The influence of the level of implementation of Lean Management on employees: an empirical study

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Abstract: This paper analyses the impact that Lean Management practices have on employees. In order to carry out this work we moved away from the level of organisational analysis traditionally used in research on Lean Management towards one based on the employee (individual). The results reached using a case study have enabled us to create a model that shows the evolution of employee integration in the company in accordance with the degree of implementation of Lean practices. Our findings indicate that increasing the level of adoption of Lean Management means employees are more motivated and keen to participate in decision making and offer a higher number of suggestions. It has also been detected that companies with a higher degree of adoption of Lean Management are characterised by having employees who are multifunctional, better trained and more skilled. On the other hand, our results show that a higher degree of Lean Management does not necessarily mean an increase in variable incentives for employees.

Keywords: Lean Management; case study; teamwork; level of implementation; commitment; employees.


Biographical notes: Nestor Raúl Baides received his PhD in Business Administration from the University of Jaén, Spain. His doctoral thesis deals with the impact of the Lean Management on human resources. He is a Teacher of Operations Management in Aden Business School and a Consultant on process efficiency. His research has appeared in the Revista Ingeniería Industrial.
1 Introduction

Lean Management (LM) is an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer, and internal variability (Shah and Ward, 2007).

A subject that has received little coverage in literature on LM is its impact on employees. This paper covers this question by analyzing employees’ perceptions of how implementation of LM system affects them.

Researchers believe that LM can be analyzed from different points of view (Shah and Ward, 2007). Most researchers have analyzed the effects of LM on a company level (Piercy and Rich, 2009), but it has been detected that there is very little research on its effects on employees (De Treville and Antonakis, 2006; Shah and Ward, 2007), and on the occasions that this effect has been studied it has been from the point of view of the company or managers (Soderquist and Montwany, 1999; Tagore, 2007).

On the other hand, LM does not inevitably result in improved financial performance; the critical issue appears to be the firm’s ability to appropriate the value generated by any savings made (Lewis, 2000). Such ability depends on internal organizational factors, many of them related to human resources such as leadership, skills and expertise (Achanga et al., 2006; Browning and Heath, 2009) or the commitment of a company’s employees.

The engagement and commitment of a company’s employees, which is an important element for the implementation of LM to be successful, is therefore being neglected. This paper aims to understand the reasons behind different levels of commitment and employee engagement in LM.

To do so, we will change the organisational analysis traditionally used in the literature on LM and focus on the individual or operational level. We will use qualitative research based on a case study that enable us to study the question in greater detail.

This paper is composed of five sections preceded by the introduction. Section 2 consists of the theoretical framework used to support this research. The following section describes the methodology used, with special focus on the criteria used when selecting cases to be studied and the instruments used. Section 4 is devoted to the analysis and interpretation of the information compiled while the fifth and final section offers the conclusions and challenges to be faced in future research on this subject.

2 The role of employees in LM

As acknowledged in the literature on this subject, employees play a fundamental role in both the adoption and implementation phases of LM. Emphasis has been put on the
importance of providing employees with information on the key aspects of LM during the implementation phase in order to obtain their commitment, satisfaction and trust (Gagnon and Michael, 2003).

Adopting LM involves changes to the company’s working organisation as well as practices used to manage human capital. One of the most important changes in the organisation is related to the criteria used to allocate work. LM abandons the allocation of functional or operational work in order to focus on teamwork. This concept involves sharing workloads with fixed objectives, responsibilities and workloads for the team as a whole (Liker, 2004). Working as part of a team implies a certain degree of integration, self-control and mutual support among the members of the unit (Kuiipers et al., 2004).

Differences in work systems between companies applying LM and others that keep to a traditional management model do not lie in aspects affecting hierarchy but in the use of more work teams to solve problems, in adopting workers’ suggestions, in much better documented work processes and in a wider range of tasks done by workers and in a better quality relationship between workers and supervisors (Forza, 1996). The emerging role of supervisors is standing in the way of the principle of delegating authority to the workers (Lowe, 1993). The workers work hard to meet objectives set by the supervisors who are under continual scrutiny at efficiency meetings (Kochan et al., 1997).

The adoption of human capital management practices related to LM favours the integration of employees in the company and their commitment to it (Winfield, 1994). Monden (1998) states that employees have to be flexible and creative for the implementation of LM to be successful. A sense of belonging is a determinant aspect, given that “being part of …” generates a greater sensation of job satisfaction that in many cases is even more important than economic factors.

The fact that employees can offer the creativity and skills they have accumulated throughout their lives in order to improve the production and management processes of the companies that they work for is an added value that can result in benefits for the company. Research carried out in an Australian organisation moving to Lean (Sohal, 1996) shows that by adopting LM, employees are more involved and committed and identify problems, suggest improvements and adopt corrective actions. Forza (1996) states that Lean companies are characterised by taking their employees suggestions into consideration.

Womack and Jones (1996) add that employees of LM companies need to control their own work, acquire multiple responsibilities, resolve production issues, implement improvements and have a more proactive attitude. It is the employees who should carry out the practice of constant improvement in their own workplace.

Focusing on the importance of employees’ engagement in LM, Liker (2004) highlights that resolving problems and the way said problems are resolved needs to be studied at the production line level as it is the employees who are the most knowledgeable in these tasks. This policy means giving authority to line personnel and taking decision making to the lowest levels of the organisation chart.

With respect to the above point, Winfield (1994) states that the number of suggestions made per operator can be considered as an indicator of the degree of commitment to solving problems. This active participation of employees through suggestion programmes has a positive effect on employee motivation (Monden, 1998). This higher level of motivation, along with a higher degree of commitment, means that employees become the drivers of constant improvement within the company.
Meanwhile, Karuppan and Kepes (2006) state that one of the basic principles of LM is multifunctional employees, which makes task rotation more feasible. This means more training, so that employees can work in different positions satisfactorily. Training is therefore another key aspect of LM and should be offered in process control and improvement, quality control, quality tools, preventive maintenance, etc. (Karlsson and Ahlstrom, 1995, 1996). This situation has led several authors to say that training and learning are fundamental in order to achieve satisfactory results using LM (Sohal, 1996; Liker, 2004). Monden (1998) groups all these ideas together and states that the number of employees in each section needs to be flexible to adapt to changes in demand by increasing or reducing each person’s workload, with multifunctional employees and a training program that means that they can be assigned to a variety of different tasks. Kochan et al. (1997) also refers to this matter and adds that LM needs multi-task positions held by multifunctional employees who are therefore flexible and can be reallocated. These employees will be multifunctional through having been trained in different tasks in their work area and their rotation through these.

Another practice related to the management of human capital according to LM is the use of a different compensation system whereby employees are paid in accordance with their qualities rather than the number of operations performed (Duguay et al., 1997). LM uses incentive systems that reward employees individually on the basis of their knowledge, skills and contribution to the company, as well as jointly for having exceeded previously set goals (Sodenkamp et al., 2005). On the one hand, employee compensation should be linked to performance to create involvement while on the other hand, there should be incentives that reward suggestions and ideas aimed at increasing employee participation and constant improvement in the organisation (Kuipers et al., 2004). Monden (1998) recognises that there are different kinds of rewards associated with fixed objectives, which can be granted depending on contributions made by the employees or their participation in quality circles (or constant improvement groups).

In keeping with the above, different expectations can be anticipated depending on the salary level of the employees, with a proposed second objective linking compensation with the goal, in this case the level of satisfaction. Organisations that adopt LM therefore need to change their assessment methods based on results and rewards given to employees in order to further progress along the road towards constant improvement, which is the right road (Womack and Jones, 1996).

Empirical evidence shows that the implementation of LM results in the greater engagement and participation of employees. Harrison and Storey (1996) state that employees feel that this management system takes their opinions into consideration and they therefore develop a sense of belonging. Van der Meer and Gudim (1996) add that in an LM environment, employees experiment an increased sense of job satisfaction.

Taking internal mechanisms that affect employees into consideration, De Treville and Antonakis (2006) conclude that LM has a positive influence on employees’ intrinsic motivation and highlight the importance of employee participation in this system.

Womack and Jones (1996) state that LM favours the democratic participation of employees, which means moving from top-down to bottom-up leadership. Employees control their own tasks, acquire a variety of responsibilities and take part in tasks aimed at constant improvement. LM also produces more constant feedback in the relationship between directors and employees (Forza, 1996).

The above reasoning suggests that a higher degree of implementation of LM will mean a higher skill level, given that the system includes more training aimed at job
The influence of the level of implementation of Lean Management on employees

rotation and increased flexibility. A higher degree of LM implementation should also result in more motivation when performing tasks and a higher number of suggestions aimed at improving the way the company operates. The degree to which LM is implemented will affect the level of employee engagement and their commitment to the company.

This paper aims to test the above idea by taking the employee as the level of analysis. In other words, the goal is to produce a more detailed and rational explanation for the impact that LM has on employees depending on the degree of implementation of the management system.

3 Methodology

In order to carry out the empirical research work, we chose the case study approach as it has been demonstrated to be one of the most solvent instruments for theory testing or development in operations management (Lewis, 1998).

Our starting point in the field of methodology is based on Miles and Huberman (1994), who consider that the creation of an underlying conceptual framework permits a prior vision of the categories to be studied, as well as of any relationships there might be between said categories. Voss et al. (2002) believe that the aim of this conceptual framework consists of explaining the main aspects to be studied graphically or narratively, in other words the key constructive or variable factors, as well as the supposed relationship between these aspects.

3.1 Study proposal

The research question to be studied is why does the degree of implementation of LM result in different levels of employee engagement and commitment?

Taking this question, objectives can then be specified to guide the field work. As the study is qualitative, these objectives are generic, and are:

1. Regarding the implementation of LM, to be aware of the practices that have the greatest impact on employees developing their functions in the manufacturing areas of different organisations in different industrial sectors.

2. To discover employees’ views on aspects such as participation and decision-making, commitment to solving problems, the possibility of offering suggestions, degree of motivation, the level of responsibility they have for performing tasks and their level of satisfaction with financial compensation received.

3.2 Selection of cases

We followed the criteria of choosing a small number of cases to be studied to enable them to be studied in greater depth in order that more detailed and thorough analyses could therefore be obtained. The cases chosen and the number are listed as follows.

According to Mukherjee et al. (2000), a single case study can offer the chance to study several different contexts.
A higher level of implementation of LM principles and practices produced in the industrial and manufacturing field (see Hines et al., 2008) supposes that we should also focus on this sector in this study. Also, given that the results of LM depend on the social and economic context of the country where the companies are located (Moreno, 1999), we chose to focus on companies located in a single country.

The objective was therefore to work with private non-financial companies located in Argentina whose main activity was within the manufacturing sector and whose total annual sales values exceeded the maximum levels of total annual sales corresponding to a medium-sized company as defined by the Argentinean Secretariat of Small and Medium-Sized Companies Resolution No. 24/2001 and amendments to same, in other words, large-scale companies.

Given the number of Argentinean companies that meet the above requisites, and considering that the behaviour of human capital can change depending on the character and culture of the area where the companies are located, we decided to reduce the selection to a single geographic area. We chose Cuyo because of this region’s greater balance regarding the percentage of industrial establishments than the rest of the country and also because of the ratio of this region’s GNP to the national GNP (Table 1).

Table 1 shows the regions of Argentina, the GNP of each of these regions compared to the country as a whole, and the comparative numbers of industrial establishments located in each.

<table>
<thead>
<tr>
<th>Region</th>
<th>GNP (%)</th>
<th>% industrial establishments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pampeana Region</td>
<td>57.4</td>
<td>47.8</td>
</tr>
<tr>
<td>Cuyo Region</td>
<td>6.6</td>
<td>7.9</td>
</tr>
<tr>
<td>NOA Region</td>
<td>5.6</td>
<td>8.1</td>
</tr>
<tr>
<td>Centro Region</td>
<td>18.3</td>
<td>24.6</td>
</tr>
<tr>
<td>Patagónica Region</td>
<td>7.7</td>
<td>4.1</td>
</tr>
<tr>
<td>NEA Region</td>
<td>4.4</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Source: CEU/UIA based on information from INDEC and IADER

Of the total population of companies that meet the above criteria, a new selection was made based on companies that also met the following points:

- A high percentage of production is exported, meaning that international manufacturing standards are also met.
- Innovation capacity in terms of products and/or processes.
- External recognition of quality system based on national or international quality awards received by the company.
- Application of advanced business management practices leading to a very positive external image.

The companies that met the above criteria were contacted via email or telephone or the CEO was contacted directly to arrange an interview. The aim was to explain in situ the objectives of the study and so achieve participation.
We contacted nine companies that met the selection criteria, with six agreeing to take part in the study. One of the companies is family-run while the others are part of multinational groups. It should be mentioned that one of the companies is located in another country (in Central America), but was included in the study as the cultural features and character of the territory are very similar to those of the region of Cuyo (Argentina).

Table 2 shows the structural characteristics of the companies included in the case studies. A letter was allocated to each in order for all information provided to the researcher to remain private.

<table>
<thead>
<tr>
<th>Companies</th>
<th>Sector</th>
<th>No. of direct employees</th>
<th>Age of company (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Metallurgy – automotive</td>
<td>1000</td>
<td>15</td>
</tr>
<tr>
<td>B</td>
<td>Glass</td>
<td>400</td>
<td>14</td>
</tr>
<tr>
<td>C</td>
<td>Beverages (non-alcoholic)</td>
<td>80</td>
<td>12</td>
</tr>
<tr>
<td>D</td>
<td>Metallurgy – oil</td>
<td>180</td>
<td>10</td>
</tr>
<tr>
<td>E</td>
<td>Beverages (alcoholic)</td>
<td>120</td>
<td>13</td>
</tr>
<tr>
<td>F</td>
<td>Aviation maintenance</td>
<td>300</td>
<td>22</td>
</tr>
</tbody>
</table>

Source: Authors

Once the companies had been chosen, the operators to be interviewed were selected using the theoretical sampling concepts provided by Taylor and Bogdan (1998) regarding the interviewee profile and number of interviewees.

With regard to the profile, the selection criterion was to study both male and female employees of different ages working at operator level (i.e., no authority over other employees) who carry out their activities in some of the companies chosen. They also had to meet the prerequisite of having worked there for a certain length of time (five years) so that they would have a certain degree of experience and ability to note changes in the way the production unit was directed and managed.

The number of operators interviewed depended on the size of the company. In some companies three operators were interviewed, while in others the number was as many as five due to the answers provided, continuing interviews until answers other than those already provided by other interviewees were given (information saturation level).

3.3 Data collection

The advantages of the case study approach include the possibility of applying data collection techniques from both qualitative and quantitative methodology strategies.

To cover quantitative aspects, a collection instrument was used that includes a series of indicators closely linked to the objectives of this study and adapted from the most recent and relevant literature on LM (Cagliano et al., 2006; Cuatrecasas, 2004; Rothenberg et al., 2001; Delbridge et al., 2000) and advanced practices in human capital management (High Performance Work System, HPWS) (Way, 2002). This instrument was applied to the director of human resources in the different companies to contrast the information with the information received from operators.
In-depth interviews were used for the collection of qualitative data. The script to be used in the interviews was subjected to a pilot test with regards to content and understanding. In order to see if any changes were required, such as wording or question order, etc., the pretest was carried out with two renowned researchers with over 25 years’ experience assessing companies in the operating field, along with a high-level director in charge of the operations area of a multinational firm. The comments and suggestions made by the participants were used to make pertinent changes to the final script.

A pilot test was also held with two specialised operators, one in the quality area, the other in maintenance, in order to estimate the length of the interview, see if the questions were interpreted correctly and calculate the approximate answer time for each question.

Having applied the instrument used to collect quantitative data to the director of human resources and/or director of operations in the companies concerned, the information received was loaded into a data matrix to be analysed and interpreted.

The aim of this double collection procedure was to use triangulation to support the validity of the results.

3.3.1 Field work

The visits to the companies that agreed to interviews took place in accordance with schedules accepted by the directors of each firm. In some cases (Companies A, C and D) two visits were required. All the companies were visited between May and July, 2009.

Information was compiled using the aforementioned instruments and completed using several sources. Firstly, different documentation issued by the companies was used, such as organisation charts, process descriptions, statistics, panel information, databases of the respective servers, etc.

Secondly, in-depth interviews were held with a list of previously selected persons chosen depending on their length of service and position in the organisation. Twenty-four interviews lasting an average of 40 to 50 minutes were held with operators, while eight interviews lasting an average of 70 to 90 minutes were held with directors of human resources and operations.

As well as the interviews and documents reviewed, annotations were made from direct observation by the researcher (when visiting the plants). These observations helped with the interpretation of the information.

Using the data collection method, triangulation and the use of several interviews, we managed to reduce the effects of bias.

3.3.2 Category system

According to the information received from the interviews, we assigned the answers to a series of representative categories, with each category including the corresponding questions. We allocated the letter ‘P’ followed by the corresponding number to questions, while answers to the survey were assigned ‘E’ plus the number of the corresponding survey:

1 Evidence of changes in the company: P4 – E7
2 Use of innovative techniques: P3
4 Existence of multifunctional work teams: P6 – E6
5 Motivation for participation/desire to collaborate: P8 – P9 – P10 – E8
6 Agreement with compensation: P11 – E10 – E11
7 Participation spaces to suggest improvements: P7 – P12
8 Training to improve skills: P18
10 Integration of employee in company: P19 – E10 – E13
11 Multifunctional employees: P16 – E9

4 Data analysis and results

We then numbered the employees and directors interviewed in order to study their comments more easily. We also included the number of interviews/surveys carried out, the area that the operator belongs to and the position held by the director (Table 3).

With regard to category 1: ‘Evidence of changes in the company’, when the directors of human resources and/or operations were asked which aspects they would consider positive, they said cost reduction, better working environment, greater operator involvement and an increased number of process improvements. The director of operations of Company A added that “for middle managers, physical work is reduced and thinking work is increased”, referring to a reduction in operational work.

On being asked about negative aspects, the following were mentioned: the length of time required to implement the system, lack of continuity due to a lack of resources or changes in upper management, and resistance by some middle managers who believe that the system puts their continuity at risk.

The latter aspect also arose in some interviews, although no operator openly said so.

With regard to comments made by operators, one stated the following:

“Better results in the management of faulty products. Instead of regarding something as a mistake I started to see it as an opportunity for improvement; 5S management also increased, which has allowed us to improve waste classification and make the working area much tidier” (Operator 3)

Two interviewees in Companies B and F also commented the following:

“We have optimized the availability of machines in the workshop, and also improved working methods, bought more tools and made the working process more orderly; we have also improved cleaning management” (Operator 6)

“Yes, there have been changes and there are more going on. Procedures have been improved, people’s attitudes, too. Managers listen more and suggestions made by operators are taken into consideration” (Operator 21)

One concept expressed by an operator was that by having more training time and, especially, more time off-line to deal with serious problems, opportunities had arisen:

“Yes, I’ve noticed changes. We have more training. We hold a daily five minute meeting in which we are listened to. This has resulted in suggestions for improvement. We have been empowered” (Operator 19)
It can be seen that in general, operators see these changes as a way towards thinking more and making less physical effort. There is more harmony and a balance of brawn and brain in their work, as well as a degree of positive feeling towards the company.

Table 3  Summary of interviews and surveys

<table>
<thead>
<tr>
<th>Companies</th>
<th>Number of interviews carried out</th>
<th>Area/sector</th>
<th>No. allocated</th>
<th>Number of surveys carried out</th>
<th>Position</th>
<th>No. allocated</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3</td>
<td>Quality</td>
<td>1</td>
<td>2</td>
<td>Director of Operations</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality</td>
<td>2</td>
<td></td>
<td>Director of HR</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Production</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>Cold glass</td>
<td>4</td>
<td>2</td>
<td>Director of Operations</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moulds</td>
<td>5</td>
<td></td>
<td>Director of HR</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical workshop</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mechanical workshop</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manufacturing</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>Production</td>
<td>9</td>
<td>1</td>
<td>Director of Operations</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Production</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintenance</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>3</td>
<td>Production</td>
<td>13</td>
<td>1</td>
<td>Director of HR</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Production</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintenance</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>Production</td>
<td>16</td>
<td>1</td>
<td>Director of HR</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Production</td>
<td>17</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Maintenance</td>
<td>18</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Maintenance</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>5</td>
<td>Aviation</td>
<td>20</td>
<td>1</td>
<td>Director of Repairs/ Guarantees</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upholstery-textile</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seats-curtains</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintenance</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

The comments that refer to Category 2 ‘Use of new techniques’ show that operators are aware that they apply new or advanced production techniques in their respective companies, although some are unaware of the technical names for said techniques (operators in Companies D and F). Operators in Company C mentioned TPM,
multifunctional operators, mirror lines (machines placed in parallel lines with one operator working on a small number of these), quality circles and the existence of groups aimed at the constant improvement of processes. These elements were also seen in Companies A and B.

There was also a strong association of the application of 5S practices with LM in all companies.

An operator working for Company A referred to this aspect and suggested that the plant employees were really trained in these kinds of techniques:

“...in my company we apply quality circles, TPM, 5S, SMED and Poka Yoke, and operators are multifunctional” (Operator 1)

When analysing Category 3, operators were positive when asked about a sense of belonging to the company. When asked to offer examples, some responded as follows:

“Personal and family pride due to working for this company, being paid without any problems, social work, training” (Operator 4)

“The working environment, health system and social work carried out” (Operator 15)

“Yes, good working conditions. I would mention training, working environment, salary, the company’s prestigious brand image” (Operator 8)

“Yes, the hours of training each year, working environment, people first, along with the company’s good figures” (Operator 20)

“I have brought my wife and my son to see where I work and what we do. I feel proud to work for this company” (Operator 10)

With regard to the sense of belonging, we can provide the answers offered by directors when asked if they observed a community commitment between directors and employees with regard to production processes. The director of operations at Company A answered that this aspect was reflected in the effort made by operators when offering suggestions, while the director at Company B said:

“Yes, slightly” (Director 3)

The director at Company E said:

“It is the basis of TPM and any management system to be implemented. Without commitment, implementation or execution, it will work for a limited time” (Director 7)

Here we would like to associate (and highlight) the concept offered by the operator at Company A, who said in the previous category, “...yes, in my company...” (Operator 1), so showing a sense of belonging and pride in working for the company. Another operator said:

“Yes, the constant concern of our bosses for reducing risks means that we feel happy working in this company” (Operator 3)

With regard to Category 4, ‘Existence of multifunctional work teams’, the answers given by employees in Companies E and F on the creation of cross-functional working teams refer to the concept of working teams within one area, although one operator in Company E said that the aforementioned teams do exist. As an example of cross-functional teams, an operator in Company B said the following:
“There are mixed teams including personnel from Production, Quality and Maintenance” (Operator 8)

The director of human resources in Company D said:

“Yes, it is normal practice and is often used. Around 70% of employees work in cross-functional teams” (Director 6)

This answer can be contrasted with that given by operators in the same firm, who said that they worked in multifunctional teams. As has already been said, operators in Company E said that working teams were used for some tasks, but not all, to which the director of Human Resources added:

“They did exist at one point” (Director 7)

The director of Company F said that there were no multifunctional teams, but there were a small number of working teams in a single area.

The answers given by operators to questions for Categories 5 and 7 enable us to see that they are highly motivated and keen to offer suggestions for improvement, and that the companies they work for offer them the space they require to do so. When asked why they work in this way, the operators answered:

“We are consulted and trained, and our suggestions are rewarded” (Operator 5)

“Being able to take part in meetings with our bosses and managers” (Operator 8)

“Specialization trips” (Operator 4)

“Challenges, one after another, the setting of clear goals, knowing what the goals are” (Operator 2)

“Being in a front-line company, travelling to the USA, giving a presentation in English to the American Society for Quality” (Operator 1)

“Being able to have a career within the company” (Operator 13)

“Being involved in improvement processes, my suggestions being listened to” (Operator 9)

“Yes, there was a competition of suggestions and new ideas to reduce costs in general” (Operator 23)

We could also see the agreement of directors on recognising that they receive a highly satisfactory number of suggestions for improvement from their operators (Company A). The directors consider that this motivation is based on a healthy working environment that can be perceived through questionnaires, constant training given to operators and the company’s willingness to receive any kind of suggestion, not just those related to production processes, but also others related to any other part of the company.

The director of Company F also said when asked if there were suggestion programmes that the idea was cancelled and that proposals aimed at improvement are not measured formally.

Training is another question that motivates operators and creates a willingness to collaborate. This could be seen in all interviews.

When operators were asked about agreement with compensation (Category 6), they were in general wary and offered brief answers. Only a few operators in Company B said the following:
“It is satisfactory, although it would be better if (our suggestions) were rewarded constantly and based on criteria”, and “acceptable, but could be better” (Operators 8 and 6)

Operators in Company E preferred not to offer their opinion, while the remainder simply said they were in agreement, although in the case of Company F one operator said:

“I don’t think it’s enough” (Operator 23)

However, the manager of Company D said that the company pays salaries above the market average, and that part of the salary is based on the project or work being done.

In the case of Category 8, which refers to training given to employees aimed at improving their skills, we observe a favourable willingness by companies to offer the information, given that they consider this aspect to be important. In Company B we could see a group of operators receiving training as they were performing their field work. The employees said that since LM techniques were used, they had received more training and had improved their output. Operators in Company A (who each receive 45 hours of training a year) and E said:

“Yes, absolutely, my knowledge and skills have increased. I have more knowledge of quality standards and tools. We also receive training in topics related to TPM, 5S, etc., which means we can work in different positions without any problems” (Operator 1)

“Yes, I have more technical knowledge and a positive attitude to my work. I’m not under as much pressure as before” (Operator 16)

We asked this last employee to elaborate on this question, to which he said:

“I receive more training and attend training courses given by the company, which means I feel more secure doing my work and I am more relaxed and under less pressure” (Operator 16)

To confirm the above question, we would like to mention the answer given by an operator in Company F:

"I have more technical knowledge in the field of aviation. I don’t work under so much pressure” (Operator 20)

The rest of the operators interviewed stated similar ideas and said they were happy with the training received from their respective companies. It should be mentioned that of all the companies where operators were interviewed, most employees had completed their secondary school studies in a technical field.

The answers given to Category 9, which refers to job satisfaction, sum up those given to categories 3, 5 and 8. Operators answered that training is fundamental for feeling happy in the company, which means that the sense of belonging is greater, they are extremely motivated to take part in activities such as offering suggestions for improvement and are willing to improve the performance of their activities. They also feel that their companies respond to these initiatives with special compensation, either financial or in kind (Trips, meals, home appliances, courses in higher education, etc.), so rewarding the operator’s contribution.

In this respect, the director of human resources at Company A mentioned a very low degree of absenteeism compared to the market average. This is probably due to the operators’ sense of belonging, degree of satisfaction and motivation, and helps them comply with their obligations very efficiently.
With regard to Category 10, we asked operators if they thought that this kind of working philosophy made the employee feel part of the company. All operators said they did, as the following comments show:

“Yes, it makes you part of the company, creates an integrated organization and permanent interaction between different parts of the organization” (Operator 2)

“Yes, a good environment makes the employee involved and committed to the company” (Operator 6)

“Yes, although you have to be careful how you do it, making everyone feel part of the whole. Being a team and having common goals” (Operator 17)

Finally, Category 11 refers to whether employees feel that rotation in different positions depending on the company’s needs is beneficial and their reasons for saying so. Operators answered that they agreed with rotation and that it was beneficial both for the company and for the employees. Some representative comments are as follows:

“We need rotation, because it allows a wider vision of the organization and means you can be more cross-functional, more multi-specialist” (Operator 3)

“Yes, so we get more knowledge about other areas, that means the company can be more flexible” (Operator 7)

“We need rotation to find out about other areas of the company, to have more knowledge, to be able to offer experience in other areas …” (Operator 11)

“Yes, it means you are multifunctional and better prepared and creates more flexibility, starting with people” (Operator 20)

Nevertheless, there was also some discrepancy regarding the answers given. When asked about rotation in his company the manager of Company F said:

“No. There are limitations due to regulations” (Director 8)

This answer relates to the answer offered by operator 20 who mentioned the ‘potential’ of achieving flexibility through rotation.

Table 4  Matrix of answers from interviews with operators (compiled in categories)

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Source: Authors
To sum up the answers given, we have allocated a positive evaluation (+) when all interviewees answered in a positive manner; (+/−) when one or several operators answered negatively; and finally, (−) when all answered negatively or failed to respond (Table 4).

**Figure 1** Model of employee in-company integration depending on implementation of LM (see online version for colours)

![Diagram](image)

Source: Authors

Figure 1 shows a model of employee integration in the company via the implementation of LM practices related to human resources management. We have used the different categories studied and the respective interaction between said categories. This model shows that when operators are asked about changes in processes and working organisation in companies that use LM, they answer that the changes are due to the use of the new techniques included in LM and, with regard to human resources, they are encouraged to get involved by offering ideas, receiving more training and being organised into multifunctional teams.

More training means multifunctional employees and facilitates rotation in different positions and the creation of multifunctional teams.

Training received by operators, along with the possibility of participation offered by the company, generates positive motivation and a willingness to participate more actively, so developing a sense of belonging, which leads to a feeling of job satisfaction and being integrated in the company.
5 Conclusions and future lines of research

This study offers a different point of view from research carried out by other authors on the impact of LM on human resources (De Treville and Antonakis, 2006; Shah and Ward, 2007) by including the ‘voice of the operator’ and contrasting it with information received from directors. We have studied the effects of the implementation of LM on human resources in more detail by offering an integrated model compiled in Figure 1 that shows the evolution of employee integration in the company over time depending on the adoption of practices included in LM.

The results of the interviews and questionnaires carried out along with our direct observation during visits made to different areas of the companies analysed enable us to draw the following conclusions:

• A greater degree of implementation of LM leads to a higher degree of participation and decision-making by employees. This can be deduced by appreciating more autonomy and a higher degree of decentralisation of authority to employees, as reflected in the positive attitude observed during the interviews: they spoke emphatically, with knowledge and conviction and always offered examples of what they were trying to explain and/or concrete facts. This also became clear in the visits made to different companies, where groups of employees could be observed in certain areas holding planning meetings, brainstorming sessions or analysing possible improvements to processes. These meetings involved employees working in the same area or other areas, without management involvement.

• On being involved and committed to the solving of problems and being able to offer suggestions, operators present a higher degree of motivation when performing their tasks. The initiative and proactive attitude observed in these visits to companies and/or in meetings held with operators enable us to deduce that involving employees produces a catalyst effect or incentive that increases their level of motivation.

• Companies with a higher degree of LM implementation are also the companies that receive more suggestions from operators. This is a concrete fact that differentiates companies that use LM practices to improve their processes from those that use conventional practices.

• Companies that have made the most progress in the implementation of LM are also those whose employees claim to have more and better skills to carry out their tasks. This can be seen in terms of knowledge/know-how as well as manual skills. There is a higher intellectual level, a global vision of the process, more arguments are offered to justify an idea, there is more integrated thinking, including aspects such as production process management, quality, maintenance and, in some cases, aspects of logistical management. It could definitely be seen that this empowerment leads to the employees feeling that they are the owners of their positions, processes and/or areas.

• Companies with a higher degree of LM implementation also have a higher number of multifunctional employees due to the training given and their rotation through different positions, which enables them to acquire more skills. This creates flexibility within the company and also increases the employee’s degree of employability. In many companies interviewed, we could observe multifunctional employees and the existence of self-managed working groups. It should be added that some companies
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rotate their operators crosswise, while others do so vertically in order to improve skills and knowledge.

- The most outstanding finding is that the level of LM implementation in companies does not lead to more variable incentive systems. In our field work we could see that there is no clear definition given by directors of how to improve the variable part of employees’ salaries.

This work does not lack limitations. It is important to mention that there is still much to be studied regarding the nature of changes in working organisations using LM and how these changes affect the behaviour and conduct of the employee, especially from the psychological point of view. It is also interesting to study how these changes affect security, commitment to the job and an increased degree of motivation regarding tasks.

As we have said, companies that have made progress in the implementation of LM have resulted in improved productivity and process quality, which leads to a higher degree of efficiency by eliminating sources of waste. Similarly, and in practically all companies interviewed, on an employee level progress in the degree of implementation of LM permits the development of positive aspects related to an increase in employee participation, motivation and engagement with LM, with the offering of suggestions for improvement and a higher degree of commitment to the company, leading to a better working environment and, simultaneously, better psychological working conditions.

Despite the above, we also observed that the companies consulted have considered the question of economic compensation, incentives, rewards, distinctions, etc. superficially. Future research in this field should cover the underlying causes of this in greater detail.

Another point to consider is that in some companies the directors interviewed have no doubts regarding the efficiency of lean practices, and even fewer doubts regarding improvements to the company’s results. Nevertheless, and in consideration of frequent economic, financial and socio-cultural fluctuations, in turbulent times directors are sometimes inclined towards more orthodox methods implemented more efficiently.

In light of the above questions, we propose some future lines of research that should cover aspects relating to:

1 Developing a model that includes quality-quantitative aspects, employees’ skills, degree of commitment to the organisation and the offering of improvements in tasks and/or processes controlled by the employees and that enable companies to reward their employees in an efficient manner.

2 It could be observed that LM is implemented to a higher degree in organisations where the staff includes a higher percentage of technically-qualified employees. In this respect, research should study these contexts in more detail to find out the true causes behind these results.

References


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Notes