Continuous Improvement System: Team members´ perceptions

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Abstract. The complexity, competition and fast changing of the global market requires the companies to seek excellence, if they crave for good performance and success. To reach this purpose, it is mandatory the existence of a Continuous Improvement (CI) culture within the companies. This concept, also known as Kaizen, mean "change for the better" and it defends that a very large of small improvements applied and sustained over the time, brings more value than a few big improvements. The objective of this paper is to evaluate the effect of lean teamwork after a Continuous Improvement system had been implemented in Lipor, a Public Organization based in Oporto that treats the municipal waste. The CI system implemented a few years ago, was possible to maintain and adapt over the years through the creation of a Kaizen Team, Natural Teams, Project Teams and the cooperation between them, cultivating this Continuous Improvement culture in the company's core. The results of the survey done to the workers regarding the CI system demonstrated that the majority consider that their work process has improved significantly with Kaizen and highlighted the importance for them to be involved in improving team's processes.

Keywords. Continuous Improvement; Teamwork; Kaizen; Lean Production.

1 Introduction

Continuous improvement or pursuing of excellence is one of the five principles of the lean thinking [1], being the most important one in insuring future competitiveness of a company. If even successful companies do not work on improving continuously their processes and products, they would gradually loose market to their competitors and eventually close down. Continuous improvement is not a choice, it is an obligation to survive in the future. Continuous improvement (CI), to be effective should be part of daily work as any other operational task. It should be clear, to all employees in a company, that making small improvements everyday should be part of the daily routine tasks. This idea is very well presented by Rother (2010) where he presents his interpretation how Toyota achieves CI. Most managers may agree that CI is very important to

companies' future but few are willing to spend their human resources on such tasks. As Abraham Lincoln (president of the USA from 1861 to 1865) once said: "If I had six hours to chop down a tree, I'd spend the first four hours sharpening the axe". Continuous improvement can be viewed in a metaphoric way as "sharpening the axe". "Sharpening the axe" takes precious time to the cutting time so most managers are not willing to "waste" precious cutting time in "sharpening the axe" (Continuous Improvement). But "sharpening the axe" improves the future productivity in a way that the time spent in production can be more effective afterwards. In reality every small improvement brings permanent gains and that is precious for organizations. Every small improvement brings the organization to a new current state, with a better standard and better performance. A new small improvement will take advantage of small previous improvements. A big sequence of small improvements become a big improvement. Many improvements wouldn't be possible if a previous improvement was not implemented.

Continuous Improvement can be materialized in many different ways. Some companies assign a person or a team of people to continuously search and identify, through "Gemba Walks" for instance, improvement opportunities and implement improvement actions. A very common approach is by using Value Stream Mapping (VSM) to represent current state observed through Gemba Walk [3], then draw a VSM of the future desired state and take the necessary actions to go from current to future state [4]. More effective CI systems are the ones where everyone in the organization are involved in CI activities as for instance in the Toyota Kata approach [2]. There is not a standard amount of human resources that should be assigned to the Continuous Improvement effort but Koenigsaecker (2009) believes that it is critical to have full-time resources dedicated to CI, recommending that 3% of an organization should dedicate full-time to it. This may not be necessary true, since many companies tend to have everyone spending a bit of their working time dedicated to CI instead of having some people dedicated full-time to it. Teamwork seems to be crucial issue since a common feature in every CI system [6] and most CI systems known in literature use teams of workers as one of the layers of responsibility in CI. In each organization, value adding activities are performed by employees, and the human factor has an enormous importance in achieve a better performance. Their creativity and involvement are the fuel to improve the organization's business [7]. In fact, reports show that Teamwork, besides Employees Involvement and Training are the main critical success factors of Continuous Improvement Projects [8]. The main guideline to Lipor's strategy is "Towards Sustainability" – depicts a sustainable management, that combines the three main principles of sustainable development – Economic, Environmental and Social. Addressing the Economic principle, a Continuous Improvement model was implemented in the company a few years ago in the back office department [9]. Based on the good results obtained, the board directors decided to extend it through all organization. This CI system suffered some small changes along the time and nowadays the CI is assigned to teams and everyone is within one team.

This paper describes the dynamic of this CI system, including team development and organization, what kaizen events are being held and which artefacts are used by the teams. Its main objective is to identify the perception of workers regarding the new practices created by the Continuous Improvement system.

2 Lipor Continuous Improvement System

Lipor was founded in 1982 as a Municipalities Association for eight municipalities around the city of Porto in Portugal and it has implemented an integrated waste management, recovered, developed and built infrastructures and organized awareness campaigns for the population, estimated in almost 1 million inhabitants. The Continuous Improvement system adopted by this company is now in a quite mature phase since it is in place for the last five years. The systems has been changing and continuously adapting according to the learnings obtained over many improvement actions and also because of the natural nature of CI concept. This CI system is based on teamwork, events and processes. Regarding the teamwork, the company is organized in Natural Teams supported by a Kaizen Team leading the process. In this company, a Natural Team is composed by a group of workers that normally work together in the same workspace, same production cell, same department, or same section, performing related or similar work, sharing a common team board, pursuing the same team objectives and making part of the company Continuous Improvement effort. On the other hand, the Kaizen Team is responsible to coordinate and support all the CI effort. Kaizen Team is supported by top management and, it is its responsibility to define the CI strategy, decide upon improvement projects and guide every Natural Team. Finally, every time a problem occurs, a multi-disciplinary team is created, with the denomination of Project Teams. These teams are created to develop some specific improvement projects and they cease to exist at the end of that project.

2.1 The Kaizen Team

Kaizen Team plays a key role in the organization being the engine of the Continuous Improvement effort of the whole company. This team needs to be continuously putting energy on the CI systems otherwise it tends to gradually reduce the improvement speed and ultimately stagnate. The Kaizen team defines CI strategies, provides guidance, implements CI audits and monitor the CI activities in the whole company. Elements of the Kaizen team are also responsible to give training and coaching to the natural teams from many different areas, from office to production work.

This team is composed by elements representing some departments. Not every Natural Team is represented in the Kaizen Team but every Kaizen Team element is member of a Natural Team. All 8 Kaizen team members are CI leaders from different departments of the company and were trained by external Kaizen experts on Lean thinking, lean leadership and kaizen tools. The kaizen team leader was selected according to her motivation and knowledge in continuous improvement and the other kaizen team members were also selected by their natural skills in CI as well as their role as CI leaders in their own departments.

2.2 Natural Teams

Natural Teams are characterized by a group of people that work together, performing similar or related tasks and normally in the same room or working area. At Lipor, Natural Teams are represented by one of their elements called "pivot". The company chose to substitute the usual term "team leader" for "team pivot". Natural team's pivot participates in the audit preparation meetings, as he or she is part of the audit team, and also participates in the kaizen teams training. Other team members' role in CI is mainly contributing to team dynamics in identifying problems and improvement opportunities and contribute to problem solving and improvement implementations. The team's pivot is the most important communication channel between the Kaizen Team and all team members. The designation and number of member of the existing natural teams (one natural team per area) are listed in Table 1.

Table 1. Designation and number of members of all natural teams

Natural Team designation	No. of members
International Business Unit	3
Legal and Audit Department	7
Operations and Logistics Department	5
Operations Division	5
Logistics and Infrastructures Division	97
Support Division for Operational Project Implementation	8
Environmental Education and Training Unit	16
Communication, Sustainability and Marketing Unit	10
Supply and Accounting Division	14
Information Systems and Management Division	11
Human Resources Division	6

2.3 Project Teams

Project Teams, on the other hand, are created with the purpose to achieve or develop a specific improvement project. They are constituted by the process owner and elements from the teams involved in the process. At the end of each disruptive project the team responsible for the project ceases to exist. Usually, improvement projects or Kobetsu, result from the use of the tool Quality Matrix. In this matrix, the errors/occurrences detected in the various tasks of a given process are identified according to its origin or intervenient. Consequently, it is possible to determine objectively if it is an occasional or frequent error/occurrence, facilitating the prioritization of the improvement projects. Any new project team that is created frequently requires training on kobetsu methodology. This training on Kobetsu is always provided by Kaizen Team, which in some cases may be represented in the Project Team. In order to monitor the performance of the Project Teams, as well as the state of the teams, a board is created with information concerning the important details of the project.

2.4 Team Artifacts and Events

Team boards play a very important role in the natural teams' management, providing transparency and creating a platform for team development, motivation and performance improvement. They afford a better daily work management, allowing to monitor in a very visual way, task assignment and priorities management as well as monitor the progress of the main team performance indicators. The board structure was created by each team, once the company believes that is important for them to decide what is more relevant for their organization, monitoring and management and by participating in the design process, team members become more engaged in the process.

Moreover, this artefact enables the track of all the ideas for improvements gathered across the team and then helps to analyses the status of ongoing improvement initiatives. Every kind of improvement idea is written down on structured cards and fixed on the board and depending on the progress of implementation, the cards are transferred to the appropriate section of the PDCA circle.

Every day, each team takes some minutes around the board to discuss the plan for the day and to analyze the performance indicators. Time to time it is necessary to introduce changes in the board and start the standardization process again. Changing needs are identified by the team during the daily meetings reflecting the dynamics of Continuous Improvement. In this process it is important for managers to ensure that the boards are used and maintained. With this goal it was conducted regular audits by other teams.

Daily Kaizen is one of the events of Lipor Continuous Improvement System. It aims to develop teams and to increase teamwork on Natural Teams. Team are encourage to have a daily meeting where all team members become aware of their team performance development, monitor standards and goals, solve problems that arise on the work floor and give new improvement suggestions. These meetings also allow Natural Teams to become more autonomous and at the same time turn these practices into routine. Daily Kaizen is therefore vital to maintain the levels of efficiency and to, steadily, improve performance indicators.

The implementation of Daily Kaizen was a challenge especially because habits and routines are difficult to change in people. As a start, it was asked to each work team to prepare a set of performance indicators that could clearly reflect the performance of their daily activities. The next step was to decide which of these were more suitable to be discussed at Daily Kaizen Meetings, and which would give a better picture of the working day. This was done by the team leaders together with their Natural Teams. Finally, everything was compiled on a board where tasks and indicators can be easily checked in a daily basis, allowing an increased level of control and efficiency. After the team boards were assembled, the concept of daily meetings was introduced to easily monitor the daily progress of work in different areas and of different team's members. This tool has proven to be much more useful than initially thought and allowed to manage both the implementation of improvement projects, as well as the daily problem solving requirements.

An important Kaizen event is the Kaizen Team meeting. This event occurs every week in a one hour meeting base, and one day meeting once in a month. In these meetings Kaizen Team analyses the action plan and make adjustments, updates the natural team's performance and issues and take action in order to solve existing problems.

Kaizen Team Audits is another type of event in the Continuous Improvement system. Every month, Kaizen Team performs audits in very Natural Team. The audits are oriented to a specific topic that changes every month. They could be focused on physic 5S in one month, 5S informatics in the other month and on standards in another. The annual external audit is also another important Kaizen Event. The external audit is performed by a lean consultant and the objectives are to get an external evaluation of the existing practices, routines and improvements. From the results of the external audits the company defines new challenges and objectives for next year.

3　Methodology Applied in This Study

In order to understand workers perception and degree of acceptance of several features of the Lipors' Continuous Improvement System, a questionnaire developed with the 12 questions (see Fig. 1). For each question the five possible answers followed a Likert scale were: strongly disagree; disagree; neither agree nor disagree; agree; strongly agree. The questions were devolved to be as neutral as possible to avoid possible bias. The questionnaire was then delivered to 135 out of 182 workers obtained a total of 62 valid replies. We did not manage to deliver (not even by email) the questionnaires to 47 remaining workers. In order to guaranty valid replies from all natural team we had to deliver in person 10 printed questionnaires.

4　Results

The analysis of the survey intends to collect and understand the opinion of the workers about the different activities developed in the context of the CI implemented system, in 4 areas: Team Meeting; Team Board and Performance Indicators Recording; Kaizen Efficiency and Worker's Suggestions. Fig. 1 depicts the general positive feedback given by employees regarding the CI movement. They perceived the continuous improvement routines and practices in a very positive way since in average 84% of the answers were either "agree" or "strongly agree". The question with more positive answers (92%) was "Q11 – I think it's important for me to be involved in improving my team's processes" with 63% of "strongly agrees". This clearly shows the importance that employees give to their involvement in improving their processes. This is strongly related to the main stream Lean idea related to "respect for people" mentioned by Sugimori, Kusunoki, Cho, & Uchikawa (1977) as one of the two basic concepts of TPS as well as "use of employee creativity" referred by Liker (2005). The second best positive feedback was given to questions "Q3 – I think that is important to update and utilize the team board" and "Q1 – I think that team meetings are important". That reflects the importance they perceive in team meeting, the visual management importance of team boards and the involvement in team's processes.

The question with worse performance was "Q10 – I can easily identify the "MUDA" (waste) in my Daily Work" with 70% "agree" or "strongly agree" answers. In reality this question is not about the way they perceive the CI system but instead it is about a certain skill that is important for CI.

Regarding Team Meeting, when questioned about the importance of daily/week meetings, 89% of the inquires consider that is important to have these sessions, 84% consider that team meeting promote and facilitate the communication and problem solving, and 87% assumes to regularly attend meetings. On the other hand, relating to performance indicators recording, 90% of the respondents think that is important to update and utilize the team board, 87% consider that is fundamental to define and follow up Process / Project indicators and also 89% have the opinion that the utilization of performance indicators enhances their daily work. The importance of visual management provided by team boards as well as the constant feedback provided by performance monitoring is very well accepted by employees.
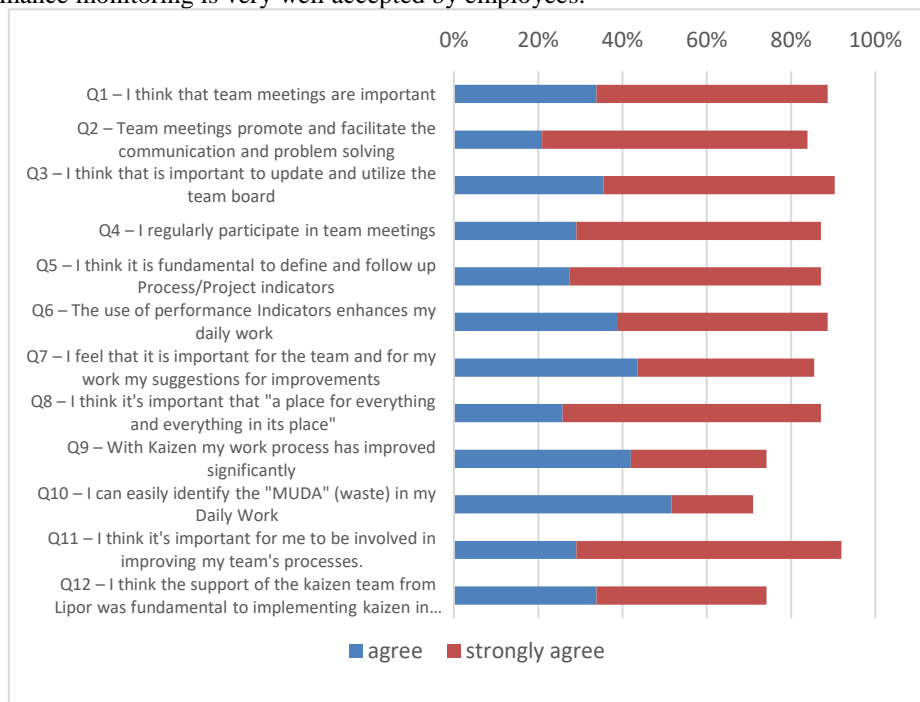
Fig. 1. Percentage of "Agree" and "Strong agree" answers obtained from the questionnaires.

Thirdly, when questioned about kaizen efficiency, 87% of the inquires answered that is important "a place for everything and everything in its place", 74% consider that their work process has improved significantly with Kaizen, 71% are able to easily identify the "MUDA" (waste) in their daily work, 92% think that is important for them to be involved in improving team's processes and also 74% mentioned that the support of the kaizen team from Lipor was fundamental to implementing kaizen in their working area. Finally, the analysis of the survey allows us to conclude that 85% of the respondents feel that their improvement suggestions are important for their team and individual work. Written comments were also provided by some members in order to clarify aspects that were not covered in the questionnaire or to provide specific feedback. Some examples are:

"I think we could still get more knowledge and support from the kaizen team."
"More meetings."
"The Kaizen at Lipor is extremely focused on quantity, getting numbers and does not help in the evaluation of work's quality.
"Keep up the great work!"
"Speed is not a sign of quality. I would have to change / adapt kaizen to the office areas because many of these areas are conceptual work therefore, having the same method for everything does not work."
"It is necessary to focus on what is fundamental and to minimize the investment of time in bureaucratic processes."
"Very well! You're doing a good job!"

Some less positive aspect were mentioned specially related to the perceived emphasis given by the Kaizen Team to quantity and speed instead of quality of the performed work. Another mentioned issue is related to the implementation of solutions that being conceived in industrial context may not be adequate to office work.

5   Conclusions

In this paper we have described the dynamic of the Continuous Improvement system, team's composition and team's events, as well as tools and artifacts used by the teams to sustain the CI movement. Achieving a successful implementation and maintenance of the CI system was quite challenging as it involved organizational changes on many levels and still requires dedication and proactivity of the workers every day. The overall workers perception regarding the CI approach is very positive since more than 80% of the workers are happy with it. When inquired about the different activities developed in the context of the CI system, the workers highlighted the involvement in improving team's processes as being the most important aspect of the CI movement with 92% of positive answers. The act of updating and utilizing the team board was considered the second most important aspect of the CI with 90% of positive answers. The employees also emphasized the effect of team's events as daily meetings (with 89%) promoting and facilitating the communication and problem solving within the teams. With same level of importance was given to the monitoring of the teams' performance indicators, also with 89% of positive answers. Some employees pointed out some negative aspects of the CI movement related to the importance given by the Kaizen Team to quantity and speed instead of the quality of the performed work and also the use of solutions that may be adequate to industrial work but may not fit office work contexts.

Although the CI routines require energy and dedication from everyone it seems that the gains obtained are worth it by the results in performance, work satisfaction and motivation. Once the implementation phase was finalized, it was very important to focus on monitoring the process and the conduction of regular audits by other teams were an important procedure to ensure that the necessary practices to maintain the CI system were being held.

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