The interplay between lean practices, organisational culture practices and operational performance

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Abstract

This paper investigates the influence of organisational culture on the implementation of lean practices in manufacturing companies. Using a quantitative sample of 295 UK companies, managers completed a survey on their level of lean implementation. The effect of lean practices on organisational culture and operational performance was analysed. Our findings show that lean practices have a significant influence on all of the cultural dimensions defined and that the process, normative and market dimensions have a significant impact on operational performance. This is one of the first studies to break down culture into sub-dimensions within the context of lean management techniques.

Keywords: lean, organisational culture, operational performance

Introduction

Lean Management is a principle founded in the east in the mid 1970's (Womack and Jones, 1996; Upton, 1998). Yet, it was some time after that the term Lean Manufacturing entered the academic lexicon more formally through a seminal report of the implementation of what is widely known as the 'Toyota Production System' (Womack and Jones, 1996). Since then, academics and practitioners alike across the globe have been fascinated by the perceived positive outcomes that can be achieved from lean implementation or lean thinking (Weingarten et al, 2011), commonly known as Lean.

However, whilst much attention has been paid to applying lean management techniques both in non-western (Bhamu and Sangwan, 2014) and western contexts (Holweg, 2007), not all implementations yield the desired outcomes (Losonci et al, 2017).

It is argued in this paper that a key reason for lean implementation not achieving the desired performance outcomes is due to the organisation mismanaging and/or ignoring the cultural environment in which the firm operates.

The primary objective and key theoretical and managerial contribution of this paper is to bridge this published current lean and culture research gap (Losonci et al, 2017) through investigating the interplay between lean practices, organisational cultural practices and operational performance. The central proposition being that firms that pay attention to ensuring a suitable organisational culture is developed during lean practices adoption will result in enhanced operational performance outcomes.

The central research question in this study is: "What key cultural practices need to be influenced when implementing lean management practices in support high operational performance outcomes?"

The key objectives of this study are:

1. To measure the perception of organisational cultural practices, lean practices and linkage to operational performance of participants;
2. To investigate how differing organisational cultural practices and lean practices influence the operational performance of the firm; and
3. To provide a lean cultural implementation model to support high operational performance outcomes.

Literature Review & Hypothesis Development

The literature review is organised into three main topics: lean management, organisational culture, and lean and organisational culture, with the hypothesis development focusing on the interrelationships between these and operational performance.

Lean Management

The term 'lean' was first used in the 1980's as authors attempted to define the secret behind the success of Japanese manufacturing companies, the most notable being the Toyota Production System (TPS) (Bamford et al, 2015, Womack and Jones, 1990).

Since then, much has been written about lean, with each piece offering its own definition, a process, philosophy, program, approach or set of principles. For example, it has been described as "a management approach" (Belekoukias et al, 2014 p.5348), as "an integrated socio-technical system' (Bortolotti et al, 2013 p.1117), and as having both strategic and operational levels (Hines et al, 2004).

Organisational Culture

Culture entered the academic lexicon in the late 1970's. Some of the most influential writers of their time in the area of organisational culture were Edgar Schein, Andrew Pettigrew and Gerard Hofstede. It entered the management literature in the 1980's with an infamous model detailing the layers of organisational culture (including practices, values, behaviours and norms). The practices level is widely recognised amongst researchers as most visible layer (Schein, 2010). At this level, manifestations of organisational culture are deemed most measureable.

Organisational Culture Definitions

There have been many attempts to define organisational culture in a sentence, with in excess of 50 definitions reported (Cadden et al, 2015).

This paper adopts "*the underlying values, beliefs and principles of the personnel as they are expressed in the management structure and practices*" (Fletcher and Jones, 1992: pg. 30) as the general definition.

Lean and Organisational Culture
As companies attempt to gain advantage in more competitive and global markets the use of management initiatives, that are perceived as improving performance both operationally and financially, is increasing significantly. Many studies have provided empirical evidence of the relationship between organisational culture and performance, focusing on specific management practices such as quality management (Narasimhan et al, 2012).

While Womack et al (1990) argue that the principles of lean are universal and are applicable in all situations, it has more recently been proposed that companies implementing lean practices can and should, using Toyota as an exemplar, adjust their culture to improve the chances of lean being successful. Yet, when firms attempt to implement lean, the cultural emphasis is largely ignored as it has traditionally been seen as being culturally independent (Wiengarten et al, 2015). In a growing body of literature investigating this lean-culture relationship, it has been proposed that with organisational culture working against it, lean cannot exist, with some going further to suggest that those executing the day-to-day lean practices are key to its success. Whilst these previous studies examine cultural characteristics that support the implementation of initiatives related to lean thinking, these are usually focused on the wider practices associated with TQM (Bortolotti et al, 2015), consider culture to be a single construct (Cadden et al, 2015) and do not consider the influence the adoption of these practices may have on cultural change.

Organizational Practice Dimensions (Verbeke, 2000)
The dimensions of organizational practices are six-fold and each is dichotomous in that it is divided into two classifications. The first organizational practice is classified as the process-results dichotomy.

Table 1: Verbeke (2000) Organisational Practices

Dimension	Definition
Results Score	A high process score indicates and organisation that is highly rule driven, very procedural where staff will not alter from their defined roles. A low process score indicates an organisation that is focused on results and will deviate from set roles and responsibilities to ensure the job gets done.
Employee Score	A high employee score indicates the organisation cares about the individual and their personal development and growth. A high level of absorptive capacity is evident. A low employee score reflects an organisation that is very much concerned about delivering on the job with no care about employee development.
Open Score	A high open score indicates an organisation that openly espouses constructive criticism. A low open score would suggest the organisation has a very defensive culture whereby a blame culture exists.

Dimension	Definition
Tight Score	A high tight score indicates and organisation who thrives on controlling its employees and how they behave. A low tight score reflects a loosely controlled organisation whereby flexibility and autonomy are more prevalent in achieving the set objectives.
Pragmatic Score	A high norm score indicates a pragmatic organisation which focuses on achievement. A low score on the norm scale indicates an organisation more focused on following standards.
Market Score	A high market score is reflective of an organisation that is customer oriented and concerned externally about its operating environment. A low market score indicates an organisation that is internally focused.

Hypothesis Development

The proposed research model (Figure 1), highlights the proposed interactions between lean practices, organisational culture and operating performance.

Results vs Process culture

One of the main objectives of lean management is to reduce waste or non-value adding activities within a business process (Bhasin 2013). A key observation is that lean practices, by nature, often require employees to have a good working knowledge of their workstations, the manufacturing process and the equipment utilised (Shah and Ward, 2003; Losonci et al 2017). Over time, employee's tasked with specific job roles will develop tacit knowledge which will help them operate specialised equipment and identify optimal equipment layouts and work routines, which in turn will contribute towards continuous improvement goals (Hatch and Dyer 2004; Losonci, et al 2017).

   H1a: Lean practices are negatively associated with a results oriented culture

Employee vs Job culture

Lean management has long been associated with a philosophy of process standardisation and the routinisation of production (Losonci, et al, 2017). While the standardisation of work has important process benefits, it also reduces work autonomy, can increase monotony, and according to some commentators, leads to unlimited performance demands and stressful work (Landsbergis, et al 1999, Mehri, et al 2006).

   H1b: Lean practices are positively associated with an employee oriented culture

Open vs Closed culture

When organisations implement lean practices it is important that employees are able to communicate both vertically and horizontally with the organisation (Bhasin, 2013). An open culture facilitates both employee suggestions and constructive feedback (Naor et al, 2010 Bortolotti, et al 2015).

   H1c: Lean practices are positively associated with an organisational culture of openness.

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Tight vs Loose culture

It is acknowledged in the literature that one of most salient tensions within lean management relates to the autonomy versus procedural dichotomy (Maalouf and Gammelgaard, 2016). However, rather than focusing on formal production processes and procedures, the loose-tight dimension differs slightly and relates to employee behavioural standards and work habits.

H1d: Lean practices are negatively associated with a tight organisational culture

Pragmatic vs Normative culture

Although lean management's ultimate goal is to provide increased value to the customer while simultaneously utilising fewer resources, the achievement of this goal ultimately involves adhering to an operating philosophy or ideology which defines and applies organisational standards for eliminating waste and non-value adding activities (Bhasin 2013; Piercy and Rich, 2015).

H1e: Lean practices are negatively associated with a pragmatic culture

Market versus Internal culture

An organisation implementing lean practices should not lose sight of the ultimate goal of delivering customer value (Maalouf and Gammelgaard, 2016). At its core, lean management is about satisfying the customer. Being close to the customer and observing demand changes is pivotal to pull production systems (Womack and Jones, 1990).

H1f: Lean practices are positively associated with a market culture

Organisational Culture and Operating Performance Hypotheses

Results culture and operating performance

Studies demonstrate that internal complexity may stifle operating performance in terms of productivity and lead-times (Mazzocato et, al 2014). Conversely, a process culture is largely focused on standardised operating procedures.

H2a; A results culture is negatively related to operating performance.

Employee oriented culture and operating performance

Human capital is often cited as key element in the implementation and success of corporate strategy. Hence, a culture which values employee as an asset, rather than a cost and is committed to employee development is more likely to achieve improved performance and/or competitive advantage (Bortolotti et al, 2015).

H2b: An employee oriented company is positively related to operating performance.

Open culture and operating performance

In an open culture, internal communication flows both ways and employees receive constructive feedback relating to their performance (Verbeke, 2000). This, in turn, facilitates learning on the job and promotes continuous improvement as feedback is absorbed and applied to shop floor operating procedures.

H2c: An "open" operating culture is positively associated with operating performance.

Tight culture and operating performance
In lean production settings, where excess inventory or production buffers are not available to counter production or quality failures, employees must have the ability and authority to make decisions (Fullerton et al, 2014).

H2d: A "Tight" operating culture is negatively associated with operating performance.

Pragmatic culture and operating performance
While a pragmatic organisation is more focused on achievement, a normative culture is concerned with doing things properly from a procedural perspective (Verbeke, 2000; Cadden, et al 2015).

H2e: A pragmatic culture is negatively related to operating performance.

Market culture and operating performance
A market culture is a customer oriented organisational culture where there is a focus on satisfying the customer in order gain a larger portion of market share (Verbeke, 2000 Losonci et al, 2017). However, a market facing culture does not neglect operating performance. On the contrary, metrics such as customer satisfaction and the number of customer compliments also represent operating performance metrics and have been adopted in previous studies relating to lean management and operating performance.

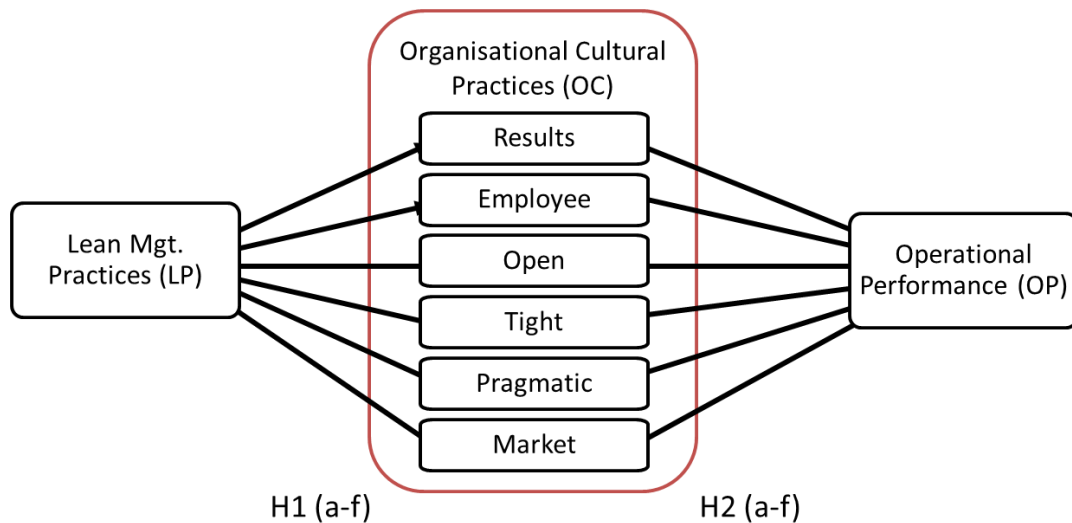H2f: A market oriented culture is positively related to operating performance.

Figure 1: Proposed Model

Method
Sampling Method
351 respondents across UK SIC codes returned questionnaires (295 were usable). Therefore, a response of 24.6% was returned which was deemed reasonable and exceeds the level of 20% as reported by previous research.

The characteristics of the sample data returned is listed in Table 2 below. In order to test for non-response bias, a set of t-tests were conducted based on early versus late respondents, by sales volume and number of employees. No significant differences were found.

Measures
All measures used were derived from existing literature.

Lean Practices: We based this 5-point scale on scales developed by Weingartern et al (2015) based on the contention that they are seen as recognised tools within the Toyota Production System (Womack and Jones, 1990).

Organisational Culture: Hofstede et al's (1990) practices tool is well recognized for measuring organisational culture (Pothukuchi et al, 2002). Verbeke (2000) practices tool was adopted. Additional benefits of this revised organisational practices tool include its empirical usage in previous supply chain culture studies (Cadden et al, 2015); therefore, providing a robust validated measurement tool.

Operational Performance Outcomes: This scale was developed from previous operational performance measures and encompassed a 6 item, 5 point Likert scale for Operational Performance (Cousins et al, 2008).

Results
Model & Analysis
The conceptual model shown in Figure 1 was specified and estimated. All items met the 0.7 Cronbach's alpha reliability indices.

The fit of the model was found to be acceptable ($\chi^2 = 2.86$, df = 2, p = .24; CFI = .99; TLI = .98; RMSEA = .04; SRMR = .01). The chi-square was non-significant, and the CFI, TLI, RMSEA and SRMR all met the criteria for acceptable fit. To investigate whether any of the proposed factors mediate the relationship between lean and operational performance, the regression coefficients from the specified and estimated model were examined. The regression coefficients for the direct effects of lean on the culture practices; and the direct effects of culture practices and lean management practices on operational performance are reported in Table 5.

Results presented in Table 5, show that Lean was significantly, positively related to Employee ($\beta = .93$, p < .01), Open ($\beta = .48$, p < .01), and Market ($\beta = .63$, p < .01), and significantly, negatively related to Results ($\beta = -.57$, p < .01), Tight ($\beta = -.37$, p < .01) and Pragmatic ($\beta = -.37$, p < .01).

Table 5: Standardised Regression Co-efficients (Standard Error) for direct effects

	Results	Employee	Open	Tight	Pragmatic	Market
Lean	-.57 (.10)**	.93 (.12)**	.48 (.06)**	-.37 (.11)**	-.37 (.05)**	.63 (.09)**

*p<.05
**p<.01

Results presented in Table 6, show that only Market ($\beta = .17$, p < .01) was significantly, positively associated with Operational Performance, while only Results ($\beta = -.13$, p < .01), and Pragmatic ($\beta = -.27$, p < .05) were significantly, negatively associated with Operational Performance.

Table 6: Standardised Regression Co-efficients (Standard Error) for the direct effects of proposed mediators on outputs

	Operational Performance
Results	-.13 (0.5)**
Employee	.05 (.05)
Open	.10 (.09)
Tight	-.07 (.04)
Pragmatic	-.27 (.11)*
Market	.17 (.06)**

*p<.05
**p<.01

Discussion

Implications for theory

Due to the varied success of lean management programs there is a growing body of literature which seeks to examine the contextual factors surrounding lean implementation (Vlachos and Siachou, 2018). Missing from this debate are studies which examine the interactions between lean practices (LP) and organisational culture (OC) (Losonci, et al 2017; Zhang et al 2017). Moreover, there have been few studies which seek to examine the interplay between LP, OC and OP. Hence, this study seeks to add new insights to the lean management-organisational culture debate.

Firstly, from an institutional perspective, the results of Hypotheses H1a-H1f suggest that organisations cannot implement LP's without considering the deeper cultural dimensions surrounding LPs. The findings of this study support this observation as it was found that that LPs, when adopted in Pragmatic or Results oriented cultures, negatively impacted operating performance. It postulated that "achievement" or "results" based cultures favour outcomes over a procedural or process focus, thus crippling operating performance. In this sense, both process and normative cultures, which advocate the adherence to strict operating principals, play a key role is achieving improved operating performance.

Secondly, the findings contribute to the OM literature as it is shown that while soft lean practices are key for cultural integration (i.e. employee orientation and open communication lines) (Bortolotti et al 2015), the findings do not extend to operating performance dimensions. It can therefore be argued that soft lean practices (i.e. employee orientation & open communication lines) are more important in the implementation stages of LM adoption, when cultural integration is required. Finally, the study finds support for the relational view of the firm, as it is found that LPs and a "Market" culture combine to influence OP. In other words, organisations implementing LP should direct attention to focus on the customer and suppliers as a dynamic market focus was shown to improve operating performance. It is postulated that firms which build robust relationships with suppliers and customers, will benefit from increased productivity as organisations can develop robust JIT and lean sourcing practices and respond better to changes in demand (Weingarten et al, 2015).

Implications for management

From the findings of the study, a lean-culture framework was developed based on the interplay between LPs, OC and OP. This model is outlined in Figure 2 and can help

management navigate the various lean-culture relationships while also improving the efficacy of LP's in terms of operating performance. More specifically, organisations seeking to implement LM should place soft lean practices (employee development and open communication lines) alongside the technical aspects of LM (process & normative focus) when implementing lean management practices whilst also maintaining an overarching focus on the market. However, management should be aware that soft lean practices have limited effect in terms of improving overall operating performance.

Secondly, management should be wary when implementing LP's in results or pragmatic based cultures, as the results show that an overarching focus on outcomes and results, at the expense of a process focus, can stifle operating performance. Finally, above all, management should not lose sight of suppliers or the customer as LP's and an external market focus was shown to enhance operating performance.
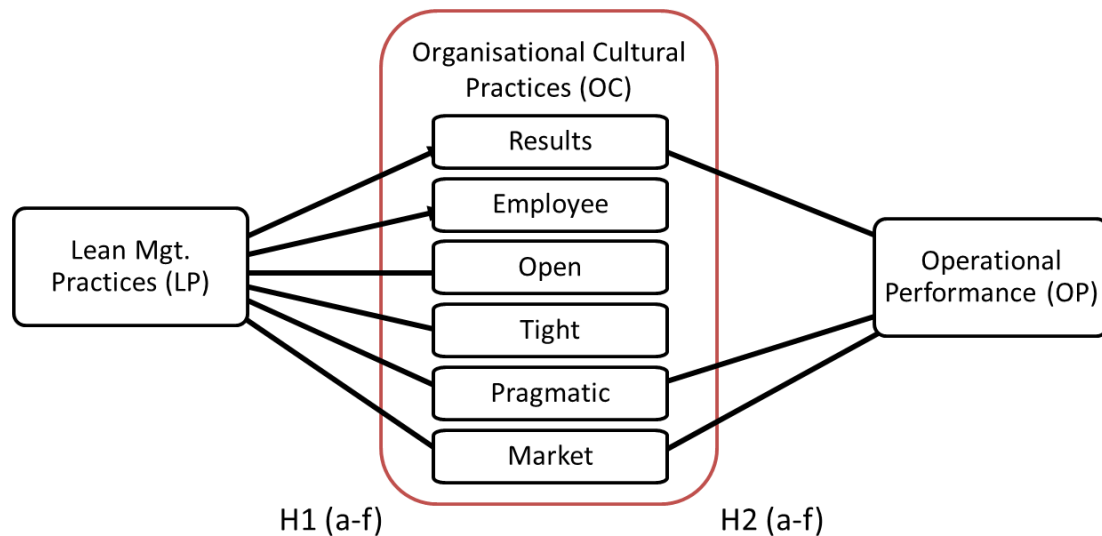

Figure 2: Revised Model

Conclusion

Previous research highlighted that less than five percent of lean adoptions are successful. Hence, there is a need for research which explores the contextual factors surrounding lean implementation (Vlachos and Siachou, 2018). The findings of this study highlight that LPs are positively associated with organisational cultures which are procedurally focused, employee oriented, structurally open, socially loose, rule driven (norm) and market oriented. However, the results also show that only the dimensions of normative, procedural and market orientations are associated with improved operating performance. Additionally, the findings demonstrated that results oriented, and pragmatic cultures were found to negatively associated with operating performance. Finally, the lean implementation framework outlined in this study not only contributes key insights to both the operations management and organisational behaviour fields, but can also act as a guide to management in industry who are perhaps embarking on a lean transformation.

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