A configurational approach to the adoption of management innovation. The case of a lean transformation in the food industry

Giancarlo Lauto
University of Udine
Department of Economics and Statistics
giancarlo.lauto@uniud.it

Nicole Belfanti
McKinsey & Co.
Lean Experience Factory
nicole.belfanti@mckinsey.com

Abstract
This paper examines how the interplay between individual behaviours and organisational practices support the successful introduction of management innovation, namely the transformation of the production process according to the principles of lean management. The investigation concerns specifically how the efficacy of training, pro-change and anti-change behaviour and experience of employees combine into configurations leading to the change in the work practices according to the lean principles. This conceptual model has been empirically explored by means of a fuzzy-set Qualitative Comparative Analysis conducted on the behaviours and perceptions of operators of an Italian SME in the food processing industry that has completed a lean transformation project. The study finds that to improve organisational performance it is sufficient that a critical mass of operators changes their work practices. It also finds four equifinal configurations leading to a change of operators’ work practices. Specifically, training emerges as a critical variable for the success of a lean transformation, but its effect may be replaced by pro-change behaviour. Under specific conditions, the operators’ experience fosters the transformation. This paper contributes to the literature on the people-related drivers of lean transformation by considering the systemic interplay among its drivers. Furthermore, it brings together the literature on lean management and change management.
A configurational approach to the adoption of management innovation.  
The case of a lean transformation in the food industry

Abstract

This paper examines how the interplay between individual behaviours and organisational practices support the successful introduction of a management innovation, namely the transformation of production process according to the principles of lean management. The investigation concerns specifically how the efficacy of training, pro-change and anti-change behaviour and experience of employees combine into configurations leading to the change in the work practices according to the lean principles.

This conceptual model has been empirically explored by means of a fuzzy-set Qualitative Comparative Analysis conducted on the behaviors and perceptions of operators of an Italian SME in food processing industry that has completed a lean transformation project. The study finds that to improve organisational performance it is sufficient that a critical mass of operators changes their work practices. It also finds four equifinal configurations leading to a change of operators’ work practices. Specifically, training emerges as a critical variable for the success of a lean transformation, but its effect may be replaced by pro-change behaviour. Under specific conditions, operators’ experience fosters the transformation.

This paper contributes to the literature on the people-related drivers of lean transformation by considering the systemic interplay among its drivers. Furthermore, it brings together the literature of lean management and change management.
1. Introduction

Saying that people are the core of organizations inspired by the principles of lean management may sound like stating the obvious. However, traditionally, the literature on “lean transformation”, i.e. the introduction of the lean management principles and techniques in a firm previously organized according to Fordism, or a un-structured, setting (Womack, Jones, & Ross, 1990), has focused on the technical dimension of the topic, looking at how to develop techniques to efficiently manage materials, equipment and technology (Mónica Ordiz-Fuertes & Fernández-Sánchez, 2003). Although several studies point out the relevance of people and of Human Resource Management (HRM) as core components of an ongoing lean organization (Forza, 1996; Parasuraman & Alutto, 1981; Power & Sohal, 1997; Power & Sohal, 2000; Tortorella & Fogliatto, 2014), they tend to focus on the relationship between implementation of HRM practices and the outcomes of a lean transformation (Martínez-Jurado et al., 2013). Surprisingly, this literature has paid little attention to the process of adoption and implementation, i.e. the initial stage of a lean transformation that entails the transition from a “traditional” to a “lean” organization, and to the reactions of the people involved in the various stages of the process.

The lack of attention to the people who take part in a lean transformation seems to resemble a general trend found also in the studies on change management. The bulk of the literature in this field focuses on the planning stage and on change agents; only recently, scholars have paid the due attention to the recipients of change, examining how their attitudes and behaviour affect a change initiative (Oreg, Bartunek, Lee, & Do, 2016).

We suggest that to understand the transformation of a business process according to the Lean principles, researchers should adopt a perspective that acknowledges the role of the people involved in the process.

The primary aim of this paper is to integrate the reactions of recipients of change in a theoretical framework explaining the contribution of the human factor to successful lean transformation.

Our analytical effort entails the appreciation of the interdependence between HRM practices and reactions of recipients to change. Among HRM practices, we focus our attention on training, due to its role in transferring knowledge about the technicalities of lean management as well as on the underlying philosophy. In other words, training emerges as a trigger of the cultural change that is needed for the introduction and sustainability of a lean system.

In our effort to introduce the reactions of recipients of change into the discourse of successful lean transformation, we adopt the lenses offered by the stream of studies that re-conceptualize the phenomenon of “resistance to change” as a feature of organisational systems, rather than an
inclination of individuals (e.g. Dent & Goldberg, 1999; Oreg, 2003; Oreg, Vakola, & Armenakis, 2011; Piderit, 2000). Specifically, we focus on two distinct behavioural reactions to change: pro-change and anti-change behaviour (Peccei, Giangreco, & Sebastiano, 2011).

In this vein, we adopt a configurational stance, which acknowledges that organisational outcomes, such as lean transformation, depend on the combined effect of multiple factors; in this study, we focus on people perception of the efficacy of a HRM practice, i.e. training, and their attitude toward organisational change. Therefore, differently, from the outstanding studies, we are not much interested in understanding whether a given factor is, per se, conducive to successful lean transformation, or in its differential contribution vis a vis other factors. Rather, we aim at understanding the trade-offs and complementarities existing among factors at different organisational levels in the context of a lean transformation.

Methodologically, we carry out a Qualitative Comparative Analysis (QCA) (Ragin, 2000, 2008) on the personnel of a small firm in the food industry that implemented one lean transformation project concerning part of its production process. Our investigation is carried out at the individual level and addresses the relationship between the perceived impact of HRM practices and the kind of reactions to change, on one side, and the extent to which different aspects of a lean transformation have been accomplished. Thanks to QCA, we identify the combinations of conditions – rather than the effect of each factor – that explain the adoption of working behaviours consistent with the lean approach by operators. This approach defines each personnel member as a configuration of characteristics relative to the aforementioned factors and compares individuals to one another to identify the configuration or configurations of characteristics that cause the adoption of lean practices.

The study of this case of lean transformation offers a threefold contribution to the literature. First, we contribute to the studies on lean management, and specifically to the stream addressing the role of HRM, by introducing the role of reactions to change within the theoretical conceptualization of the phenomenon. Therefore, we acknowledge the nature of lean transformation as organisational change, a notion that is still implicit in the literature, notwithstanding the ongoing shift of the debate from technical to the organisational side of the phenomenon. Our second contribution concerns indeed the studies on change management, as we provide empirical evidence on the role of recipients of change in the process, answering a call for a better understanding of these actors of the process. Our results corroborate an understanding of “resistance to change” as an element of the organisational system, rather than an individual inclination. Third, by bringing together the literature on lean management and change management, we highlight the interdependent nature of the relationship between HRM and individual reactions to change, thus contributing to the advancement of a systemic perspective in organisational studies. Finally, as we address the case of a
small firm, we provide empirical evidence to the field of lean management in small and medium firms, that, despite the prevalence in industrial systems, is still under-researched.

The remainder of the paper is structured as follow. We outline the background of our study, focusing on the bodies of literature on the relationship between HRM and lean management and on resistance to change. Then we present the analytical approach and the case study. We present the results and the preliminary discussion.

2. The centrality of people in lean management systems

2.1 An analytical framework

In line with our understanding of lean transformations as projects of organisational change, we adopt an analytical framework that distinguishes the role of HRM as a component of a lean management system and as a mechanism to bring about the transformation; we also acknowledge that the reactions of those involved in the change affect the outcomes of the transformation. Furthermore, we disentangle the outcomes of the transformation along two levels: the changes of operators’ working behaviour and the improvements of organisational performance along the multiple dimensions that are relevant to lean management. The former refers to the extent to which the transformation initiative has produced an alignment of the individuals’ work practice with the principles of the lean philosophy, while the latter considers the performance of the whole production system (e.g. customer satisfaction; cycle time; efficiency). Figure 1 summarizes the analytical model that we adopt to review the relevant literature.

**Figure 1 – Analytical model that guides our literature review**

2.2 Features of lean management systems
Lean management is a managerial philosophy aimed at delivering products and services to fully satisfy customers’ needs while economizing on the use of resources by eliminating or reducing waste and increasing operational efficiency (Krafcik, 1988; Womack et al., 1990). Lean management systems involve a set of “attitudes, decision and actions” that implement a hybrid system in which the bundling of original elements and principles rooted in Taylorism allow an increase of variety and efficiency compared to mass production (Holweg, 2007). According to the concept of a “lean enterprise”, lean thinking can be extended from the manufacturing to all business processes (Womack & Jones, 2003).

Lean transformation enables the achievement of performance goals such as “greater flexibility, reduced lead time, improved speed in order processing, smaller batch sizes and increased profits” (Dubey & Singh, 2015) that strengthen the competitive position of a firm.

In addition to the general principles of customer orientation, continuous improvement, and creation of higher quality and lower cost, lean management consists of a series of design principles for operations.

Specifically, they refer to the features of the process (e.g. pull systems, just-in-time, uniform workload, quick changeover techniques), to quality management (standard operation procedures, continuous improvement, systematic problem solving), to preventive maintenance and to the empowerment of operators, as well as to management practices (e.g. genchi genbutsu, project management) (Bonavia & Marin-Garcia, 2011; Liker, 2004; Shah & Ward, 2003).

The literature on lean management is unanimous in emphasizing its process nature, as suggested by the goals of continuous improvement and systematic problem solving (Forza, 1996; Pakdil & Leonard, 2014; Yasin, Small, & Wafa, 1997). Indeed, the implementation of the general and operational principles of lean management requires operators to change their mind-sets and their behaviour on the floor.

Lean production systems broaden the job in several ways, thus increasing its meaningfulness. For instance, employees have the right/duty of interrupting the production flow whenever they notice anomalies, the possibility of exchanging positions within the team when needed, the opportunity to contribute to continuous improvement by means of problem-solving and to suggestion programs (Forza, 1996; Fullerton, Wempe, & Fullerton, 2009; Rachna Shah & Ward, 2007).

The notion that the human factor is one of the pillars of Lean Management (Moyano-Fuentes & Sacristán-Díaz, 2012) is deeply rooted in the history of the approach, that was originally named “Respect for Humanity System” as it emphasized the goal of humanizing work and advancing society (Jadhav, Shankar, & Santosh, 2014). Virtually all subsequent conceptualizations acknowledge such
central role of people: for instance, Liker (2004) argues that their skills endowment and their ability to learn enable the implementation of a production system. Importantly, the definition of “people” includes shop-floor workers, support employees, managers, change leaders and all the partners involved in the production system. It is worth noticing that the centrality of people characterizes not only production systems that operate according to a Lean approach, but also the process of transition towards a Lean organization. The implementation of such process requires change leaders to appreciate how people perceive a transitional environment, as their working conditions are going to be substantially altered (Hasle, Bojesen, Jensen, & Bramming, 2012; Tortorella & Fogliatto, 2014).

For this reason, it is relevant to investigate what HRM practices a firm can deploy to facilitate the implementation of a lean management system, and how operators can react to such interventions.

3. The role of HRM in the process of lean management adoption

According to a “strategic” view of HRM, the elements of a HRM system are designed in order to produce outcomes that are relevant for the multiple stakeholders that influence the effectiveness and survival of an organization (Jackson, Schuler, & Jiang, 2013). The literature on HRM has developed an inventory of practices that refer to the areas of compensation and benefits, job, and work design, training and development, recruiting and selection, employee relations, communication, performance management and appraisal, and promotions (Posthuma, Campion, Masimova, & Campion, 2013).

Adoption of specific HRM practices has been related to organisational goals such as productivity, quality, service level, growth and profits (Fu, Flood, Bosak, Morris, & Regan, 2015); furthermore, the practices proposed by this approach can be related also to the goal of Lean management systems. We argue that the practices referring to the following areas affect the process of Lean transformation: objective performance measures; performance-based compensation; team-based job design and job enlargement; dedicated communication tools; transformation-oriented training. In our analytical effort, we do not consider one core area of HRM practices, namely recruitment, and selection, because our interest concerns transformations that involve the existing workforce of the organization and do not require initiating a recruitment process.

3.1 Objective performance measures for Lean transformations

A sustainable Lean transformation rests on a long-term strategy that defines the overall aspirations that the organization wants to accomplish and the relationships between specific
interventions in which the transformation is structured (Bhasin, 2012; Hines, Holweg, & Rich, 2004). In particular, it helps to disentangle possible trade-off among multiple goals, such as costs, quality, delivery and flexibility (Hallgren & Olhager, 2009). Moreover, strategic planning entails the definition of the costs and the duration of the project, which are important parameters to gauge the success of the initiative (Achanga, Shehab, Roy, & Nelder, 2006).

Often, instead, organizations outline a transformation project relying on common sense judgment rather than on logical justification. This approach is very risky because the implementation of Lean techniques not supported by a deliberate strategy is likely to reduce employees’ confidence in the initiative and therefore to undermine their willingness to support it (Karim & Arif-Uz-Zaman, 2013). Indeed, as employees’ involvement is one of the internal factors that could support or hinder strategy implementation (Alagaraja & Egan, 2013), it is important for the organization to stimulate their alignment to the change goals.

The existence of a performance management system tailored to the specific strategic goals is, therefore, necessary to support the transformation (Pakdil & Leonard, 2014). A Lean transformation requires an assessment that highlights the starting situation of the organization, the gap between the desired state and the ongoing progress (Martínez-Jurado & Moyano-Fuentes, 2014; Pakdil & Leonard, 2014).

Fullerton et al. (2009) propose that lean-oriented performance measurement system should integrated financial measures with non-financial ones, that are more suitable to capture information that is relevant for the measurement of strategy implementation. Features of well-designed performance measurement systems include clarity, simplicity and visual representation of information.

Properly designed measurement systems, positively influence on employees’ involvement, arguably because they engender a sense of ownership in the results among the employees, offer a straightforward indication of the targets and reinforce collective responsibilities (Sterling & Boxall, 2013). Fullerton et al. (2009) also found that the adoption of non-financial measures impacts positively on financial performance. By contrast, the lack of a “clear understanding of lean performance and its measurement” is a significant reason of failure (Karim & Arif-Uz-Zaman, 2013).

3.2 Reward systems for Lean transformations

A formal performance measurement system is a precondition for the introduction of a reward system. Generally speaking, rewards are one of the motivators which can contribute to the
development of positive employees attitudes like job involvement (Bessant & Caffyn, 1997; Boon, Arumugam, Safa, & Bakar, 2007; Lawler, 1994).

Although a form of extrinsic motivation for the employees, the fairness of rewards are associated with employee involvement (Maden, 2015).

Given its importance in influencing employees’ behaviour, a Lean transformation should critically review the existing reward system of an organization (Power & Sohal, 2000). Bhasin (2012) suggests that the transformation effort is sustained by rewards based on continuous improvement measures, operational efficiency, employees’ participation and teamwork, and short-term results. Organizations should implement both monetary and non-monetary rewards, according to the stage of the transformation (Martínez-Jurado et al., 2013).

3.3 Job design for Lean transformations

Lean principles offer guidance about organisational design at micro- and macro-level. Therefore, it is possible to expect that organizations that already embody such principles face fewer constraints during a Lean transformation.

At micro-level, in Lean organizations work is organized in self-directed teams composed of the multi-skilled and multi-functional workforce, characterized by high levels of job rotation within the team. Teams are entrusted with authority over work decisions and problem-solving responsibility (Forza, 1996; Kabst, Holt, & Bramming, 1996; Karlsson & Ahlstrom, 1996; Martínez-Jurado et al., 2013; Moyano-Fuentes & Sacristán-Díaz, 2012; Power & Sohal, 1997; Sterling & Boxall, 2013). Consequences of teamwork are a decrease in the number of job classifications, an increase of flexibility and a reduction of vulnerability in the production system (Karlsson & Ahlstrom, 1996). Moreover, enhanced capabilities in problem-solving enable the experimentation of lean principles on the field that foster learning and, accordingly, operational performance (Sterling & Boxall, 2013).

Increased teamwork, multi-skilled workforce, enlarged responsibilities and collaborative environment lessen the necessity of supervision, which enable a reduction of hierarchical levels (Forza, 1996; Ingvaldsen & Benders, 2016; Kabst et al., 1996). In particular, teamwork positively facilitates the meeting of affiliates need with the workplace. This organisational arrangement allows reducing the span-of-control and shifts the job of supervisors from controlling to coaching (Ingvaldsen & Benders, 2016).

Managers play the role of enablers, culture setters and supporters (Lawler, 1994). In the context of a Lean transformation, managers play a role not only of strategic planning tasks but even in the operational side through genchi genbutzu that actively involve them in the shop-floor (Marksberry,
Badurdeen, & Maginnis, 2011). Moreover, their attitude towards employees is expected to constantly communicate respect, if they do not want to generate discouragement and the consequent failure of the implementation (Worley & Doolen, 2006).

3.4 Communication strategy for Lean transformations

Organisational communication refers to the process of sharing information with other individuals (Boon et al., 2007). Effective communication is one of the success factors in Lean transformations because it can accelerate the speed of the process and contributes to its sustainability (Alagaraja & Egan, 2013; Chay, Xu, Tiwari, & Chay, 2015). Communication is considered effective when an organization is capable to transmit accurate, relevant and understandable information among its employees (Worley & Doolen, 2006). In the context of a Lean transformation, frequent and open communication is regarded as a success factor (Martínez-Jurado & Moyano-Fuentes, 2014; Power & Sohal, 2000). In particular, the organization should implement both bottom-up and top-down communication channels (Kabst et al., 1996): the first one informs employees about managerial decisions while the second one allows employees to voice their demands, opinion and wishes to the management. The latter channel enables the feedback process that is critical for Lean transformations (Fullerton et al., 2009; Power & Sohal, 2000; Worley & Doolen, 2006).

Effective organisational communication fosters trust among employees who are more willing to share information, knowledge, and thoughts; an environment that favours this kind of openness in communication is positively connected with employees’ involvement (Thomas, Zolin, & Hartman, 2009).

3.5 Training in Lean transformations

Lean training programs typically pursue two sets of goals: improving and extending employees skills of employees, so that can effectively work in a team; embedding Lean Management values and principles in employees (Kabst et al., 1996). Training is needed in a transformation because Lean management systems increase employees’ responsibilities, including contribution to continuous improvement, and require them to collaborate within teams (Dubey & Singh, 2015). Therefore, employees are requested to develop work-related skills as well as a new mind-set (Martínez-Jurado et al., 2013). Indeed, training is a powerful tool to promote an approach towards systematically “learning new things at work” (Lorenz & Valeyre, 2005).
Training programs should address all the people involved in a transformation (Kabst et al., 1996), and specific initiative should target supervisors and managers, who are going to redefine their role and their relationship with the workforce (Power & Sohal, 1997).

Lean training reduces the time needed to implement the transformation (Bhasin, 2012), facilitates the achievement of the goals (Boyer, 1996; Davy, 1992; Dubey & Singh, 2015; Marin-Garcia & Bonavia, 2015) and reduces the resistance to change (Power & Sohal, 1997). However, organizations are sometimes reluctant to engage their employees in training programs because of the investment they require (Boyer, 1996; Taylor, Taylor, & McSweeney, 2013), exposing the transformation to the risk of failure (Bhasin, 2012).

Partially distant from this perspective (Mónica Ordiz-Fuertes & Fernández-Sánchez, 2003) assert that the less the experience accumulated by workers in the existing practices, the easier will be the implementation of HRM practices.

**4. Reactions to change**

The literature on change management has long explored the topic of reactions to change according to a perspective that conceptualized the phenomenon as a “resistance” that change agents should overcome (Oreg et al., 2016). This understanding stems from an enduring misinterpretation of the classic Kurt Lewin’s (1952) model of force field analysis (Dent & Goldberg, 1999): while Lewin’s model puts forward the systemic nature of change and the necessity of alignment of all the components of an organization towards the goal of change, subsequent interpretation equated the reactions of those involved in the change to resistance.

This interpretation of Lewin’s work is reflected in definitions of resistance to change such as Zaltman & Duncan (1977) who characterize it as ‘*any conduct that serves to maintain the status quo in the face of pressure to alter the status quo*’ (p. 63). Therefore, this point of view blames the individual as the source of resistance and pictured it as the “force” that constrain the adoption of a change program. This view called for a role of change leaders as those entrusted of a reducing or eliminating opposing behaviours of the recipients (Dent & Goldberg, 1999; Ford, Ford, & McNamara, 2002).

Only recently, the literature has acknowledged that resistance to change can be found anywhere in an organisational system and that it is a physiologic phenomenon that may not necessarily be a negative event (Dent & Goldberg, 1999). Indeed, resistance to change may be considered as a source of feedback that ultimately contributes to the success of a change initiative (King & Anderson, 1995; Marris, 1993).
The individual reactions to change can be understood at the emotional, cognitive and intentional level (Piderit, 2000). In particular, the emotional level concerns reactions such as the stress or the pleasantness that the change initiative provokes in the individual; the cognitive reaction entails the beliefs and evaluation towards the change initiative; the intentional level deals with the level of involvement, the intentions and the coping behaviours that the individual performs (Oreg et al., 2011). This analytical framework recognizes that recipients may show apathy or withdraw from the change, instead of performing explicit behaviours that actively support (Jones, Jimmieson, & Griffiths, 2005; Lam & Schaubroeck, 2000; Oreg, 2003) or resist the change (Bovey & Hede, 2003). Typically, this behaviour does not arise because people resist the change per se, but because they are concerned with the way the change process is carried out and/or with the expected outcome of the change (Oreg, 2006).

The factors affecting the process of change include the extent to which recipients are involved in the planning and execution of the initiative, the trust in the change agents, the efficacy of the communication and in particular the existence of a two-way channel, and the perceived procedural fairness of the intervention.

With regard to the content of the change, individual resistance may arise because people fear that the change would bring a loss of status, compensation or comfort (Dent & Goldberg, 1999; Pugh, 1993). Indeed, a change initiative may alter “job content, introduce new and unknown tasks, disrupt established ways of working, reshape social work relationships, reduce autonomy and authority, and lower status” (Giangreco & Peccei, 2005, p.1817).

The multi-level conceptualization of reactions to change highlights the difference between the cognitive and the behavioural dimension of the phenomenon: the former refers to the way in which individuals appreciate the change in terms of alignment with their interests; the latter deals with their involvement in the change initiative. Within this dimension, the distinction between of pro-change and anti-change behaviour (Fuchs & Edwards, 2012; Giangreco & Peccei, 2005; Peccei et al., 2011) is useful to characterize the active reactions to change. In particular, pro-change behaviour refers to an effort that a recipient to change makes, beyond their duties and obligations, in order to accomplish the change initiative (Armenakis & Bedeian, 1999; Klein & Sorra, 1996). Anti-change behaviour entails a lack of cooperation with the vision and the activities outlined in the change project that undermines its implementation (Herscovitch & Meyer, 2002). Giangreco & Peccei (2005) appreciate the difference in intensity of forms of anti-change behaviour, distinguishing between explicit forms of opposition at collective (e.g. strikes) or individual level (e.g. speaking out against the change in public) on one side, and covert dissent on the other.
The distinction between pro-change and anti-change behaviour fosters a conceptualization of “resistance to change” as the outcome of the presence of anti-change behaviours and absence of sufficiently strong pro-change behaviours as posited by Herscovitch & Meyer (2002) and by Giangreco & Peccei (2005). We argue that this articulation of the concept is consistent with a configurational view of the change process, according to which the same outcome (support or resistance to change) may derive by different combinations of behaviours along multiple dimensions.

The literature suggests that these reactions to change may have multiple antecedents in terms of characteristics of the change recipient (such as dispositions, motivational needs, and demographics), but also that recipients of change may show multiple, confounded and ambivalent reactions (McLoughlin, Badham, & Palmer, 2005; Oreg, Vakola, & Armenakis, 2011). The holistic view of reactions to change suggested by this stream of literature, allows for the possibility that an individual feels anxious about the loss of status or working conditions, despite acknowledging the benefits of change.

Some studies have examined the effect of negative reactions to change in the context of lean transformations, reiterating the findings of the general literature. For instance, in their study of a case of unsuccessful lean adoption, Turesky & Connell (2010) identified the mistrust between operators and change agents as one of the causes of resistance that eventually compromised the project. Interestingly, they also found that tenure in the firm has a negative relationship with the willingness to change working practices and behaviours.

5. Research design

5.1 Case selection

We conducted a case study with the purpose of building theory on how individual attitudes towards change interact with bundles of HRM practices, and training in particular, in the adoption of lean practices and its overall success. As the literature review in the previous section shows, previous studies have analysed the relationship between HRM practices and successful lean transformation; however, the systemic effect of attitudes toward change, HRM practices and adoption of lean practices that are consistent with the lean philosophy is much less understood and demands a conceptualization effort. In particular, our theoretical effort is to disentangle the patterns leading to success or failure of a transformation assuming that the causal factors may be different. The adoption of a case study methodology appears consistent with the theory building aim of this study (Voss et al., 2002).
We adopted a theoretical sampling strategy (Eisenhardt & Graebner, 2007) that is suitable to stimulate theory building as it facilitates pattern recognition in the data, and points toward contrasting or even extreme patterns (Jugdev & LaFramboise, 2010). We identified Alpha (a pseudonym used to retain anonymity) as our case study because it operates in the food processing industry, in which Lean Management is difficult to implement. Indeed, the in-process industries, nature of production and unstable demand represent obstacles in implementing lean practices (Panwar, Nepal, Jain, & Rathore, 2015) that are exasperated by the limited room for manoeuvre of change agents due to the health regulations. Furthermore, in Alpha, the change team was entirely composed of firm members and did not have a specific background as professional trainers in Lean management.

In such conditions, one may expect that non-professional training could produce only limited impact on the outcomes of the transformation, given the contextual challenge; by contrast, in industries in which Lean management is easier to implement, trainers find a much more fertile environment and the impact of their intervention is expected to be more noticeable.

5.2 Data sources and triangulation

We collected data from multiple sources. For the purposes of case selection and for an initial outline of the empirical setting, we examined public sources, including websites, social media, and press releases. Subsequently, we generated primary data through field visits and interviews with members of the top management team of the firms. We administered a questionnaire to all the employees involved in the transformation, investigating a broad range of issues related to the transformation. Triangulation was achieved by interviewing different firm representatives and by verifying information with secondary sources.

5.3 Causal conditions and outcome

Based on the theoretical framework/literature review outlined in the previous section, we identified the following conditions that operationalize the theoretical notions. As the data were collected through our survey at the same point in time, from the same respondent and using the same medium, we adopted the remedies indicated by Podsakoff, MacKenzie, Lee, & Podsakoff (2003) to limit common method bias.

Table 1 presents the item making up the conditions and the original source of the scale. These conditions were measured through the questionnaire with 7-point Likert scales. Furthermore, we considered the Tenure of the operator in the firm, distinguishing four age brackets: less than 3 years,
3 to 5, 6 to 10, more than 10. Tenure or expertise of operators was considered because some studies argue that it is an important driver of successful lean transformation (Karim & Arif-Uz-Zaman, 2013; Moyano-Fuentes & Sacristán-Díaz, 2012), although its actual role is debated, with other scholars finding opposite results (Mónica Ordiz-Fuertes & Fernández-Sánchez, 2003).

**Table 1 – Conditions and scales**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Items</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption of lean practices</td>
<td>After the lean transformation, I and my colleagues:</td>
<td>Padkil &amp; Leonard, 2014</td>
</tr>
<tr>
<td></td>
<td>Stop the process in case of defects.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carry out preventive maintenance.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adopt 5S techniques.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Follow standard operating procedures</td>
<td></td>
</tr>
<tr>
<td>Pro-change behaviour</td>
<td>I am doing more than required from me to help the organization to bring about the change</td>
<td>Giangreco and Peccei (2005)</td>
</tr>
<tr>
<td></td>
<td>I co-operate actively to realize the change</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I promote change with enthusiasm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I try to convince others of the appropriateness of the change</td>
<td></td>
</tr>
<tr>
<td>Anti-change behaviour</td>
<td>I am critical about the change with superiors</td>
<td>Giangreco and Peccei (2005)</td>
</tr>
<tr>
<td></td>
<td>I am critical about the change with colleagues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I support actions of colleagues against the change</td>
<td></td>
</tr>
<tr>
<td>Efficacy of training</td>
<td>During the transformation, operators received an appropriate level of training</td>
<td>Mason (2008)</td>
</tr>
<tr>
<td></td>
<td>My knowledge of lean techniques is adequate to apply them on the job</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thanks to training, I have learned to do new jobs</td>
<td></td>
</tr>
<tr>
<td>Teamwork</td>
<td>Work in this firm is appointed around groups</td>
<td>Boon (2007)</td>
</tr>
<tr>
<td></td>
<td>I am more comfortable working in a team rather than individually</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When problems emerge, the firm establish teams to solve them</td>
<td></td>
</tr>
<tr>
<td></td>
<td>My colleagues help me if needed</td>
<td></td>
</tr>
<tr>
<td>Culture</td>
<td>The firm pays great attention to people</td>
<td>Ordiz-Furtes (2003); Bhasin (2011)</td>
</tr>
<tr>
<td></td>
<td>Change is natural and necessary in this firm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>My supervisor trusts me</td>
<td></td>
</tr>
</tbody>
</table>
The firms encourages me to express my ideas and improve my job. My supervisor is willing to collaborate with me, if needed.

Performance indicators
- Performance indicators linked to the lean philosophy exist
- The indicators are connected to the firm strategy
- The indicators are clear and easy to understand
- The indicators guide my action

Performance indicators linked to the firm strategy exist. The indicators are connected to the firm strategy. The indicators are clear and easy to understand. The indicators guide my action.

Fullerton (2014); Bhasin (2011)

Rewards
- The firm acknowledges the individual and team contribution during the transformation
- The firm acknowledges the efforts to improve quality during the transformation
- All the ideas for improvement during the transformation have been acknowledged
- Rewards have been clearly communicated

The firm acknowledges the individual and team contribution during the transformation. The firm acknowledges the efforts to improve quality during the transformation. All the ideas for improvement during the transformation have been acknowledged. Rewards have been clearly communicated.

Boon (2007)

Support
- My supervisor is engaged in continuous improvement during the lean transformation
- My supervisor devotes enough resources (time; tools) to the lean transformation
- My supervisor shares with me the information that is relevant for the transformation
- My supervisor believes that entrusting me responsibility stimulates my team to work better.

My supervisor is engaged in continuous improvement during the lean transformation. My supervisor devotes enough resources (time; tools) to the lean transformation. My supervisor shares with me the information that is relevant for the transformation. My supervisor believes that entrusting me responsibility stimulates my team to work better.

Bhasin (2011); Ordiz-Fuertes (2003)

5.4 Analytical strategy

We adopted the technique of QCA for the analysis of the survey data. QCA is a method that builds on set theory with the goal of analysing how configurations of explanatory conditions cause a specific outcome. It focuses on the effect of the constellation of elements, rather than on the effect of single elements in isolation from others (Furnari & Grandori, 2013).

Compared to inferential analysis, QCA presents properties that make it suitable to investigate complex systems. First, it allows equifinality, i.e. the possibility that there are multiple combinations of conditions explaining the same outcome. Second, it does not assume uniformity of causal effects, i.e. a given element may cause or prevent the outcome, depending on the state of the other elements. Third, it does not assume causal symmetry, i.e. it does not assume that if the presence of a condition causes the outcome, the absence of such condition causes the absence of the outcome. Therefore, this method requires distinct analyses to identify the causes, the presence, and the absence of the outcome.
Fourth, it distinguishes between necessary and sufficient conditions. A condition is necessary if it is always present when the outcome occurs, while it is sufficient if the outcome always occurs when the condition is present. This notion represents an important improvement from the conventional thinking, in which the two conditions are generally assumed as simultaneous (Furnari & Grandori, 2013; Ragin & Rihoux, 2009).

5.5 Procedure

QCA assumes that each case (in our study, each operator) is a member of multiple sets (e.g. the set of pro-change individuals; the set of those who received appropriate training) and, by means of an algorithm, it reduces the possible combinations among those sets to provide a parsimonious overview of the conditions that conjecturally cause the outcome (Fiss, 2011; Ragin, 2008). There are two versions of QCA: fuzzy set (fs) assumes that membership in a set is not always binary, as in crisp set QCA, but presents a degree of intensity. Each version uses a different reduction algorithm. In this study, we adopt fsQCA as it produces a more nuanced picture of the phenomenon.

The first step of fsQCA is the calibration of membership, i.e. the definition of the intensity of membership of each case to a set, in a range from full non-membership (i.e. the case does not present the attribute) to full membership (i.e. the case presents the attribute). As we operationalized the causal conditions and the outcome by using 7-point Likert scales, we defined the thresholds for full membership, full non-membership and the crossover point at the levels 7, 1 and 4.1. These thresholds resemble the wording of the scale and therefore answer to the prescription of using an external benchmark for the definition of thresholds (Ragin, 2000, 2008). Individuals with a tenure of fewer than 3 years were considered fully out, while those with more than 10 years were considered fully in the set of tenure in the firm (crossover being within the categories 3-5 and 5-10 years of tenure). Calibration was carried out through the direct method (Ragin, 2008).

After the calibration, we calculated the truth tables. A truth table contains all the logically possible combinations of conditions, either empirically existing or not. Given the small size of our sample, we considered all the configurations with at least one instance for reduction. Each truth table was minimized with the Quine-McCluskey algorithm (Ragin, 2008).

6. Case presentation

Alpha produces pre-cooked, vacuum-packaged, high-quality, ready-to-eat fish fillets that are distributed through specialty shops, restaurants and mass market retail chains, mostly at the national
level. Founded in the early 1970s, in 2016 it reached a gross revenue of about 4 million Euro, constantly growing in the last decade. At the time of the analysis, the firm employed 16 operators and five sales and administrative staff. Alpha is fully owned by the founder’s family, whose members are directly engaged in the management of the firm.

During 2017, the firm planned a pilot lean transformation project addressing a part of the production process as a part of a long-term of change towards a “lean organization”. The firm did not initiate this project to answer a contingent crisis, but as a strategic move to consolidate their competitive advantage and sustain its growth.

Alpha runs its own breeding farm and produces its feed: upstream vertical integration is aimed at assuring the quality of the raw materials the continuity of supply. The transformation plant is located in the proximity of the farm to minimize logistics costs and reduce the risks of bacterial contamination without the need of freezing the raw material. Assuring the product quality and the speed of the process are key success factors for the firm: the former allows meeting customers’ expectations, while the latter is important for retailers as it increases the shelf life.

The intervention took place from January to March 2017 and concerned the transformation lines of two fish products, involving nine operators. It was structured according to the canonical stages of diagnosis, action planning according to a framework for lean transformation in the food industry, and implementation (Dora & Gellynck, 2015; Manoj Dora, Kumar, & Gellynck, 2016).

The change team was composed of an owning family member and a senior employee of the company. Contrary to what Martínez-Jurado, Moyano-Fuentes, & Gómez (2013) indicate as a good practice, no external change agents took part in the project. However, the family member had relatively little previous professional engagement in the firm and took part in a university level course focused on lean transformation. Therefore, the role of this person may be not too distant from the one of an external agent.

Before the intervention, the production process consisted of the following stages: 1) machine-assisted fish deboning; 2) manual fish deboning; 3) salting; 4) fish positioning on racks; 5) spicing; 6) cooking; 7) packaging. It is important to point out that even before the intervention, due to the industry regulation, all the production lines of the firm must conform to HACCP mandatory regulation. HACCP is a systematic preventive approach to food safety from biological, chemical, and physical hazards in production processes that can cause the finished product to be unsafe, and designs measurements to reduce these risks to a safe level. HACCP focuses on the health safety issues of the product and not on the quality aspects, yet its principles are at the basis of most food quality and safety assurance systems.
The change team analysed this process by means of the tool of value stream mapping. Based on the analysis and on an analytical framework that integrated the well-established lean principles with concepts and techniques that are specific to the food industry, the change team identified an array of improvements to the process. These possible interventions involved the application of lean tools such as process layout modification, optimization of process capacity, reduction of process stops, 5S, preventive maintenance, and were designed in accordance with HACCP regulations. The team considered also the purchase of new machinery adopting chill-blasting technology for the quick reduction of the temperature of the fish, that would allow a substantial extension of the shelf life.

After discussing the plan with the owning family, the change team decided to implement two of the proposed interventions, including the purchase of the new technology.

Before entering the field, the change team trained the nine employees, to share the goals of the intervention and a ‘common language’ about key concepts. The change team designed a significant redefinition of the sequence of the phases of the process. The new layout, working practices, and the new machinery were introduced in a three-week period, during which the change team offered training and support to the employees.

7. Findings

7.1 Outcomes of the change project

The lean transformation project carried out by Alpha involved a substantial redefinition of the stages of the process, which led to the reduction of downtime, reduction of changeovers, a more streamlined flow of activities, and the possibility to process bigger quantity of raw material per day. The members of the owning family consider the outcomes as “fully satisfactory and paving the way to the transformation of other processes, both technical and administrative”. The achievement of the transformation project is corroborated by objective measures of performance, that meet the targets set by the change-team (Table 2). Therefore, the case of Alpha can be considered as a successful case of small-scale lean transformation.
Table 2 – Change of key performance indicators before/after the intervention

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total cycle time</strong></td>
<td>593.47</td>
<td>569.17</td>
</tr>
<tr>
<td><strong>Uptime</strong></td>
<td>509.17</td>
<td>506.57</td>
</tr>
<tr>
<td><strong>C/O time</strong></td>
<td>84.3</td>
<td>62.6</td>
</tr>
<tr>
<td><strong>Uptime/cycle time</strong></td>
<td>0.86</td>
<td>0.89</td>
</tr>
<tr>
<td><strong>Kg produced/hour</strong></td>
<td>15.54</td>
<td>16.20</td>
</tr>
<tr>
<td><strong>Cost/kg</strong></td>
<td></td>
<td>-3.7%</td>
</tr>
<tr>
<td><strong>Food safety and quality</strong></td>
<td></td>
<td>Increased by adoption of state-of-the-art technology</td>
</tr>
</tbody>
</table>

However, we find that the change in the work behavior of the employees is not homogeneous. As already mentioned, lean transformations address multiple dimensions of the technical and organisational sides of the business, and the change project may address one or the other with different strength. Furthermore, operators may be more or less prone to change their work practices in one or the other dimension. Preventive maintenance is sensitively less performed (mean=3.77, min=1) compared to other practices, especially 5S and the use of standard procedures. However, the great majority of operators adopt all the lean practices intensively, but there are two operators who present a very low (Operator E=2.5) or moderate (D=3.75; G=4; B=4.5) lean adoption score.

On the ground of this result, we speculate that a lean transformation project can produce satisfactory outcomes even though a not negligible portion of the operators does not change their work practices, or does so only to a limited extent. It seems that the positive outcomes are brought by the few who conveniently embrace the approach, and act as catalysts for the change to happen.

A closer analysis of the data, reveals some variation in the factors that drive low adoption score: B and D indicate that the operators do not have the right to stop the process (2/7), while G and E consider this feature of lean production as substantially implemented (6/7). However, E is particularly critical about the implementation of the other features of a lean management system, while the other operators focus on especially on the lack of preventive maintenance. This analysis reveals that the appreciation of the implementation of lean management practices is to some degree subjective. However, the analysis of the demographic profile (sex, age, experience in the firm) of these four operators does not reveal any obvious pattern, suggesting to observe operators’ organisational behaviour to understand the reasons of lean adoption.
7.2 The drivers of lean transformation

In order to understand the causes of the successful lean transformation implemented by Alpha, and most important, the causes of the different degree of adoption of lean practices by operators, we look at the drivers that the literature suggests as more conducive to a transformation. Specifically, we distinguish between organisational features that are consolidated in the culture of the firm and changes brought by the transformation effort. Consistently with our theoretical framework, we also consider the operators’ reactions to change. Figures 2-4 summarize the distribution of answers of operators with regard to the variables considered in the analysis.

Figure 2 – Distribution of Structural features of the firm
The analysis of the distributions makes it evident that the firm enjoys an environment that is favorable to the introduction of a lean management system, is characterized by a team-based organization and by an organisational culture that appreciates the individual effort, especially in
change programs. This evidence is confirmed by a member of the owning family: “We have always promoted the exploration of new and better ways of doing things. During the firm’s history, this resulted in continuously improved procedures and adapted or invented from scratch machinery or instruments. Employees have always been involved in such initiatives and encouraged to share their ideas. Communication is informal and promoted at all levels of the organization.”

During the lean transformation, the change team has introduced a series of tools and systems with the aim of supporting the change, namely objective indicators assessing the performance of the process, project-specific rewards, dedicated management support to the operators, and lean training. With the exception of the latter, all the operators indicate that the firm has deployed the tools effectively or very effectively. Lean training represents an exception, as two operators consider the tool as only sufficiently (H) or less than sufficiently (A) implemented.

The majority of operators supported the transformation by adopting a pro-change behaviour, although without reaching a high level of engagement in the initiative. In particular, the intensity of pro-change behaviour of two operators (A and C) is just average (4/7). However, these two operators did not explicitly oppose the change, as their anti-change behaviour has a score of 1/7. The two operators presenting anti-change behaviour are instead B and I. The case of the latter seems interesting because this operator displays also the highest pro-change score; the age and the experience in the firm of this operator (both class 3) both suggest the adoption of a critical and responsible approach to the transformation.

Overall these data indicate that the change team has worked consistently with the best practices indicated by the literature, in a firm that presents a favorable context towards lean transformation. Our case-study offers additional support to the established findings between organisational features and success of a lean transformation. Indeed, these conditions may explain the overall success of the transformation. However, they do not explain why some operators have changed their behaviour and others have not.

As our primary interest lies in the individual organisational behaviour, we adopt the tool of fsQCA to deepen our analysis by investigating the relationship between Adoption of lean practices and Pro-change behaviour, Anti-change behaviour, the effectiveness of lean training and experience in the firm – i.e. the factors that exhibit variation in the population under investigation.

7.3 Results of fsQCA

An important assumption in our investigation is asymmetric causality, i.e. the causes of adoption of lean practices are not necessarily the opposite of the causes of non-adoption of such practices. Therefore, we need to carry out two distinct analyses.
The fsQCA of the causes of non-adoption of lean practices does not identify any necessary nor sufficient configuration. The only, tentative and descriptive, evidence that this case study offers on the topic, is the one presented in the previous section.

This case study, instead, provides richer insights on the causes of adoption. First, we appreciate the existence of causal conditions that are necessary for activating a transformation. A condition is necessary if the occurrence of the outcome is not possible without the presence of that condition; such condition may not be enough to produce the outcome alone and may be found also in cases that do not present the outcome. Conventionally, a condition, or a combination of conditions, is considered “necessary” or “almost always necessary” when its consistency score exceeds the value of 0.90 (Ragin, 2008). The results presented in Table 3 reveal that none of the considered conditions meet the requirement.
Table 3 – Analysis of necessity of Necessary Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Consistency</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRO-CHANGE</td>
<td>0.854</td>
<td>0.818</td>
</tr>
<tr>
<td>pro-change</td>
<td>0.489</td>
<td>0.981</td>
</tr>
<tr>
<td>ANTI-CHANGE</td>
<td>0.398</td>
<td>0.912</td>
</tr>
<tr>
<td>anti-change</td>
<td>0.798</td>
<td>0.721</td>
</tr>
<tr>
<td>EXPERIENCE</td>
<td>0.763</td>
<td>0.868</td>
</tr>
<tr>
<td>Experience</td>
<td>0.468</td>
<td>0.707</td>
</tr>
<tr>
<td>TRAINING</td>
<td>0.842</td>
<td>0.739</td>
</tr>
<tr>
<td>Training</td>
<td>0.403</td>
<td>1</td>
</tr>
<tr>
<td>training_fs_b+~antichange_fs</td>
<td>1.000000</td>
<td>0.711732</td>
</tr>
<tr>
<td>training_fs_b+experience_fs</td>
<td>0.904207</td>
<td>0.731674</td>
</tr>
</tbody>
</table>

We, therefore, examine what combinations of conditions are sufficient for the existence of the outcome, i.e. those that when are present always present also the occurrence of the outcome, although also other conditions may produce the outcome. In other terms, a sufficient condition is a subset of the outcome. We considered as sufficient the conditions presenting a consistency score higher than 0.90. Such threshold is higher than the value of 0.85 recommended by Ragin (2008) and is also consistent with the rule of thumb suggesting of choosing a threshold corresponding to a break in the distribution of consistency. Consequently, we assigned value 1 in the Truth table to the combinations of conditions exceeding the threshold and 0 to those with a lower score. Table 4 reports the truth table.
The inspection of the truth table offers an important insight. Configuration n.3 expresses the organisational setting that, according to the extant literature, is expected to be conducive to successful transformation, referring to an individual high level of training, presence of pro-change behaviour and absence of anti-change behaviour, as well as with limited experience in the firm – a feature that may suggest low firm-specific inertia. Surprisingly, some of those individuals have maintained much of the existing working practice to a much higher degree than other individuals characterized by less conducive configurations.

This finding corroborates our choice of a configurational approach for the analysis of this phenomenon. Indeed, the conventional analytical approach would suggest an additive effect among the drivers of a transformation, i.e. the presence of an increasing number of drivers should strengthen the chances of occurrence of the outcome. Our analysis, instead, suggests that appropriate combinations of factors that singularly have a poorer ability to lead to a change may be more effective than combining “powerful” factors.

The truth table also shows that our empirical setting presents six of the 16 possible combinations of conditions. As all of the 16 possible combinations represent plausible situations, we suggest that the limited diversity is due to the small size of the population under investigation; in other words, being the size of the firm small, we cannot find enough employees to identify all the possible combinations of individual and organisational factors.

The fsQCA methodology offers a remedy to the issue of limited diversity, which is the specification of the theoretical expectations about the direction of the effect of each condition on the

### Table 4 – Truth table

<table>
<thead>
<tr>
<th>n.</th>
<th>Pro-change</th>
<th>Anti-change</th>
<th>Training</th>
<th>Experience</th>
<th>Outcome</th>
<th>Frequency</th>
<th>Raw consist.</th>
<th>PRI consist.</th>
<th>SYM consist</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0.953</td>
<td>0.897</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0.915</td>
<td>0.814</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0.768</td>
<td>0.484</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0.975</td>
<td>0.899</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
outcome. The reduction algorithm uses this piece of information to calculate the “intermediate solution”, which Ragin (2008) recommends for interpretation. Consistent with theory, we assumed that the presence of pro-change behaviour and training, and the absence of anti-change behaviour should be conducive to the outcome. We do not formulate any assumption regarding the experience, as, in extant literature, is not clear the direction of the relationship between employees’ experience and successful lean transformation.

Table 5 illustrates the intermediate solution. Presenting four distinct causal pathways, the intermediate solution makes evident the equifinality of the process of organisational change.

**Table 5 – Sufficient combinations of conditions for change of working behaviour**

<table>
<thead>
<tr>
<th>Intermediate solution</th>
<th>Raw coverage</th>
<th>Unique coverage</th>
<th>Consistency</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPERIENCE * TRAINING * PRO-CHANGE</td>
<td>0.687</td>
<td>0.169</td>
<td>0.911</td>
<td>4 (I, G, B, F)</td>
</tr>
<tr>
<td>EXPERIENCE * anti-change</td>
<td>0.582</td>
<td>0.050</td>
<td>0.911</td>
<td>3 (A, G, F)</td>
</tr>
<tr>
<td>TRAINING * anti-change * pro-change</td>
<td>0.453</td>
<td>0.040</td>
<td>0.979</td>
<td>1 (C)</td>
</tr>
<tr>
<td>training * anti-change * PRO-CHANGE</td>
<td>0.377</td>
<td>0.020</td>
<td>1</td>
<td>1 (H)</td>
</tr>
<tr>
<td>Solution coverage: 0.873</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solution consistency: 0.911</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

First, we notice the four causal paths are composed of combinations of conditions, i.e. no condition alone is sufficient to lead to the outcome.

The coverage and consistency scores indicate that all the paths are empirically meaningful. Together, these paths cover most of the outcome (solution coverage score of 0.872) and, overall, consistently present the outcome. Indeed, the solution consistency (a measure that resembles significance in statistical models) exceeds the threshold of 0.800 indicated by Ragin (2008), although this is expected given the small number of cases. The raw coverage of each path – which expresses the extent to which that path can explain the outcome, i.e. the overlap between the path and the outcome – varies from 0.377 to 0.687. Since single cases are typically covered by more than one causal path, the unique coverage indicates the share of cases that are explained exclusively by that path. The coverage measure offers an indication of the relative importance of the paths.

The first two causal paths to changed behaviour, with a unique coverage of 0.169 and 0.050, concern experienced employees. The first one requires the presence of both Pro-change behaviour...
and Training to lead to the outcome, while the second one the absence of Anti-change behaviour. Taken together, these two causal paths suggest that experienced employees can effectively change their work practices according to the lean principles, and therefore, the accumulation of firm-specific knowledge and the development of routines is not, per se, an inhibitor of change. This result supports the viewpoint that employees experience positively impact on successful lean transformation (Karim & Arif-Uz-Zaman, 2013), in contrast to what Ordiz-Fuertes & Fernández-Sánchez (2003) found.

However, for experienced workers to bring about change, some facilitating mechanisms need to be in place, to break the status quo. Specifically, we find two alternative mechanisms: the absence of Anti-change behaviour, and the simultaneous presence of Training and Pro-change behaviour. Each of these conditions is expected to contribute to change, according to existing studies. Furthermore, this finding suggests that pro-change behaviour is less strong than the absence of anti-change behaviour in leading to a change, as the former needs to be accompanied by training in order to cause the outcome. This indicates that the presence of Pro-change behaviour is not symmetric to the absence of Anti-change behaviour, supporting the conceptual distinction between the two notions.

In the two other paths, Experience neither is a present nor absent condition, meaning that they refer to all employees. These paths are characterized by anti-change behaviour as an absent condition which is not, per se, sufficient to lead to a change, but needs to be accompanied by other factors. In particular, Training and Pro-change behaviour play the role of substitutes: in the third path, the former compensates for the absence of the latter, while the opposite occurs in the fourth. It is important to notice that they do not need to be present simultaneously in order to lead to the outcome, as in configuration n.1. This suggests that the absence of anti-change behaviour (configurations n. 3 and 4) is a more favorable condition for the occurrence of the outcome than the presence of experience workers possibly accompanied by anti-change behaviour (configuration n.1). In other words, the case firm benefits, to some extent and under specific conditions, from the experience of its employees to introduce the change. The possible presence of anti-change behaviour demands a much higher organisational effort to generate the change than the possible inertia associated with experienced workers, as configuration n.2 makes evident.

8. Concluding remarks and limitations

The research effort of this paper was aimed at deepening the knowledge about the people-related drivers of successful lean management adoption by means of a case study explored with the fuzzy-set Qualitative Comparative Analysis methodology. The case study under analysis was an Italian SME in the food processing industry that started a pilot lean transformation.
The explorative model sustains that the deployment of HRM practices together with the reaction to change – pro-change and anti-change behaviours – have an impact on successful lean transformation, disentangled as a change in work practices and organisational performance.

The study further highlights that adoption of HRM practices and reactions to change need to be considered systemically in order to understand the patterns of adoption of working behaviour during a lean transformation.

The first important outcome is that there is no one-best-way to the adoption of lean practices, while multiple patterns are conducive to the same outcome. The fsQCA highlights four meaningful and equifinal configurations leading toward successful lean transformation. The four configurations are made by different expressions of four sufficient conditions - pro-change and anti-change behaviours, training and operator experience.

A second important outcome is the role of training during a lean transformation. The perception of being trained enough to cope with the transformation seems to play a crucial role as:

1. It seems more difficult for a change agent to offer an adequate level of training, compared to other HRM practices;
2. Variations in the efficacy of training seem to explain differences in the adoption of lean practices.

Moreover, from the four configurations, training and pro-change behaviours play the role as substitutes – this means that, in absence of anti-change behaviour, training or pro-change behaviour alone is enough to guarantee successful lean transformation.

The third outcome is linked to the role of operators’ experience during a lean transformation. The role of experience is contested among scholars, some arguing that experience has a positive impact on lean transformation, while others sustain exactly the opposite. This paper provides evidence to the first perspective by showing that experienced operators involved in the lean transformation fostered successful implementation of lean tools and performance improvement. This result is a first step toward the resolution of the literature debate on the role covered by experience during lean transformations, and, more in general, on the role of employee tenure in change processes.

The operators involved in the transformation expressed both pro-change and anti-change attitudes toward lean transformation. Nevertheless, a lean transformation led the company to the adoption of lean tools – e.g. 5S and standardization, and a remarkable improvement of several dimensions of organisational performance in terms of cycle times, changeover times, and production costs. Despite the presence of some anti-change behaviours, the lean transformation has led to results that largely met the management’s expectations and so it seems that the success of a lean transformation does not require the engagement of the whole workforce, but of a critical mass. This
result resonates the concept of “tipping point” in the change management literature, i.e. the condition of a system that enables the passage from the status of stasis to change.

As all research, the study is affected by limitations. First of all, this case study addresses a firm in which standardization was already in place due to industry regulations, and a culture of change was well rooted in the firm history. Nonetheless, we found that some HRM practices (i.e. training), did not deliver the highest possible results.

Another limitation is that the survey was conducted only after the lean transformation and there are not any data collected before the starting of the lean transformation project. From this limitation, scholars can take the good practice of collecting information both before and after the execution of a lean transformation project.

Finally, the results were collected after a short amount of time after the implementation of the lean tools and the first results obtained from the transformation. It could be meaningful consider a longer term of analysis to take into consideration the results of lean transformation that may not be perceived or recordable in the short term of action.

Despite these limitations, the study brings together the literature on change management and lean management and introduces a configurational approach to the phenomenon of lean transformation, that promises to overcome the fragmentation and contraction of existing studies.

REFERENCES


Forza, C., 1996. Work organization in lean production and traditional plants. *International


Oreg, S. et al., 2016. An affect-based model of recipients’ responses to organizational change.
events. *Academy of Management Review.*


Pugh, D., 1993. Understanding and managing organizational change. In C. Mabey & B. Mayon-


