

## An improvement’s project model to foster sustainable continuous improvement

Costa F.\*, Portioli Staudacher A.\*\*

\* *Management Engineering Department – Politecnico di Milano, Via Raffaele Lambruschini 4/B, 20156 Milano – Italy (federica.costa@polimi.it)*

---

**Abstract:** Continuous Improvement programs are constantly applied amongst companies to reach competitive advantages. However, it is known that companies struggle to sustain benefits of continuous improvement projects in long-term periods. Indeed, there is not a common shared framework assessing which are the managerial variables that can guarantee improvement’s projects success. This research presents a model and a pool of improvement’s projects could be framed and carried out accordingly. The model and its enabler mechanisms foster the importance that the outstanding literature assign to human focused factors and soft practices to sustain continuous improvement benefits in the long-term period. This study presents a first assessment analysis of the model, even if not statistically valid, highlighting its enablers and barriers for a correct application. Then, based on the first data collected on a sample of improvement’s projects framed with the model described, the study draws some considerations about which are the critical success factors for improvement’s projects.

**Keywords:** sustainable continuous improvement (SCI), improvement’s projects, critical success factors.

### 1.Introduction

Companies aim at continuous progress, increase of value, intensification, and improvement (Karkoszka and Szewieczet, 2007). This could be translated as ongoing, continuous improvement (Malik et al., 2007). Undertaking improvement’s projects continuously is the way through which continuous improvement could be achieved by companies. However, an issue of investigation is how to sustain the continuous improvement in the long-term period, trying to identify a framework so that its application could guarantee the sustainability of a continuous improvement program.

SCI can be seen as the spread of a continuous improvement culture within the whole organization, defined as a constant and never-ending strive for perfection through incremental improvements.

Under such perspective, continuous improvement leaders can represent the link between Lean toolbox implementation and a sustainable continuously improving organization as stated by Dombrowski and Mieljke (2014), who deduce from literature, study results and practical experiences of Lean rules’ implementation for a SCI program. According to Dombrowski and Mielke (2014), for a SCI, continuous improvement leaders are suggested to give their employees enough space for experimenting, developing their own ideas and furthermore being able to autonomously implement improvements. They should be motivated to always question their processes, identify improvement opportunities and become the change-makers of the continuous improvement philosophy.

The outstanding literature provides evidence that despite the initial gains, in terms of performances improvement,

coming from the implementation of the most common and known Lean techniques, companies struggle to continue improving, highlighting some difficulties to make it a sustainable mechanism. Lean Management represents indeed a socio- technical system, where technical and social practices should be consistently implemented to foster a SCI culture.

Improvement’s projects are largely applied amongst companies to enhance continuous improvement culture, thus the need to identify a framework highlighting the critical success factors for improvement’s project is becoming urgent.

Based on the positive results collected from a pool of thirty improvement’s projects, the purpose of this study is to describe that model applied. The model as it is framed fosters the sustainability of the continuous improvement, considering also some of the socio focused variables and principles framed by Dombrowski and Mieljke (2014).

In addition, there will be the assessment of the variables that, according to the model, could be considered as success factors when considering continuous improvement’s projects, taking into consideration soft dimensions of the Lean approach as fundamental to implement a SCI.

The paper is organized as follows. Section 2 presents the theoretical background by surveying the literature. Section 4 presents a detailed description of the model applied, and so the methodology this research is proposing and section 3 presents the main findings and results that have been achieved through the model’s implementation on a pool of improvement’s project.

## 2. Theoretical Background and Research objectives

Continuous improvement concept could be related to different organizational developments, including the adoption of “lean manufacturing” techniques, total quality management (TMQ), employee involvement programmes, customer services initiatives and waste reduction campaign (J. Singh, H. Singh, 2013). The common way to enhance continuous improvement process inside companies is the implementation of improvement’s projects. In organizations, the management uses the lever of improvement’s projects to establish a continuous improvement program. However, companies face the main concern regarding how to achieve a SCI, indeed researches in the Operations Management and Lean fields showed that implementing Lean without considering the human component does not lead to competitive results. Operations Management literature is still missing a clear understanding of the mechanisms enhancing the establishment of a continuous improvement culture and there is no consensus on the definition of a sustainable Lean implementation. Indeed, the literature highlights that Lean tools and techniques can be integrated with human-focused practices aimed at developing the firm’s internal knowledge, its employee’s engagement and innovativeness in way that promote the establishment of a SCI culture (Anand et al.). Liker et al. (2010) observe that even if improvement projects lead to significant cost savings, the results are still lower than expected and generally not sustainable. Anand et al. (2009) support the idea that the individual knowledge - together with workers’ skills and consistency between human resources management practices and firm strategy – is fundamental for economic performance (MacDuffie, 1995) and the individual forms of learning are significant predictors of continuous improvement projects success.

Then, considering the literature on projects’ critical success factors it is established that there is not a shared framework highlighting the critical success factors for an improvement’s project. In despite of proliferative researches in this field, there is no agreement about the causal factors of project success (Pinto and Slevin 1987). The reason could be that it is not possible to assume a universal theory of project management to apply to all types of projects (D.Dvir, S. Lipovetsky, 1998).

Several attempts have been made to identify the critical success factors of industrial projects. Rubinstein et al. (1976) found that individuals, rather than organizations, ensure the success of an R&D project, linking the idea of Lean Management as a socio-technical system. Slevin and Pinto (1986) developed a research framework that included the following major factors believed to contribute to the success of project implementation: clearly defined goals, top management support, a competent project manager, competent project team members, sufficient resource allocation, adequate control mechanisms, adequate communications channel with feedback capabilities and responsiveness to client’s needs. Assuming that there is not a unique framework through which is possible to classify improvement’s project the aim of the research is to assess how SCI achievement

could be facilitated within companies. The aim is to find which are the dimensions, that if comprised in an innovative model to carry out improvement’s project can foster its success and better enable SCI. The dimensions that would be considered take into account human focused practices, like employee’s engagement, and not only hard practices, to show that the causal success factors could result from a combination of Lean hard and soft practices. The model used to carry out improvement’s project, as it is framed, stresses the importance of human based factors, like employee motivation and engagement. In the next section, it is presented the model through which all data and information would be collected to answer to research’s objectives. It represents an innovative way of conducting improvement’s projects that, according to us, can enhance human focused practices, highlighted in the literature as relevant for the sustainability of the improvement’s projects.

## 3. The Research Design

The model this research is presenting to carry out improvement’s projects involves a methodological tutor, company’s operative workers and company’s management and its focus is continuous improvement’s projects.

Companies nowadays implement improvement’s projects continuously, since the implementation of continuous improvement program represents the key for company’s success; however, managers in organizations have always to consider the time constraints which represents a barrier to the development of improvement’s projects. Managers would be grateful if they free up their full-time experienced personnel to perform important tasks, and delegate less important assignments. The idea is to let to operative workers’ teams to carry out improvement’s project.

According to the model here proposed company’s operative workers organized in team of two-three people belonging to the same functional area have the chance to diversify their tasks, thus spending some of their working time on improvement’s projects execution. Company’s workers that have been selected for taking part in improvement’s projects have the possibility to attend a methodological course and apply what they have learnt directly on improvement’s projects at their company. They come in contact with new techniques and methodologies they could directly apply in a relevant improvement’s project, started by company’s management. In addition, they are given the possibility to gain more visibility in the company working environment that could lead to have the opportunity to get promotion in the future or to evaluate if they are interested in working in another specific company’s department or field area.

Considering companies’ management perspective, improvement’s projects assigned to company’s operative workers let the management to get rid of operational working tasks associated to the improvement’s project. The company’s management is embodied in what the model indicates as company tutor, who is in charge of supervising operative workers’ team from the content

point of you, providing all data and information need to carry out improvement's project. Then, operative workers usually represent a different vision on a company's problem that in all the cases brings to new fresh ideas into the company, and so new solution's opportunities to exploit. Lastly, companies dispose of operative workers' teams which represent lower-cost labor in respect of experienced professionals. This means that the economic benefits resulting from the improvement's projects have to be combined with experienced personnel cost saved that companies have taken advantage of, leading to a higher level of profit.

The methodological tutor, coming from Kaizen Promotion Office is the remaining actor involved in the model here proposed, where needs of company's management and company's operative workers are melted. The methodological tutor supports company's operative workers throughout improvement's projects execution on correct implementation of the main technical tools and communicates a methodology to conduct every kind of improvement's project to make operative workers autonomous for future improvement's projects. Applying the model here described methodological tutors' training programs overcome the weak link between theory based courses and real application of the techniques and methodologies taught, making more explicit the learning by doing principle. They answer better to company's management who constantly look for well-prepared professionals regarding theoretical techniques and tools and practical problem solving workers. In addition, company provides a unique opportunity to workers, giving them the possibility to take part into relevant improvement's projects performed within their working environment and so integrate their monotonous tasks with new activities aimed at improving their working conditions.

The element of differentiation of the model here proposed in respect of others applied by companies to conduct improvement's projects consists in the constant methodological supervision of Kaizen Promotion Office's tutors over operative workers' team during project's time span.

As described the model proposed represents a win-win-win solution, since it would lead to potential benefits for three actors involved. Operative workers can gain experience about improvement's projects and develop new skills while applying their knowledge, proposing new solutions that could impact on their day by day working activities. They also get the opportunity to have a promotion by the company where the improvement's project is being performed as they are being observed by the management and the methodological tutor. Among the benefits for methodological tutors are: workers' satisfaction and motivation increase, since they are endowed by company's management to carry out relevant improvement's projects and they play an active role in all the improvement's activities leading to a substantial positive change of their working condition. For company's management, the model would lead to have a higher rate of project's completion, gain more positive

visibility among its workers, letting them having a proactive role in improvement's changing activities and enhance workers' knowledge and theoretical tools, facilitating the self-sustaining mechanism of continuous improvement.

### 3.1 Prerequisite activities

The model proposed presents some prerequisite activities that should be follow to assure its correct implementation. Company's management and methodological tutor have to work together to reach a collaboration agreement which regulates the conduction of the improvement's project. Prior to improvement's project starting, company's management and methodological tutor have to organize meetings to agree on the project's objectives according to company's needs to improve. During preliminary meetings, the company expresses its challenges, objectives and where to address improvement's interests, in which company's area or department. On the other hand, methodological tutor can focus on company's management challenges and interests into a defined number of different improvement's projects with an established target. During these meetings, company's management and methodological tutor define operative workers' profiles fitting each improvement's project, that would be chosen and select among the resources available. Indeed, company's management and methodological tutor take into account the possibility that some of operative workers can demonstrate a reluctant attitude when dealing with improvement's project. Amongst the resources available the ones that have shown a positive attitude towards improvement's changes will be chosen. The selection of the most positive workers is a fundamental issue because it easily influences the project's success, preventing improvement's project from initial failures or stops. Lastly, the positive workers firstly selected play an important role in spreading amongst all the other workers the positive attitude towards the change management, thus maximizing improvements' projects benefits.

Once improvement's projects have been designed, operative workers are divided in team; at beginning operative workers are selected amongst the same functional area, thus enhancing the communication; then when the model reach a maturity condition, operative workers could be selected among different functional areas. Operative workers' team carrying out improvement's project are constantly supported by the methodological tutor, who belongs to the Kaizen Promotion Office. Indeed, they have access to a methodological course, designed to provide them the knowledge to better tackle improvement's projects at the company. They are taught different problem solving techniques and tools to better address the problems they face during project's execution. Workers' team could benefit from meetings to discuss the deliverables and receive feedbacks. The feedbacks should be provided by both methodological tutor and company's management, as they should guide the team to a successful implementation of knowledge. Improvement's projects team meet weekly kaizen promotion office professionals

whose function is to provide a methodological support to frame and execute the project. Indeed, it is in charge of monitoring the correct implementation not only of the tools and techniques, but also of the methodology. The main aim is not only the achievement of the improvement's project objectives but teaching a robust methodology that could allow workers to carry out every kind of improvement's project in their future working experience. This is part of company's management ultimate goal of conveying to company's workers the knowledge and practical tools to make them as autonomous as possible in improvement's project execution to reach and enhance the sustainability of the continuous improvement.

Methodological tutor and company's management have to maintain communication during improvement's projects execution, so that they are aligned on feedbacks they give to workers. Periodically meetings discussing the work in progress of improvement's projects are necessary to get alignment on project's activities and mid results and agreement of all the stakeholders on improvement's projects directions.

#### 4. Preliminary Results

To measure the effectiveness of the model proposed, a questionnaire has been submitted to companies. The detailed structure of the questionnaire is reported in paper's appendix and among the preliminary results the variables that have been showing until now a small standard deviation, so the most reliable, will be considered to draw some considerations. The questionnaire comprises a pool of variable that has been assessed as the most relevant ones to achieve project's success, to be intended as benefits for the customer and meeting of the designed goal.

The pool of improvement's projects that have been conducted so far could permit to conduct a starting analysis and derive some considerations on the success factors when considering improvement's projects. The variables have been selected from the literature and from the projects' improvement experience and could be divided in three different categories: managerial, methodological and organizational. Among the dimensions emerging from the questionnaire as the most relevant there are, regarding the methodological: use of the A3 methodology, discussion and report (follow-up), easiness to check the results (test); regarding the cultural variables: flexibility in management and adequate communications channel; and among the organizational: clearly definition of goals, technical specification and top management support.

A first confirmatory point emerging from the survey is the importance of the methodological thinking process through which all the projects have been conducted. The methodology here addressed is the A3 methodology which evoke the PDCA cycle and focus its attention on the strong logical links between all its sections. Then, what emerges to be relevant for improvement's project success is the cultural dimension related to the management's flexibility, standing for willingness to encourage new ideas

and consider changes and new approaches; and the possibility to have adequate communication channels fostering ideas and feedback sharing.

From the organizational point of view, the first assessment reveals that agreement on project's goal is really relevant for project's success, confirming that agreement on project's objective has to be reached, thus representing a crucial pre-activity. As already mentioned, that point was confirmed also by the experience in the improvement's projects completed; project's objective mismatching occurred to be one of the main reason of company's dissatisfaction, leading also to workers' demotivation. Top management support is the other organizational dimension rated as very important for improvement's projects success, indeed it has been assessed as relevant management's support, interest and presence during project's execution. Company's management have always to give the main direction and feedbacks to workers, nonetheless show its availability to share information and data and to devote some time to workers.

First collection of the results coming from the questionnaire's answers highlight that all companies expressed a positive feedback regarding the whole experience, in particular they appreciated ideas' originality proposed as solution of improvement's projects, operative workers' motivation and good knowledge and competences acquired.

Company's management acknowledges the importance of the methodological tutor who supervised improvement's projects and the training course that provides useful problem solving tools leading to a value's increase of project's outcome.

As result of the questionnaire, the only issue the model could deal with is represented by objectives mismatching, occurred when there is a lack of communication between parties. As already mentioned, communication between company's management and methodological tutor over project's objectives alignment represents the pivotal factor to achieve project's success and foster workers' motivation and satisfaction.

Moreover, questionnaire results could allow us to draw some considerations about the payback time of each improvement's project, taking into account the monetary saving resulting from each improvement's project and the overall cost associated to it, thus considering, among the others, the hourly cost of company's managers and so hours' amount devoted from managers to improvement's project. Indeed, from the first results it emerges that all improvement's projects completed showed high monetary savings per year compared with a low company's effort in terms of monetary investment for the solution implemented and time devoted to the project by experienced personnel, reinforcing the winning approach of the model proposed, which relies on that small improvement's projects could lead to relevant outcomes and results for companies.

The pool of improvement's project considered are characterised by a great diversity in terms of hours'

amount devoted by operative workers and company’s management, ranging from 700 hours per person to 1700 hours per person for operative workers and from 30 hours to 60 hours per person considering a managerial level.

Referring to the monetary saving for each improvement’s project and the total of working hours devoted by managers and operative workers to the project it has been possible to derive an index of 1:50, meaning that there is a multiplier of 50 for each working hour spent on improvement’s project. Thus, it is worthy to consider each improvement’s project in the category low-effort high-results, giving evidence to the assumption that small improvement’s projects, carried out by a team of two-three operators can achieve very positive results because of model’s enablers factors that consists in operative workers’ motivation increase and useful methodological tutors’ supervision.

In the table below, average values for monetary savings, management’s working hour cost and operative workers’ working hours cost devoted to improvement’s project are presented. The average is computed considering five improvement’s project amongst the thirty belonging to the pool and even if the sample is small, we believe that first insights could be delineated. Indeed, management’s cost to carry out improvement’s projects is quite small compared to the monetary savings of the project. Anyway, also considering the total cost, including operative workers’ cost and management’s cost, it is worthy to mention that the average payback time of an improvement’s project is about eight months.

The data presented supports the idea that small improvement’s projects in terms of low management’s

effort and engagement could achieve positive economic results, reinforcing the idea of the SCI: company’s management can obtain great benefits from improvement’s projects just supervising them and devoting small time and energies, because motivated operative workers carry out proactively improvement’s projects.

**Table 1: Questionnaire’s Quantitative Results**

	Average values
Monetary saving	87000 €
Management’s cost	2400 €
Operative worker’s cost	14500 €
Payback time (Months)	8 months

**5. Conclusions**

First results gathered about the implementation of improvement projects show that the average monetary saving is high compared to the cost in terms of working hour spent by management. First results gathered from improvement’s projects, confirmed that, as the project’s conduction mechanism is framed, it fosters and enhance

operative workers’ motivation and engagement, leading to a virtuous circle according to which management’s supervision’s effort decreases even though improvement’s project success keeps increasing. Operative workers take an active part in the project’s improvement conduction and they get highly motivated thanks to the fact they can play an active role in improving their working environment and that they can perform a different activity, thus diversifying their tasks. Highly motivated and engaged, they would lead and manage improvement’s projects, without the necessity of management’s warnings and reminders to conclude and finalize improvement’s projects.

Further researches would focus on a bigger pool of improvement’s projects to gather more information and data to statistically validate improvement’s projects model that enhances SCI. Moreover, next researches would evaluate some other Lean soft practices that contribute in the model and their impact on improvement’s projects success. Thus, it would be possible to identify a framework, highlighting the critical success’ factors that would guarantee the sustainability of the continuous improvement. After having collected all the data, it would be possible to use multivariate methods, which have been proven to be effective in many ways, assessing the ranking of the different factors according to their influence on improvement projects’ success. Then, it would be possible to identify possible causal relationships between the factors involved in the future framework in order to reduce the number of key dimensions, managers should focus on when dealing with improvement’s projects.

**References**

Karkoszka, T. and Szewieczet, D. (2007), “Risk of the processes in the aspect of quality, natural environment and occupational safety”, *Journal of Achievements in material and manufacturing Engineering*, Vol. 20 No. 1, pp. 539-542.

Malik, S.A., Li-bin, L., YeZhuang, T. and Xiao-lin, S. (2007), “Continuous improvement practices in Asian developing countries: a comparative analysis between Chinese and Pakistani manufacturing industry”, 14th International Conference on Management Science and Engineering, Harbin, pp. 692-697.

Singh, Jagdeep, and Harwinder Singh. "Continuous Improvement Philosophy – Literature Review And Directions". *Benchmarking: An International Journal* 22.1 (2015): 75-119.

Liker, Jeffrey K., and Michael Hoseus. "Human Resource Development in Toyota Culture". *International Journal of Human Resources Development and Management* 10.1 (2010): 34.

Anand, Gopesh, Peter T. Ward, and Mohan V. Tatikonda. "Role of Explicit and Tacit Knowledge In Six Sigma Projects: An Empirical Examination Of Differential Project Success". *Journal of Operations Management* 28.4 (2010): 303-315.

**XXII Summer School “Francesco Turco” – Industrial Systems Engineering**

Macduffie, John Paul. "Human Resource Bundles and Manufacturing Performance: Organizational Logic And Flexible Production Systems in The World Auto Industry". ILR Review 48.2 (1995): 197-221.

Pinto, Jeffrey K., and Dennis P. Slevin. "Critical Factors In Successful Project Implementation". IEEE Transactions on Engineering Management EM-34.1 (1987): 22-27.

Dvir, D et al. "In Search of Project Classification: A Non-Universal Approach To Project Success Factors". Research Policy 27.9 (1998): 915-935. Web.

Rubinstein, A.M., Chakrabarti, A.K., O’Keefe, R.D., Sounder, W.E., Young, H.C., 1976. “Factors influencing success at the project level”. Research Management 16, 15-20.

Slevin, D.P., Pinto, J.K., 1986. “The project implementation profile: new tool for project managers”. Project Management Journal 18, 57-71

**Appendix - Questionnaire’s structure**

Evaluate from a scale from 1 to 5
<b>Organizational Dimensions</b>
Clearly definition of the Goal/s
Top management support
Sufficient and Adequate Resource Allocation
Adequate Control Mechanism (Schedule and Milestones)
Adequate communications channel with feedback capabilities and responsiveness to client's need
Definition of operational need
Definition of technical and operational specification
Active participation in development activities
<b>Methodological Dimensions</b>
Usefulness of the A3 methodology
Use of technology during the project
Schedule and Milestones
Discussions and Report/follow up
Easiness of checking the results (test)
<b>Cultural Dimensions</b>
Flexibility in management (encouraging new ideas - willingness to consider changes and new approaches)
Team Characteristics (Key personnel in the project for its entire duration - high technical level - A technical leader)
Adequate communications channel with feedback capabilities and responsiveness to client's need
Degree of Lean Management Culture
How much the company is devoted to continuous improvement?
How much the company team contributed to the project, so assess company's team members engagement in your project
How much the initial motivation of team has been increased during project's execution?
<b>Results</b>
Make an estimation of the amount of hours that on average managers and operative workers in the company dedicated to your project
Make an estimation of the amount of hours dedicated to the project by your Methodological Tutor
Make an estimation of the amount of hours dedicated to the project by your Company Tutor
Meeting design goals
Benefits to the customer
Target/s achievement
Monetary saving