review of the literature enabled us to determine the main factors to consider for the successful implementation of a continuous improvement process.

Table 1: Key Components of a Continuous Improvement Process.

Key Components Assessed	Foundations
I. Formalization & Structure	**(ANAND et al., 2009; CHOO et al., 2007; FORMENTO et al., 2007; GRUTTER et al., 2002; TERZIOVSKI et al., 2000; WRUCK ; JENSEN, 1998)**
II. Continuity / Duration	**(RAPP; EKLUND, 2002; SILLINCE et al., 1996; TERZIOVSKI et al., 2000)**
III. Deployment / Scope of Program	**(CHOO et al., 2007; WRUCK et al., 1998)**
IV. Training	**(BACDAYAN, 2001; RAPP et al., 2002; TERZIOVSKI et al., 2000; WOOD, 2003)**
V. Management Commitment	**(ATTARAN, 2003; BASHEIN et al., 1994; BATEMAN; RICH, 2003; JORGENSEN et al., 2003; TERZIOVSKI et al., 2003)**
VI. Program Coordination	**(GRUTTER et al., 2002; RAP et al., 2002; SCHURING ; LUIJTEN, 2001; TERZIOVSKI et al., 2000)**
VII. Methodology & Tools	**(BATEMAN, 2005; FORMENTO et al., 2007; FORRESTER, 2000; GARVIN, 1993; HANDEL ; GITTLEMAN, 2004; PIL; MACDUFFIE, 1996; SPEAR; BOWEN, 1999; TERZIOVSKI et al., 2000)**
VIII. Performance Measurement	**(BESSANT; FRANCIS, 1999; DAS et al., 2000; DENNIS et al., 2003; EVANS; LINDSAY, 2008; FOSTER, 2004; HAMMER; STANTON, 1999)**
IX. Communication of Results, Recognition & Incentives	**(BUCH; SPANGLER, 1990; FAIRBANK; WILLIAMS, 2001; KERRIN; OLIVER, 2002; RAPP et al., 2002; LAWLER III, 1991; SILLINCE et al., 1996;)**

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The following table summarizes references from previous works that support the key components evaluated in our investigation.

I. Formalization & Structure

In the absence of a formalized program, continuous improvement efforts are intermittent and depend on personal attitudes and circumstantial pressures. Formalization generates the field needed to create the support structure and establish the routines mentioned by Bessant et al. (2001) in their five evolutionary stages of process improvement. Without formalization and structure, it is impossible to move beyond the first level of evolution.

II. Continuity / Duration

A continuous improvement process—as the name implies—has no end to it. In contrast, improvement routines are expected to be integrated into the organization's daily activities and used to generate results in line with the firm's strategic objectives.

The most prominent examples—such as the Toyota Production System—are stable and facilitate the spread of practices through the company (GARCÍA-SABATER et al., 2009).

The inability to maintain continuity creates a very negative impact on employees and has a limited duration (between one and four years) after going through three phases: introduction, spread, and decline. The reasons for this are diverse, but are generally related to static programs with no capacity for development (LAWLER III, 1991; SILLINCE et al., 1996). Sometimes there is a fourth phase in which the improvement effort is relaunched (RAPP et al., 2002). Regarding this same idea, Wu et al. (2006) argue that all activities (including improvements) have a life cycle which moves through introduction, growth, maturity, and decline. If a regenerative impulse is not achieved at the appropriate time, the program declines.

III. Deployment / Scope of Program

If continuous improvement is inadequately deployed and poorly coordinated, the process becomes less effective, even after achieving some initial results (CHOO et al., 2007; WRUCK et al., 1998).

Continuity is important, but another critical factor is the way processes are deployed in order for improvement routines to reach all levels of the organization. The systemic approach (DEMING, 1993) requires that different processes are viewed

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as part of a global system where the final result depends on the quality of the interactions between them. In this sense, it is unthinkable for continuous improvement to work without the integration of all sectors and processes.

IV. Training

Modifying the classic structure of problem-solving using trial and error—based on individual experience—to the scientific method—using teams—requires specific training in methodologies and tools for analysis.

In addition to the need of large-scale training, it is reasonable to start with upper management and focus on the agents of change, which will generate a big impact on the process (SPEAR et al., 1999; SPEAR, 2004). Several studies highlight the importance of implementing training in basic tools and of moving toward new tools as soon as more complex problems make them necessary (BACDAYAN, 2001; RAPP et al., 2002; TERZIOVSKI et al., 2000; WOOD, 2003).

V. Management Commitment

Management commitment is needed so that participation and teamwork become part of the organizational culture (ATTARAN, 2003; BASHEIN; MARKUS; RILEY, 1994; JORGENSEN; BOER; GERTSEN, 2003; TERZIOVSKI; FITZPATRICK; O'NEILL, 2003).

It is not possible to develop a continuous improvement program without a strong commitment from top and senior management. Directors must agree to commit the required resources; align activities with strategic objectives; establish systems, procedures, and policies; and, most importantly, generate a culture of continuous improvement (GARCÍA-SABATER et al., 2009).

VI. Program Coordination

The promotion of continuous improvement within the organizational routine requires actors which facilitate this within day-to-day activities. This role goes beyond specific team leaders and refers to the figure of one or more internal coordinators who support activities, facilitating access to resources and to providing methodological advice to team members (GARCÍA-SABATER et al., 2009).

VII. Methodology & Tools

The existence of a common scientific method is vital, and should include a predetermined routine of steps for the development of improvement projects

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(FORRESTER, 2000; GARVIN, 1993; SPEAR et al., 1999). A formalized methodology enables a common working basis on which to developing changes (BATEMAN, 2005).

This systematic analysis process replaces the traditional trial-and-error approach to problem-solving.

A previous study of Australian firms by Terziovski et al. (2000) shows that these companies still prefer the seven basic tools over more advanced ones such as Failure Mode and Effect Analysis (FMEA) and Quality Function Deployment (QFD).

Another study conducted in Argentina demonstrates the ongoing use of the PDCA cycle and methods derived from it in a high percentage of improvement projects. The Six Sigma methodology is an alternative, using DMAIC cycle, and currently applied in lower percentage of cases. Both methods apply the 7 basic tools, which remain the most widely used (FORMENTO, 2008).

VIII. Performance Measurement

The development of continuous improvement capacities requires a process of monitoring and measuring results against the strategic objectives of the firm (BESSANT; FRANCIS, 1999).

Continuous improvement is based on continuous assessment techniques applied to systems, processes, and key results (DAS; HANDFIELD; CALANTONE; GHOSH, 2000; DENNIS; CARTE; KELLY, 2003; EVANS et al., 2008; FOSTER, 2004; HAMMER et al., 1999).

IX. Communication of Results, Recognition, and Incentives

The experiences feedback within a continuous improvement program allows the building, analyzing, and facilitating of the exchange of knowledge between experts in problems solving (JABROUNI; KAMSU-FOGUEM; GENESTE; VAYSSE, 2011). When teams show their results for internal events, the knowledge they have developed is deployed beyond their own team members and applied to the whole organization. Additionally, in cases of external events, showing the successful results of a project operates as a motivational factor.

Significant contributions—measured in terms of their impact on results—are usually rewarded. These recognition programs can take different forms but always

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attempt to reinforce and spread positive attitudes (BUCH et al., 1990; KERRIN et al., 2002; LAWLER III, 1991; RAPP et al., 2002; SILLINCE et al., 1996;).

3. METHODOLOGY

A qualitative and exploratory research design was undertaken in order to determine prominent components of key factors who explain the success of a continuous improvement program.

We analyzed, through an in-depth survey, a group of 30 large companies pertaining to the following activities: oil (5), foodstuffs (8), steel (5), automotive (4), chemicals (4) and services (4).

Companies considered for this study were chosen based on the following criteria:

- Large companies (more than $ 25 million in annual sales).
- Leaders in their markets (considering their market share).
- Members of SAMECO (Argentine Society for Continuous Improvement) or FUNDECE (Business Foundation for Quality and Excellence).
- With a certified management system (ISO 9001, ISO 14001 or other specific norms of the activity.

The survey form was designed based on the theoretical framework for the project, which was made up of the classical literature on continuous improvement, placing emphasis on the key components described above.

The resulting survey included 67 questions, 20 of which were multiple choice. The survey was sent by e-mail to the continuous improvement coordinator of 52 companies. After telephone follow-up, response was obtained in 30 firms.

The rating of the results obtained, by the continuous improvement process, in each company was taken from the vision of the coordinator. The options were: very effective results, effective results, scarce results and ineffective results.

Survey results were processed statistically and stratified to display trends. The comments in open questions were discussed qualitatively to find signs of significant differences.

Finally we compared the answers and comments in companies with very effective results, by one side, with companies with scarce and ineffective results, by

ISSN: 2236-269X
DOI: 10.14807/ijmp.v4i2.76

the other side. Differences that emerged from this comparison enabled us to identify prominent components, inside the key factors, that seem to be critical, for achieving successful continuous improvement processes.

4. OBSERVED RESULTS

4.1 Sample Profile

Firms for this study correspond to the group called large companies, according to their billing levels and market share. Previous investigations in Argentina (FORMENTO; BRAIDOT; PITTALIGA, 2007), shows that companies of this size were the first to implement continuous improvement. Making a survey of the presentations made at the annual conference SAMECO (Argentina Society for Continuous Improvement), over 15 years, it appears that continuous improvement processes of these companies are among the most advanced in Argentina. The latter aspect is especially important to this study as it allows us to determine trends in the field.

Another feature of this group is that all companies have a certified management system. In addition, 18 companies have two or more certified standards, and 14 companies have an integrated management system.

Additionally, eight of these companies have won quality awards, including a National Quality Award of Argentina, the Iberoamerican Quality Award, the prize TPM in Japan, and the International Team Excellence Award of the American Society for Quality. These data confirm the level of the sample in terms of formal achievements in the field of quality systems, both locally and internationally.

4.2 Findings on Key Factors

I. Formalization & Structure

At first glance, it would appear that there are few doubts, among firms, regarding the need for the existence of continuous improvement, given that 28 companies of the sample said that they have a formalized program. This contrasts strongly with a previous study of Argentinian SMEs (FORMENTO; ALTUBE; BRAIDOT; NICOLINI, 2006), which showed that there are improvement teams within only 36% of companies in the automotive sector, 17% in the steel sector, and around 10% in other sectors.

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II. Continuity / Duration

The average age of the continuous improvement programs evaluated in this research is nine years. In 14 cases, programs were over 10 years old, and two firms had programs with more than 20 years.

This confirms that we are evaluating a set of pioneers in the field in Argentina. These kinds of programs first started to be developed in Argentina in the late 1980s.

Of all the companies that claim to have implemented a continuous improvement program, five of them said they had discontinued at some point. The same number of companies acknowledged that the continuous improvement program had not evolved within their organizations, which in principle could be considered a negative feature.

The main characteristics mentioned as evolving positively were: scope, results, number of projects, and people involved.

III. Deployment / Scope of the Program

The scope of the continuous improvement program in these companies shows logical and predictable results. In all cases with formal programs, the program reached the production areas. The rest of the areas reached by the program are, in order of importance: support areas, administrative areas, and commercial areas.

Table 2: Scope of the program (number of cases)

Areas	Number of cases
Production / Operations	28
Support	21
Administrative	15
Commercial / Business	12

An important issue is the number of firms that reached support and administrative areas with continuous improvement programs. This is a good sign in terms of deployment of the program through the organization. It seems that continuous improvement is advancing from operational areas towards non-operational ones.

IV. Training

As was expected for firms of this size, 27 companies reported having a continuous improvement training program for their staff.

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Sample analysis shows that in 18 firms, all staff is trained in continuous improvement.

Table 3: Recipients of continuous improvement´s training program

Recipients	Number of cases
All staff	18
Team members	8
Team leaders	3
Supervisors	4
Facilitators	3
Managers	3

Most companies (25 cases), apply internal training resources—that is, using their own staff to provide the training. Twelve of these companies combine this with external training. In contrast, very few companies (just two), work exclusively with external training.

The advantage and need for internal training had already been comprehensively stated by Shiba et al., (1995). Internal training gives strong signals of commitment mainly if managers participate.

All this seems to be in line with Ishikawa's famous phrase (1986) : "Quality begins with education and ends with education… to apply quality control we have to offer continuing education for everyone from the president to the workers". This sample suggests that things are moving in this direction.

V. Management Commitment

When we studied the level of involvement of firms' different hierarchical levels within quality management systems, we found that although the involvement rate of top management appears higher than the middle and operational levels, it was noteworthy that over 50% of managers did not have high involvement levels and that 17% had low involvement levels. This could explain the involvement rates at middle and operational levels, because managers' attitudes spread rapidly to the rest of the organization.

In this respect, interpreting the words of Meegan and Taylor (1997), we believe that "strong motivation" should mean "high involvement". This is not observed in table 4, where— in contrast—over 50% of staff shows middle or low involvement.

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Table 4: Management Involvement (number of cases)

Hierarchical Level	High	Medium	Low	No answer
Senior management	14	9	5	2
Middle management	14	12	2	2
Operators	9	15	4	2

VI. Program Coordination

These programs are not always coordinated by the same management area.

This highlights the emergence of special sectors that are specifically dedicated to tasks related to quality management and continuous improvement. These new organizational sectors, which differ from the classical structures, show the evolution of the importance assigned to these programs. High rated's human resources are allocated to manage and facilitate the quality system and continuous improvement program.

There is no uniform name for these areas, so each company uses their own term to refer to them. However, the important issue here is having a small and highly qualified group of human resources devoted entirely to managing improvement tasks.

According to data collected (27 answers), this positive outcome seems to be becoming a trend.

Table 5: Program Coordination.

Sector	Number of cases
Special areas	14
Quality	7
Production line	4
Other	2
Total	27

Some of the names identified for special areas are: Total Quality Management, Continuous Improvement, Technology Management, Operational Excellence, Six Sigma, etc.

We also analyzed the make-up of the group and the different roles used to coordinate continuous improvement projects.

In companies with formalized programs we found that, in 24 of them, there are different roles within teams.

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The vast majority of companies in the sample have assigned the roles of leader (23 cases), and facilitator (20 cases). It is understood that these two roles are key to promoting and managing teams that carry out projects and continuous improvement actions.

If we analyze companies which use different roles in teams, within their formalized programs, we find that there are no leaders just in one case and there are no facilitators just in four cases. In many cases, facilitators are part of special areas (see table 5), that coordinate the improvement program.

An equally interesting fact is that in 50% of cases, in which there are different roles, the figure of sponsor or mentor is used. These configurations tend to provide greater sustainability to the performance of continuous improvement teams. Experience indicates that in the absence of these roles, work can become more dependent on individual tenacity and less effective.

Other roles, such as secretary, have a very low presence in the team structures evaluated in this sample.

Table 6: Existence of different roles within teams.

Roles	Number of cases
Leader	23
Facilitator	20
Sponsor/mentor	12
Secretary	4
Others	6

We then analyzed the situation in more depth by exploring who is assigned to perform the different roles in improvement teams within the formal structure.

The Figure 1 shows the percentage of cases where top management, middle management, supervisors, employees, and the improvement committee take on the different roles.

We can conclude that internal facilitators and leaders are mostly middle managers and supervisors.

The team members are mainly employees, supervisors and middle managers.

As expected, approval of the action plans is in charge of senior and middle management and improvement committee.

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Finally, launching and closing projects lies mainly in the hands of senior management and middle management.

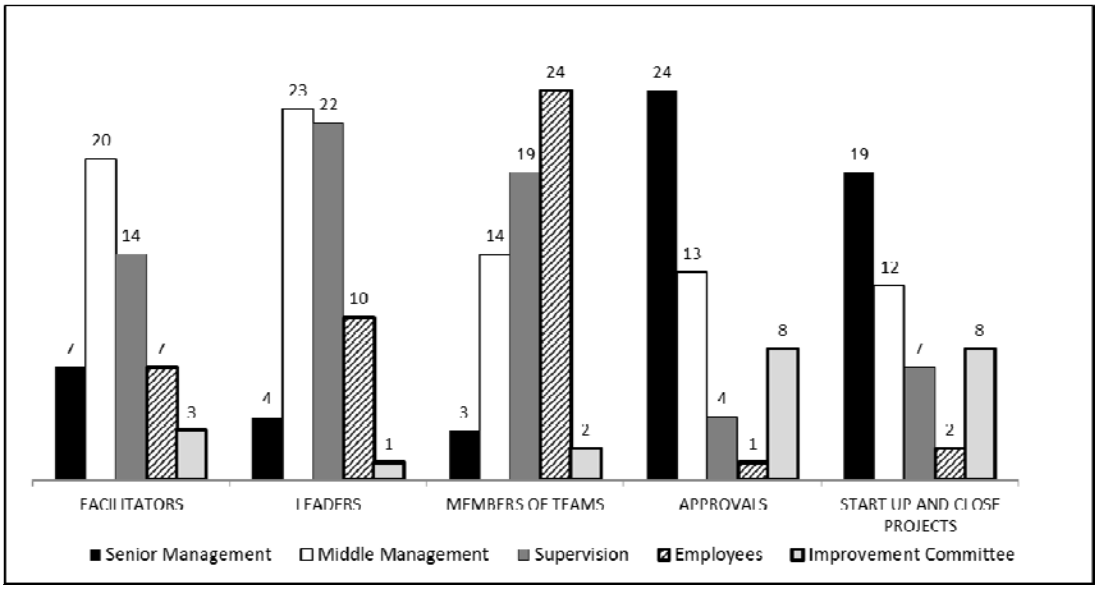

Figure 1.Roles played by different hierarchical levels (number of cases).

VII. Methodology & Tools

All the 28 cases with formalized programs stated that they use a methodology and tools for problem-solving.

It is not possible to identify in detail tools and methods applied, due to the vast number and the different ways that companies refer to them. Nevertheless, table 7 shows the methods and tools more mentioned by respondents when talking on methodology.

Table 7: Tools and methods used.

Name	Number of cases
7 Basic Tools	24
5S	17
Kaizen	13
7 New Tools	12
Benchmarking	12
FMEA	10
TPM	9
8 Steps Method	9
Six Sigma	7
SQC	5
QFD	3

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As we can observe most (80%) still use basic tools, followed by 5S, 7 new tools, benchmarking, and FMEA, and others that were mentioned less frequently. This result is consistent with previous research on the subject, which shows the same tendencies (FORMENTO, 2008). It seems evident, in this sense, that basic methods are very accessible, can be used by all employees after short training courses, and are appropriate for a high percentage of chronic problems in companies. New trends, such as Six Sigma, are observed in seven of the cases.

While the table shows methodologies being combined with tools and toolkits, we can conclude that basic tools continue to be massively used.

VIII. Performance Measurement

Improvement teams address a wide range of issues which has been classified into the following areas: Quality/Defects; Cost/Benefits; Standard deviations; Environment; Security; Change/Innovation; and Others.

Table 8: Issues addressed by continuous improvement projects.

Issues	Number of cases
Quality / defects	25
Costs /benefits	23
Deviation from the standard	23
Security	22
Changes / innovations	22
Environment	20
Others	9

It must be remembered that these rankings are tentative, since most improvement projects make an impact on several areas simultaneously.

When searching how these topics emerged as improvement projects, we found that the origins detected are very varied (these results are shown in table 9). Deviations from standards and managers' proposals stand out as the two largest groups. This seems to show a relationship between improvement programs and the company’s strategy, although this is not enough to assure it.

A second group emerges which consists of customer complaints and staff suggestions. Although customer complaints are very important, this group should never represent a majority because, were that the case, it would reveal great

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problems in dealing with customers and therefore indicates a company that works very “reactively” and is permanently in a risk zone.

The staff suggestions are a category, possibly of minor impact, but one that is nonetheless important to ensuring employee involvement and sense of pertaining.

Table 9: Project origins.

Origin	Number of cases
Deviation from standards	24
Managers’ proposals	23
Customer complaints	17
Staff suggestions	16
Surveys	9
Others	6

The impact of the implementation of continuous improvement program, in each company, is a critical data to understand which are the key factors in this process. As mentioned in methodology, we took this result from the internal coordinator´s point of view.

The following table shows that a relatively small number of companies consider their program to be “very effective”; just eight firms. Nevertheless, nobody consider the program as ineffective, but nine companies considered the results are scarce.

Table 10: Results of continuous improvement programs.

Result	Number of cases
Effective	13
Very effective	8
Scarce	9
Ineffective	0
Total	30

With respect to the information available for decision-making at high organizational levels, only 12 companies have expressed that they have statistics on improvement projects, both completed or in development.

On the other hand, in just 16 cases, costs of poor-quality have been calculated.

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Program statistics are essential to generating information that increases the body of knowledge and learning so that companies can make good decisions when they need it.

IX. Communication of Results, Recognition & Incentives

Our question about the existence of a recognition system elicited a positive result in 21 of the firms being investigated.

When asked about the recipients of this recognition, it appears that the trend is to include all participants and all team members. Only five organizations mentioned that they give recognition exclusively to operations personnel, and three applies it only to the best teams.

The type of recognition is mainly non-cash, and is based on entertainment, gifts, and internal and external events.

Some of the companies that reported not having a formal recognition program had, nonetheless developed other forms of recognition. As such, only 7 firms of the sample have no kind of recognition for the staff.

Table 11: Forms of Recognition.

Forms	Number of cases
Gifts	19
Internal events	14
External events	13
Dinners	10
Money	6

Several of the alternatives for recognition, shown in table 11, are used in combination.

Although only 14 companies mentioned internal events as a form of recognition, 18 firms, say there are presentations of improvement teams in such events. In 16 cases, senior management takes part of internal events. In contrast, only nine organizations included all staff and only three of them include people outside the company.

We would like to emphasize several aspects. One is that the need for recognition is generally accepted. On the other hand, the internal events, as a form of

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DOI: 10.14807/ijmp.v4i2.76

recognition, are only used in less than 50% of the sample, even in cases where managers' involvement is high.

Finally there is little external benchmarking, since less than 50% of sample participate in external events and people of other companies are only invited to internal team presentations in just three cases.

5. DISCUSSION OF FINDINGS

This section contains a comparative analysis of data.

We confront data from companies with very effective results with data from companies with scarce results. The group of companies that qualifies only as effective is not part of this comparison, to seek a better contrast between the extremes.

The above remark is based on an understanding that the label "effective" is a necessary but insufficient condition. In other words, if this type of initiative does not generate enthusiasm, it will have limited consistency and its permanence will be in doubt. It should be kept in mind that continuous improvement generates a permanent stress (in terms of resource commitment) with companies' daily routines.

Starting with the elements that seem to have no influence on the effectiveness of the continuous improvement process, table 12 shows the number of companies, out of the total in the group, who certify standards, apply to models of excellence and have training programs on continuous improvement.

Table 12: Number of companies in each category.

Formal aspects	**Process with very effective results 8 firms**	**Process with scarce results 9 firms**
ISO 9001 Certification	5	8
ISO 14001 Certification	6	5
Application of Excellence Models	5	4
Training program on continuous improvement	7	8

No relationship seems to have between ISO 9001 certification and the results of continuous improvement process. The group of companies that achieved very effective results (almost 27% of the sample) includes companies without ISO 9001 certification.

ISSN: 2236-269X
DOI: 10.14807/ijmp.v4i2.76

Likewise, there is no evidence that models of excellence and quality awards ensure an adequate continuous improvement process. When we analyze the seven cases, in the whole sample, that have won quality awards, it emerges that only three of them have continuous improvement programs very effective, two qualify just as merely effectives, one as scarce results, while the remaining do not have a formalized program.

Additionally, the existence of a continuous improvement´s training program does not seem to be an element that produce a difference on results.

From the above we conclude that the systems and strategies mentioned (certification and models), and the training programs are desirable but do not ensure a very effective continuous improvement process.

We now analyze the main components of the key factors to look for significant differences. Table 13 shows the deployment of the nine factors and the number of firms in each group that complies them.

Table 13: Differences in key factors.

Key Factors	**Prominent Components**	**Process with very effective results 8 firms**	**Process with scarce results 9 firms**
Formalization & Structure	Existence of formal program	8	7
	Existence of Continuous Improvement teams	8	5
Continuity / Duration	Never was discontinued	8	4
	It evolved over time	8	3
	Age of the program (average)	9,1 years	9,7 years
Deployment / Scope of the program	Projects also apply on support areas	8	4
	Percentage of employees involved (average)	53%	17%
Training	Training program on continuous improvement	7	8
	Training for all staff	4	7
Management Commitment	Managers identify topics for improvements	8	4
	Managers approve topics for improvement	8	6
	Managers open and close projects	8	3
	Senior management participate in internal events	7	3
Program Coordination	Middle managers facilitate teams	8	5
	Different roles to coordinate teams	8	4
Methodology & Tools	There are an official method for teamwork	8	4
	Interdisciplinary teams	8	5
	Use of basic tools	8	6
Performance Measurement	Measurement of avoided cost	8	2
	Measurement of participation	8	4
Communication of Results, Recognition & Incentives	Existence of recognition program	8	4
	Teams´ presentation in internal events	6	4

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ISSN: 2236-269X
DOI: 10.14807/ijmp.v4i2.76

The table shows another component that does not impact the difference in results: the duration of the process. This means that a continuous improvement program can exist for a long time and still have poor results.

Looking for components that can explain the differences we observed a number of items present in 100% of companies with very effective results. These items appear only in some of the companies with scarce results.

However, all components are present in some company of the second group. Therefore, a question that arises is: any of these companies meets all the key factors?.

The answer is in Table 14, which shows the nine cases of firms with scarce results. This table shows only the components that are present in 100% of companies with very effective results. As you can see, none of these companies meets all the components.

Table 14: Components in processes with scarce results.

Prominent Components	**Process with scarce results (Cases)**								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Existence of formal program	X	X	X	X	X			X	X
Existence of Continuous Improvement teams	X	X		X			X	X	
Never was discontinued	X	X	X	X					
It evolved over time	X	X	X						
Projects also apply on support areas		X	X		X			X	
Percentage of employees involved (average)	5%		2%	30%	30%				
Managers identify topics for improvements		X	X				X	X	
Managers approve topics for improvement	X	X	X		X		X	X	
Managers open and close projects		X	X				X		
Middle managers facilitate teams	X	X	X		X			X	
Different roles to coordinate teams	X	X	X		X				
There are an official method for teamwork	X	X			X		X		
Interdisciplinary teams	X	X		X	X			X	
Use of basic tools	X		X	X	X		X	X	
Measurement of avoided cost		X			X				
Measurement of participation	X		X	X	X				
Existence of recognition program	X	X			X			X	

The cases are diverse. For example: in case 1, which meets most of the components, the improvement projects do not reach support areas, the percentage of employee participation is low, managers are not involved in the selection of topics and in the opening and closing of projects and finally, they do not measure avoided cost.

The case 2, which seems to be the most comprehensive in this group, do not use basic tools - when statistics say they are the most effective and used in

http://www.ijmp.jor.br v. 4, n. 2, July – September 2013.
ISSN: 2236-269X
DOI: 10.14807/ijmp.v4i2.76

continuous improvement projects - and do not recorded or measured participation. The latter suggests that may be low.

Completely different from Case 2 is the case 6, where none of evaluated components are present. Interestingly, this company is certified ISO 9001, ISO 14001 and won the national quality award of Argentina.

In summary, all these cases have shortcomings with respect to very effective processes. Cases 3 and 4, do not have recognition program and a standardized method for teamwork, among other difficulties.

In case 5, we see: discontinuity, lack of evolution and poor managerial involvement.

Finally in cases 7 to 9, appear as common shortcomings lack of: continuity, evolution, measurements and roles in teams.

6. CONCLUSIONS

The observations above enable us to draw some preliminary conclusions, which must be confirmed or refuted in future research.

On the basis of the findings discussed in the previous sections, we can infer that approximately one in three large companies have a continuous improvement program with very effective results. This means that they have developed high standards and are thus benchmarks for other companies, even though they still need to develop further themselves.

It seems evident from previous comparison that the prominent components identified, into the nine key factors, make a difference in terms of the effectiveness of results. Table 14 shows the seventeen mentioned components.

Companies with continuous improvement processes very effective, in 100% of cases, meet all these components. In contrast, none of the companies with poor results meets all prominent components.

From Table 13 it appears that the most remarkable differences are observed in:

- Measurement (avoided cost and participation)
- Percentage of employees involved
- Management participation

ISSN: 2236-269X
DOI: 10.14807/ijmp.v4i2.76

- Recognition
- Projects applying to support areas
- Continuity
- Different roles in teams
- Standard method for teamwork

To summarize, we recommend establishing lines of work which take into account the nine key factors and, specially, the seventeen prominent components mentioned in the previous paragraph, since they seem to explain the difference between very effective and ineffective processes.

It is important to clarify that the presence of a key factor or a prominent component in a company that did not experience very effective results does not contradict our findings, since the key factors and their components operate together, as a system. Therefore the appearance of one of these factors alone does not guarantee results.

The latter may apply to training, which has not been demonstrated to be a differentiating factor. Training is a key factor (Table 13), of continuous improvement, but it is as a necessary but insufficient condition. In other words, most of the firms in the group with scarce results have a training program for continuous improvement, which is fine, but the process lacks other key components which prevent them from reaping the benefits of training.

While each organization must develop its own continuous improvement strategy, a working plan oriented to these findings may increase the success possibilities.

We understand this research contributes to the study of continuous improvement processes in Argentina and could be of interest to develop more effective strategies on the matter.

However, further research must confirm these findings and move forward on the analysis of intangible factors, like: internal communications, internal climate, culture, self reflexion, consensus, etc. Those factors could play an important role in building a highly effective continuous improvement program in conjunction with the ones here researched.

ISSN: 2236-269X
DOI: 10.14807/ijmp.v4i2.76

7. ACKNOWLEDGEMENT

The authors want to acknowledge the support provided by SAMECO (Argentine society for continuous improvement), opening the access to a great number of cases for study and the Industry Institute at the National University of General Sarmiento where we developed our work during the two years of research.

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