

# The Development of a Lean Culture Diagnostic Tool

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## Abstract

Prevailing research suggests that organisational culture plays a significant role in successful lean manufacturing implementation. Given the abstract nature of organisational culture it would be useful to crystallise the concept so that efforts may be made to identify actions that lead to a lean culture. Prior research has led to the development of a lean culture causal framework that outlines the categories of leadership actions shown to contribute towards a lean organisational culture. The purpose of this paper is to further extend the idea of a causal framework and to develop a tool that can be used to diagnose organisational culture in the context of the lean philosophy.

**Keywords:** Change management, lean manufacturing, performance improvement, production.

## Introduction

Due to globalisation, the need to adopt a manufacturing performance improvement philosophy is arguably now more important than at any time before. Lean manufacturing has been the first choice improvement philosophy for many organisations around the globe and a positive link has been established in literature between the adoption of a lean philosophy and performance improvement (Netland and Sanchez, 2012). Not all of the lean conversions, however, have been successful and Bhasin (2013) cites a failure to address the question of organisational culture as the primary reason for this phenomena. Given the widespread support for this notion (Bernstein, 2005; Dahlgaard and Dahlgaard-Park, 2006; Kelsner, 2012; Stone, 2012) it is reasonable to conclude that research aimed on the topic of organisational culture and, more specifically, lean culture *per se* would assist organisations with lean implementation. Predictable questions in this regard would include:

- What is an organisational culture?
- What are the characteristics of a *lean* organisational culture?
- What is the primary source of lean culture change?
- How could the level of attainment (of the characteristics) be measured?

The following sections seek to provide answers to these questions with the ultimate aim of providing a tool that can measure lean culture and provide an indication of areas to address in the case of weak lean cultures.

## Organisational Culture

Organisational culture is by its very nature difficult to define and this has led to a situation where various researchers and authors have developed differing definitions. A central theme, however, common to many of these definitions is that organisational culture is a set of deeply embedded, commonly held values and beliefs that influence the behaviours of the employees of the organisation (Deal and Kennedy, 1982; Schein, 1992; Kotter and Heskett, 1992, van der Post, de Coning and Smit, 1998). A popular analogy used to explain the concept of organisational culture is to compare it to an iceberg (Sackman, 1991)

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where the values and beliefs are shown to form thinking and emotions, ultimately resulting in behaviours and results. It is these behaviours and results that are observable (Figure 1) and ultimately measurable.

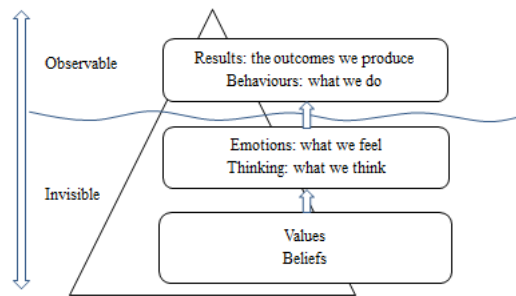


Figure 1. Organisational culture iceberg model (adapted from Sackman, 1991)

Given that values and beliefs effect the daily decisions that employees make and that all of the organisational processes will be either positively or negatively impacted upon by these decisions it has been widely accepted that organisational culture has a definite link to organisational performance. Kotter and Heskett (1992) concluded that organisational culture has a significant impact on long term performance despite their acknowledgement that studies involving organisational culture are difficult to conduct scientifically. Various approaches to establishing the association between organisational culture and performance have been researched (Bititci, Mendibil, Nudurupati, Garengo & Turner, 2006). The challenge has been to determine how a fairly abstract concept, such as organisational culture, can be linked to a solid and measurable characteristic. One approach relevant to this research is the consideration of organisational commitment as a possible link. Research on this topic reveals a significant correlation between these factors (Rashid, Sambasivan and Johari, 2003). Findings confirm that the type of corporate culture and organisational commitment has a definite influence on performance. Other studies (Lee & Yu, 2004) could not conclusively prove the link between corporate culture and organisational performance, but strongly suggest that culture impacts on a range of organisational processes and, by association, organisational performance.

McShane and Von Glinow (2005) argue that an appropriate organisational culture enhances performance for three reasons. Firstly, organisational culture influences decisions and behaviours. An inappropriate culture, therefore, would cause decisions and behaviours not congruent with the desired or chosen strategies. Secondly, it is suggested that organisational culture provides a common framework for employees, thereby affording them a sense of belonging. This is particularly important as it is widely accepted that a sense of belonging is fundamental to realising superior levels of motivation. Finally, organisational culture provides a framework for employees to understand organisational direction or focus. Automatic responses result in time and effort efficiencies, especially when individuals have an internal frame of reference when faced with choices or problems. Accepting these organisational culture characteristics strengthens the argument for research aimed at measuring prevailing lean manufacturing cultures. Having reviewed this and other literature relating to organisational culture and performance, it is apparent that a strong and positive culture can be viewed as a competitive advantage. It is, therefore, a prerequisite for a successful lean programme.

## Lean Organisational Culture

Many types of organisational cultures are in existence and each will have characteristics that either inhibit or enable a chosen performance improvement strategy. Denison (1990) conducted extensive research into this link and concluded that certain types of cultures could support and sustain performance improvement initiatives. Support for this conclusion has come from many other researchers (Rashid, Sambavisan and Johari, 2003; Suppiah and Sandhu, 2010; Keiser, 2012; Bhasin, 2013).

In order to establish cultural traits that support the adoption of lean it is first necessary to understand what *lean manufacturing* is. Here again, some confusion exists with regard to an exact definition of lean manufacturing. Stone (2012) undertook a comprehensive survey of lean literature spanning four decades and finally concluded that lean is a philosophy centred on differentiating between *waste* and *value*. This concept has its roots in the definition of waste provide by Womack and Jones (1996) who defined waste as “any human activity which absorbs resources but creates no value”. Murman (2002) offers a more comprehensive view of lean, defining the philosophy as “the dynamic, knowledge-driven and customer-focused process through which all people in a defined enterprise continuously eliminate waste with the goal of creating value”.

Although these definitions of lean are useful very few authors provide address the issue of defining a *lean culture*. Two notable exceptions to the brief statement-like explanations of lean culture include the works of Drew, McCallum and Roggenhofer (2004) and Liker and Hoseus (2008). Drew et al (2004) assert that certain mindsets and behaviours support lean systems. Their explanation of mindsets and behaviours closely mirrors that of organisational culture. It becomes apparent that mindsets cannot be observed, but behaviours can. The lean mindset includes the following five beliefs that provide a frame of reference for actions and decisions:

- Don't think big; think small and flexible. Lean systems respond rapidly to customer demands and decisions made are, therefore, counter-intuitive to economies of scale. The lean practitioner should instinctively select the option that leads to small batch sizes and includes flexible equipment when presented with a range of options.
- Value is added at the front line. The processes that add value require the most attention. Team members should instinctively gravitate towards these value-adding operations. This mindset is described as *genchi genbutsu* (Japanese term meaning go to the place of action) in Toyota literature.
- Everyone in the organisation needs to understand how his/her actions contribute to achieving business goals. Apart from understanding the overall organisational goals (mission and vision), team members need to accept the need for change based on perceived gains outweighing perceived losses. Lean thinking requires that members are motivated to take on more responsibility (for example, problem solving) with the understanding that they are helping themselves and others by contributing to the greater good of the organisation.
- The root causes of problems need to be addressed, not just the symptoms. Unstable conditions result in team members continually redirecting efforts to create the required system stability without eliminating the true causes of the instability. Ironically, individuals who find quick solutions to problems are generally praised, despite the fact that the solutions are often short-lived (Arnheiter & Greenland, 2008). Lean thinking requires that team members continue to investigate a problem

until it is evident that the root causes have been identified and suitable countermeasures installed.

- A problem is an opportunity to improve, not to blame. Lean systems can only exist in an atmosphere that encourages problem identification. Team members should unhesitatingly expose problems. The likelihood of team members repeating this process is limited if the consequences of this type of action are negative. Continuous improvement, therefore, will not occur.

Arguably the most important contributor to lean thinking is the Toyota Production system. Liker and Hoseus (2008) maintain that this system is supported by two values; namely, *respect for people* and *continuous improvement*. Employees would be expected to use these two values to guide their daily behaviour and decisions. The ideal lean system incorporates “a production system that highlights problems and a human system that produces people who are able and willing to identify and solve them” (Liker, 2004).

Respect for people is an expansive obligation that includes respect for employees, customers, suppliers, investors and the community at large. This belief manifests itself in respect for individuals and teamwork. Respect for individuals results in behaviour patterns that can be observed. Employees, at all levels, display a desire to understand each other and accept responsibility. Consistency in such endeavours creates mutual trust.

With the afore-mentioned definitions in mind van der Merwe, Pieterse and Lourens (2014) developed a lean culture causal framework (Figure 2) that identifies the actions believed to facilitate lean culture.

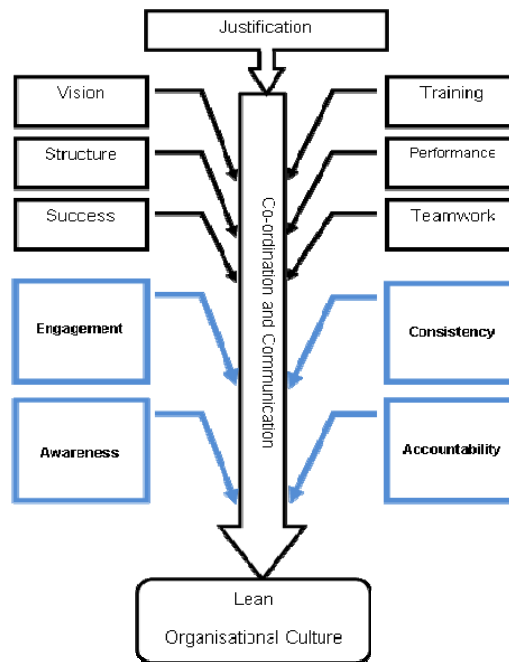


Figure 2. Lean culture causal framework model (van der Merwe, Pieterse and Lourens, 2014)

The model is an extension of a previously developed generic organisational culture change model by the same authors and includes four characteristics of a lean culture namely, employee engagement, situational awareness, consistent behaviour and accountability. The degree to which each of these characteristics is enacted was shown to be positively linked to the presence or absence of a lean culture while the remaining seven

characteristics listed above these four were originally developed as generic organisational culture change factors.

### Source of culture change

Understanding the source of organisational transformation is necessary if a tool is to be developed that can measure lean culture. Schein (2004) maintains that the actions and behaviours of the leadership group are the primary driving force behind organisational culture change. This view has received wide support from many researchers and authors (Adebanjo and Kehoe, 1999; Bamford and Forrester, 2003; Henderson and Larco, 2003; Rashid, Sambasivan and Johari, 2003; Mann, 2005; O’Donovan, 2006; Liker and Hoseus, 2008; Keiser, 2012).

Hellriegel, Jackson and Slocum (2007) argue that in most manufacturing operations leadership is referred to as “management” and exists at three distinct levels namely first-line, middle and top. First-line managers are normally shop-floor based and are made up of supervisors and production team leaders. Middle management consists of department heads and functional managers who are largely responsible for converting strategies into tactics while top managers are tasked with setting overall strategies. All of these groups are ultimately responsible for the prevailing organisational culture – although many argue that top and middle management carry the most responsibility.

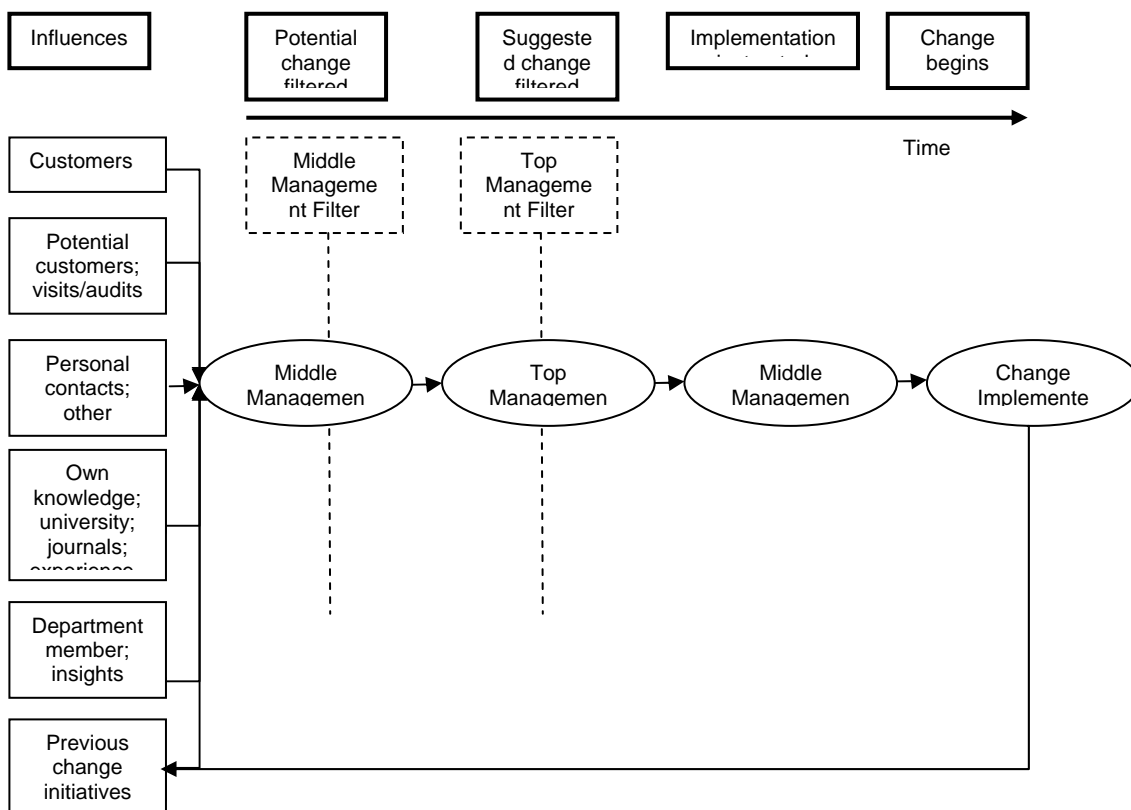


Figure 3. Middle management as change initiators (Bamford and Forrester, 2003)

Bamford and Forrester (2003) support the concept of middle management as the initiator of change and top management as the ultimate decision makers with regards to change (Figure 3). Acceptance of the source of culture change leads to the reasonable assumption that a lean culture diagnostic tool should focus on measuring the actions of the leadership group with regards to the four previously identified lean characteristics.

## Measuring Lean Culture

The first point to consider in relation to lean culture measurement is whether or not an organisational culture can be measured. Many of the characteristics of an organisation are intangible and therefore very difficult to gauge. Hofstede, Neuijen and Sanders (1990) are credited with the first scientific research project linked to the measurement of organisational culture. Their findings showed that an organisational culture could be measured quantitatively, on the basis of answers completed by organisational members to written questions.

Further support for these findings came from (but is not limited to) McMillan and Schumacher (2001) as well as Tucker, McCoy and Evans (2003). The latter group of researchers maintains that an objective organisational questionnaire is preferable because organisational culture is often studied as an independent variable for its potential relationship to organisational outcomes, such as managing change, product quality and productivity. Identifying the nature of these relationships is a significant part of the empirical grounding process through which the meaning of the construct of organisational culture is refined beyond its ordinary parameters. This observation is of particular relevance to current research as the measurement of lean culture is closely linked to both change management, as well as the quest for sustainable performance improvement.

### The Instrument

The process of developing an instrument that could measure those characteristics believed to be crucial for lean culture attainment was centred on the four categories of actions identified in the lean culture causal framework. A total of 33 questions are contained in the survey instrument with nine each covering situational awareness, engagement and consistency. The final section dealing with accountability is covered with six questions due to the straightforward nature of this category.

Section 1 (Table 1) explores the degree to which managers have successfully implemented systems aimed at creating a shop floor environment conducive to situational awareness. Literature suggests that an overall awareness of prevailing conditions (within value streams) is one of the prerequisites for the development of a lean culture.

Table 1. Questions related to situational awareness.

1. This section relates to the levels of awareness on the shop floor. Please indicate to what extent you agree with each of the statements below by circling the appropriate number.		<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly agree</i>
1.1	The concept of a value stream is widely understood	1	2	3	4	5
1.2	A visitor would be able to identify each shop floor value stream	1	2	3	4	5
1.3	We know what measures are important to each value stream	1	2	3	4	5
1.4	Visual systems provide information about the status of each value stream	1	2	3	4	5
1.5	We constantly monitor our visual systems	1	2	3	4	5
1.6	Employees know the location and extent of each value stream	1	2	3	4	5
1.7	Key processes have been identified in each value stream	1	2	3	4	5
1.8	Problems affecting output have been identified	1	2	3	4	5
1.9	Problems on the shop floor become obvious as soon as they occur	1	2	3	4	5

Three distinct groups of activities were identified, each of which were addressed by three questions:

- Questions 1.1, 1.2 and 1.6 explore the extent to which managers have pursued actions that create awareness of the concept, extent and boundaries of each value stream.
- Questions 1.3, 1.7 and 1.8 gauge the efficacy of actions aimed at identifying factors critical to the success of each value stream, as well as the extent to which employees are aware of these factors.
- Questions 1.4, 1.5 and 1.9 assess the degree to which visual systems have been implemented.

Positive responses to the above-mentioned questions would indicate that leaders within the organisation have actively made decisions resulting in an operational environment where team members are constantly aware of the conditions prevailing throughout the length of their value stream.

Section 2 (Table 2) was designed to determine the extent to which management have actively engaged and challenged the employees within the organisation.

Table 2. Questions related to employee engagement.

2. This section aims to explore the degree to which employees are engaged and challenged by management. Please indicate to what extent you agree with each of the statements below by circling the appropriate number		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
2.1	Leaders participate in shop floor improvement efforts	1	2	3	4	5
2.2	Team member's feedback is valued by supervisors and managers	1	2	3	4	5
2.3	Team members are challenged to provide the best solutions	1	2	3	4	5
2.4	A formal procedure exists for obtaining suggestions	1	2	3	4	5
2.5	Feedback is provided on all suggestions	1	2	3	4	5
2.6	Leaders discuss work problems and often offer guidance	1	2	3	4	5
2.7	Team members are encouraged to discover improvement opportunities	1	2	3	4	5
2.8	Experience and guidance has led to improved problem-solving	1	2	3	4	5
2.9	Good suggestions are implemented	1	2	3	4	5

Literature supporting the inclusion of Engagement as a lean culture causal factor (van der Merwe et al, 2014) suggests that meaningful interaction between management and operational team members was a key priority in organisations that have successfully developed a lean culture. The inclusion of the word “meaningful” is significant as it describes the nature of the interaction that is so supportive of a lean culture. Normal communication and the acceptance of mediocrity are transcended by intense engagement and the continual pursuit of original solutions to root-cause problems. Implicit in this process is the understanding both that *managers* have a deep-rooted conviction that team members are capable of providing such solutions, as well as that *team members* can rely on managers to coach them in the initial stages. Three distinct groups of activities were identified, each of which were addressed by three questions:

- Questions 2.1, 2.2 and 2.6 determine the extent to which managers actively engage team members and value the input of team members.
- Questions 2.3, 2.7 and 2.8 obtain information about the perceived level of meaningful engagement implicit in the process. This establishes the degree to which participants believe they are either *challenging* (managers), or *being challenged* (team members), to provide innovative solutions to problems.
- Questions 2.4, 2.5 and 2.9 explore the extent to which formal systems have been implemented for harvesting suggestions, as well as the perceived efficacy of these systems.

It is proposed that a lean culture will develop relatively quickly in an organisation where managers foster a process of meaningful engagement through altered behaviour and the implementation of effective structures.

Section 3 (Table 3) contains questions related to the consistency of managerial actions. These actions are guided by the vision and mission and are supported by a layered organisation-wide interaction plan. This construct is three-dimensional. It includes *adherence* to the vision/mission that is demonstrated by means of *consistent* decisions taken at *standardised* meetings by the leadership group.

Table 3. Questions related to managerial consistency.

3. This section relates to the consistency of managerial actions. Please indicate to what extent you agree with each of the statements below by circling the appropriate number.		<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly agree</i>
3.1	A regular schedule of lean feedback meetings exists for all leaders	1	2	3	4	5
3.2	Regular lean feedback meetings ensure sustained focus	1	2	3	4	5
3.3	All levels of leadership are included in the plan	1	2	3	4	5
3.4	Leaders make decisions that support the vision and mission objectives	1	2	3	4	5
3.5	Daily decisions support our vision and mission statements	1	2	3	4	5
3.6	Managers meet with supervisors regularly throughout a shift	1	2	3	4	5
3.7	The feedback meeting schedule is written into organisational procedures	1	2	3	4	5
3.8	Managers are often too busy to attend scheduled value stream meetings	1	2	3	4	5
3.9	Managers have a common approach to problem solving	1	2	3	4	5

The three dimensions of Consistency (in the context of lean culture) were addressed by the following questions:

- Questions 3.1, 3.2 and 3.6 – explore the extent to which successful layered and standardised leadership plans have been developed.
- Questions 3.3, 3.7 and 3.8 determine the extent of the standardised leadership plan, as well as the degree to which it has been institutionalised and accepted as standard practice (or “the way we do things around here”). Question 3.8 was phrased in the negative to more rigorously test management commitment to the standardised leadership plan. The pilot study confirmed that respondents were aware of the question style. Respondents answered in a manner consistent with their general pattern of responses.
- Questions 3.4, 3.5 and 3.9 examine the aspect of making decisions aligned with the stated lean objectives and the consistency thereof within the management group.

Adherence, consistency and standardisation (of leadership actions), therefore, are the major themes of the above-mentioned questions. It is hypothesised that these factors have a positive correlation to the lean culture development process.

Section 4 (Table 4) examines only two constructs as factors in the development of lean culture; namely, the assignment of corrective actions, and the associated follow-up process. These are grouped under the general heading of Accountability. Literature (van der Merwe et al, 2014) suggests that the acceptance of Accountability is a key factor in the lean culture development process.



Table 4. Questions related to accountability.

4. This section aims to explore the prevailing levels of accountability and associated systems. Please indicate to what extent you agree with each of the statements below by circling the appropriate number.		<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly agree</i>
4.1	Corrective actions are assigned to individuals	1	2	3	4	5
4.2	Team members know what is expected of their team	1	2	3	4	5
4.3	Due dates are assigned to corrective actions at all levels	1	2	3	4	5
4.4	Procedures exist for assigning corrective actions to individuals within teams	1	2	3	4	5
4.5	Managers and supervisors follow up on corrective actions	1	2	3	4	5
4.6	Action is taken when deadlines are missed	1	2	3	4	5

The two components of Accountability are each examined by three questions, as follows:

- Questions 4.1, 4.2 and 4.4 explore the extent to which corrective actions are assigned to team members and the likelihood of these actions being sustainable. Sustainability is considered achievable if team members understand what is expected of them. Furthermore, the procedures for creating accountability must be written into standard operating procedures.
- Questions 4.3, 4.5 and 4.6 examine the issue of due date assignation and the consequences of missed deadlines.

Accountability is the overarching theme of the above-mentioned questions. It is hypothesised that this characteristic has a positive correlation to the lean culture development process.

## Conclusion

It is envisaged that the survey instrument described in the preceding sections will be utilised to gauge the progress towards a lean culture. Results can be compared over time and leaders would be able identify areas where further actions are required to ensure the growth of a lean culture. Successful pilot tests have been conducted and it is expected that full scale testing and validation will be completed by the end of 2014. An automated format is envisaged that will be able to produce instant radar-charts from the aggregate results obtained in an organisation that has been surveyed.

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