Lean viewed as a philosophy

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Abstract

Purpose – The purpose of this paper is to act as a meticulous conceptual paper probing the contemporary view towards lean and illustrate that, despite its discernible benefits, the implementation record suffers as the prevailing opinion fails to encapsulate that an aspiring lean enterprise shall only succeed if it views lean as a philosophy rather than another strategy.

Design/methodology/approach – The paper is based on a thorough literature search concerning the success and failure of lean implementations and acts as a precursor for one of the authors utilising a combination of methodologies; namely, interviewing, survey questionnaire and participant observation in attempting to prove his PhD hypothesis.

Findings – Evidently, a cocktail of factors are needed for lean success; not only is it necessary to implement most of the technical tools but an organisation's culture needs transforming too. Furthermore, the alterations need to be implemented throughout an organisation's value chain. Lean has a major strategic significance, though its implementation procedure, HRM implications, general approach to the supplier base coupled with the overall universal conviction of viewing lean as a set of tactics rather than embracing it as a philosophy advocates that this contributes to the relatively low number of successful lean initiatives.

Originality/value – The paper would prove invaluable to lean practitioners through its summation of the intricacies towards lean enterprise success and academic researchers by focusing their attention towards the necessary cultural implications.

Keywords Philosophy, Culture, Lean production, Manufacturing systems, Productive maintenance, Operations strategy

Paper type Conceptual paper

Introduction

This paper examines the underlying reasons surrounding low rates of successful lean initiatives. Mora (1999, p. 2), submits that "only some 10 per cent or less of companies succeed at implementing TPM and other lean manufacturing practices". Sohal and Eggleston (1994, p. 8), advise "that only 10 per cent have the philosophy properly instituted". Repenning and Sterman (2001, p. 1), advocate that companies use initiatives almost as a fad and submit that whilst the: "number of tools, techniques and technologies available to improve operational performance is growing rapidly, on the other hand, despite dramatic successes in a few companies most efforts to use them fail to produce significant results".

Ostensibly, less than 10 per cent of UK organisations have accomplished successful lean implementation insist Baker (2002) and O'Corrbui and Corboy (1999). Often organisations view lean as a process whereas they should embrace it as a philosophy. The subsequent investigations subscribe to this concept since when seen as a philosophy it becomes a way of thinking whereas tactics or processes are mechanisms

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to action these thoughts; this forms the basis of the PhD hypothesis which one of the authors is researching.

Definition

The generic term lean manufacturing was popularised by its major proponents, international motor vehicle programme (IMVP) researchers of the Massachusetts Institute of Technology. Their project focused on the significant performance gap between Western and Japanese automotive industries of 52 assembly plants in 14 countries over a five-year period. The hypothesis of the subsequent research evolves from Liker's (1996, p. 481) perception of lean manufacturing; that it is: "a philosophy that when implemented reduces the time from customer order to delivery by eliminating sources of waste in the production flow".

Technical requirements

Rather than embracing one or two isolated tools it is suggested that it is important that companies practice most, if not all, of the following:

- *Continuous improvement*/kaizen. The continual pursuit of improvements in quality, cost, delivery and design.
- *Cellular manufacturing*. It is vital to group closely all the facilities required to make a product (or related group of products), in order to reduce transport, waiting and process time.
- *Kanban*. A kanban system needs to be in place.
- *Single piece flow needs to be in operation*. Where products proceed, one complete product at a time through various operations in design, order taking and production, without interruptions, backflows or scrap.
- *Process mapping exercise is required*. This is a detailed mapping of the order fulfilment process.
- *Single minute exchange of dies (SMED)*. In order to reduce the lead-time and improve flows it is necessary to eliminate delays in change-over times on machines.
- *Step change/kaikaku*. There is a need to make radical improvements of an activity to eliminate waste.
- *Supplier development*. The organisation needs to actively develop links with suppliers and working closely with them for mutual benefit as intimated by Bicheno (1999) and Henderson *et al.* (1999).
- *Supplier base reduction*. Further attempting to reduce the number of suppliers an organisation engages with.
- *Five S and general visual management*. To reduce the clutter and inefficiency of any typical production and office environment.
- *Total productive maintenance (TPM)*. This is aimed at improving the reliability, consistency and capacity of machines through maintenance regimes as dwelled on originally by Ohno (1988).
- *Value and the seven wastes*. The notion of value should never be ignored and essentially is the capability provided to the customer at the right time at an appropriate price, as defined in each case by the customer.

This substantiates the prevailing principles of lean addressing the following wastes as suggested by Philips (2002), Maskell (2000), Nystuen (2002), Meier (2001), Standard and Davis (2000), Womack and Jones (2003), Parker (2003), Olexa (2002a, b), Siekman (2000), Dimancescu *et al.* (1997), Liker (1996), Taylor and Brunt (2001), Prizinsky (2001) and Oliver (1996):

- over production;
- waiting;
- transportation;
- inappropriate processing;
- inventory;
- unnecessary motions; and
- defects.

Cultural requirements

The methodical attack on waste is also a systematic assault on the factors underlying poor quality and elementary management problems, suggest Hines and Taylor (2000). Whilst lean is concerned with reducing waste at all levels, it is also about changing corporate culture; in this case there is a need to:

(1) Make decisions at the lowest level assessed by the number of organisation levels.

(2) Hines *et al.* (1998), forward a definite clarity of vision; an indication of what the organisation believes it will look like once the transformation is complete.

(3) Ensure that there is a strategy of change whereby the organisation communicates how the goals will be achieved.

(4) Assign responsibilities within the pilot programme initially and ultimately within the whole organisation whereby it is also evident who is championing the programme.

(5) Develop supplier relationships based on mutual trust and commitment; this could be assessed by the:
   - number of years a relationship has existed with a supplier; and
   - percentage of procurement £s purchased under long term supplier agreements.

(6) Nurture a learning environment for which indices such as, training hours/employee, can provide an approximate barometer.

(7) Systematically and continuously focus on the customer; one could receive a signal of this via the percentage of projects in which the customer was involved as intimated by Koenigsaecker (2000).

(8) Promote lean leadership at all levels observed by the number of lean metrics at all levels.

(9) Maintain the challenge of existing processes through, e.g. number of repeat problems and customer assistance to suppliers.

(10) Make a conscientious effort to maximise stability in a changing environment whereby an attempt is made to reduce:

- schedule changes;
- program restructures; and
- procurement quantity changes.

(11) Assess the fraction of an organisation's employees operating under lean conditions.

(12) Observe the proportion of an organisation's departments pursuing lean.

(13) Undeniably, as reiterated by Emiliani (2003), Gregory (2002) and Liker (2004), lean requires a long-term commitment. A medium-sized company would need a minimum of three to five years to start pursuing the lean philosophy. According to the current British classifications, CIMA (2003), to be regarded as small or medium it is necessary to fulfil any two of the criteria shown in Table I.

Lean enterprise objectives

A decade ago the lean production concept was viewed as a counter-intuitive alternative to traditional manufacturing models propose Womack *et al.* (1990), Shingo (1989) and Krafcik (1988). Katayama and Bennett (1996) declare that today it is arguably the paradigm for operations. Despite its pre-eminence there remain a number of theoretical and methodological concerns, urge Oliver and Hunter (1998). Lebow (1999), proposes that the need to reduce costs and shorten lead-times ranked highest amongst the quoted objectives. These results are consistent with the notion proposed by consultants, Claudius Consulting (2004) and XR Associates (2003). Standard and Davis (2000), is emphatic that the single measure most organisations strive towards is that of the total product cycle time.

Moore (2001) and Convis (2001), remonstrate that lean should not lead to redundancies. Moore (2001) suggests that a study by the *Wall Street Journal* in 1995 showed that in over 300 companies engaged in cost cutting through layoffs only 45 per cent showed productivity improvements; 30 per cent showed profit improvements whereas 88 per cent experienced a serious decline in morale. The Engineering Employers' Federation (2000, 2001) surveys, proceeded to intimate that 70 per cent of organisations adopting lean did so to boost overall performance; 25 per cent felt pressurized to pursue the lean path owing to competitive forces.

Hamel (2000, p. 2), refers to the concept of "corporate liposuction"; that in a review of 50 companies, including some notable Fortune 500 companies such as Kodak and Unisys, 43 suffered a significant downturn in earnings after three years of implementing lean. Dimancescu *et al.* (1997), Bateman (2002) and Hanson and Voss (1998), are unwavering that growing profits through cost cutting is not likely to be sustainable and must be balanced with sales growth through innovation, new product

	Small	Medium
Turnover (less than or equal to)	£2.8 millions (net) £3.36 m (gross)	£11.2 m (net) £13.4 m (gross)
Aggregate gross assets (less than or equal to)	£1.4 millions (net) £1.68 m (gross)	£5.6 m (net) £6.72 m (gross)
Number of employees (less than or equal to)	50	250

Table I.

development and process improvement. Maskell and Baggaley (2004), dwells on the need to realign the financial goals with those which lean attempts accomplish. Krizner (2001), is uncompromising regards the ultimate goal; eliminating waste as it can account for between 55 and 95 per cent of the manufacturing process. The true benefit of lean, insists Meier and Forrester (2002), is the overall strengthening of the system. If applied properly, the lean methods will make any shortcomings in the system appear quickly and the shortcomings will have profound impacts. In fact, a survey carried out by Sanchez and Perez (2000), showed that the three most important indicators were:

(1) inventory rotation;

(2) lead-time of customers orders; and

(3) percentage of production procedures that are documented in the company.

Nonetheless, more work is required to assess the correlation between the joint use of these production indicators.

Strategic implication

Despite some voices of discontent, such as Gordon (1995) and Berggren (1992), many case examples illustrate how companies are changing their production methods and management practices to become leaner. Hanson and Voss (1998), recommend that adopting a range of lean production practices bears a direct relationship to improvements in performance. Womack and Jones (2003), allege that a lean system is the superior way of producing manufactured goods; Katayama and Bennett (1996, p. 2), argue that when Womack and his colleagues conducted their research, that it was "during conditions of a bull stock market and low interest rates". Equally, Hall (2004, p. 22), points out the: "differences between the Toyota Production System, as practiced by Toyota and lean manufacturing are significant. Two of those are that the TPS emphasises worker development for problem solving and spends much more time creating standardised work, which lean seldom incorporates". Miyai (1995), proposes that a weakness of lean is its inability to accommodate the variations or reductions in demand for finished products which are occurring in many Japanese companies. However, Chase (1999, p. 3), suggests that "it is a long-term plan for actually implementing a lean enterprise",; that whilst benefits are evident, companies need to view lean as a long term strategy. Emiliani (2003), suggests that the focus of lean needs to switch to the supply chain, product development, administration and behaviour if the full benefits are to be realised.

Lewis (2000) and Lin and Hui (1999), endorse caution with the generic assertion that lean aids an organisation's performance; investigations of the relationship between profitability and lean production adoption by Oliver and Hunter (1998), found no statistical significance between high and low users except that high level users exhibited much higher volatility in profits. Katayama and Bennett (1996), recommend that lean production is incapable of responding to large oscillations in aggregate demand volumes, arguing that the Japanese economy at the time of the IMVP study was exhibiting specific conducive characteristics, creating conditions of high and stable domestic demand. The Engineering Employers' Federation (2001) survey, suggested that 90 per cent of respondents from their 352 sample organisations that had implemented lean felt that it had been either, very or fairly successful in achieving its aims.

Lewis (2000), remonstrates that lean does not inevitably result in improved financial performance; the critical issue appears to be the firm's ability to appropriate the value generated by any savings the organisation makes. However, his investigation was based upon empirical data drawn from three case studies; ideally a more statistically significant sample size would have probably offered more valid conclusions as alleged by Silverman (2000).

Benefits of lean manufacturing

A sizeable portion of literature (Billesbach, 1994; Nystuen, 2002; Standard and Davis (2000); Vasilash, 2001; Parker, 2003; Olexa, 2002a, b; Siekman, 2000; Dimancescu *et al.*, 1997; Liker, 1996, 2004; Taylor and Brunt, 2001; Prizinsky, 2001; Oliver 1996) dwells on the apparent empirical evidence suggesting that lean aids competitiveness. Sheridan (2000), is adamant that benchmarking studies of Japanese companies demonstrated that true conversions to lean produced four fold productivity gains. Sohal and Eggleston (1994, p. 6) suggest that: "two-thirds of the companies said that a strategic advantage had been generated … with the greatest improvements stemming from market competitive positioning, customer relationships and quality constraints".

Lathin (2001), maintains that traditional mass producers can expect a reduction of 90 per cent in lead-time, 90 per cent in inventories, 90 per cent in the cost of quality and a 50 per cent increase in labour productivity. XR Associates (2003), ranked amongst the top ten European manufacturing consultancy and training providers, as intimated by Ferch (1998), alongside Claudius Consulting (2004), are insistent that lean manufacturing can help to reduce waste by 40 per cent, cut costs by between 15 and 70 per cent, decrease space and inventory requirements by 60 per cent, push productivity up between 15 and 40 per cent whilst cutting process changeovers by 60 per cent.

Nystuen (2002), suggests that the product lead-time was reduced by 11 per cent, product travel time by 90 per cent and inventory by 82 per cent. Nonetheless, he fails to reveal the level of investment initially required as advocated by Elliott (2001), Convis (2001), Liker (1996, 2004), Rea (2001) and Womack and Jones (2003). Joseph Day, CEO of Freudenberg-NOK in Olexa (2002a, b), is emphatic that $7 million a year is spent on the execution of lean but this achieves $20 million a year in cost savings. However, Bateman (2002), suggests that consultants dwell on the positives of lean whilst being somewhat sketchy on their respective implementation records. Bergstrom (1995), Allen (2000) and Timco (2001) insist that a thorough evaluation of success statistics is required owing to the number of unsuccessful lean initiatives. Needy *et al.* (2002), argue that the success statistics are wrongly weighted since there are only a few true conversions to lean.

Bicheno (1999), Hines (1999), Liker (2004) and Womack and Jones (2003), maintain that the range of companies adopting lean reveals the popularity of the automobile sector. Nonetheless, Raleigh (Parker, 2003), Lincoln Electric Holdings (Prizinsky, 2001), Westbury Housing who assemble "Kit" houses, Royal Doulton Plc, Mars (Claudius Consulting, 2004), Boeing Co. (Lewis, 2001), Cessna (Siekman, 2000), Rolls Royce (XR Associates, 2003), ICI Chemicals and Polymers, Lever Brothers Ltd, and Pedigree Pet Foods (Bateman, 2002), have all adopted lean. A comprehensive study of 72 manufacturing companies (Sohal and Eggleston, 1994), including the top 50 organisations in Australia based on the number of employees, revenue and profitability and whose names were supplied by the "Business Council of Australia" and

the "Australian Chamber of Commerce" concluded that 66 per cent felt a strategic advantage had been generated by the adoption of lean production with the greatest improvement stemming from market competitive positioning. There is concern with the above study as the method of data capture adopted was that of a telephone survey. The Engineering Employers Federation (2001) – EEF, investigation on US and UK productivity, found a clear link between lean manufacturing and higher productivity and profitability. The study was based on in-depth interviews and surveys. Standard and Davis (2000), urge that often some of the intangible benefits of lean are difficult to quantify. Jusko (1999, p. 1), as a result of the third annual *Industry Week* census corporate – survey claims that 55 per cent of the corporate executives identified lean as "extremely critical", to their ability to achieve world class status, whilst another 40 per cent identified it as "somewhat critical" (p. 2). Nonetheless, when it came to reporting "wide adoption" (p. 6), 20.3 per cent of the survey respondents stated that they had adopted predictive and preventive maintenance, though no other lean technique reached the 20 per cent mark in terms of wide adoption. The concept of "wide adoption" was loosely defined, argues Philips (2002). Taylor and Brunt (2001) and Moore and Gibbons (1997), allege that many survey respondents may be at the early stages of implementation and would have not yet had the opportunity to realize its full benefits.

Lean implementation procedure

Sheridan (2000, p. 6), proposes that it takes: "three years to become competent in applying such tools as set-up reduction, standard work or cell building and five years to instil a firm belief in all the tools". The University of Michigan has been at the forefront of lean manufacturing research for over a decade affirm (Taylor and Brunt, 2001). A key player is Liker (2004) who is unequivocal in promoting a total approach; that lean cannot work with isolated tools. Elliott (2001), Shingo (1989), Sanchez and Perez (2000), Rea (2001) and Meier (2001) urge this policy too. Securing the full benefits of lean requires the need to concentrate on the whole value chain suggest Comm and Mathaisel (2000) and Weiss (2001). Convis (2001), Allen (2000) and Henderson *et al.* (2003), insist that for the Toyota production system to work effectively, it needs to be adopted in its entirety, not piecemeal; Allen (2000, p. 2) claims: "that lean manufacturing is a system approach. Each approach builds on the previous one, anchoring the systems as a whole ... introducing a scattering of lean tools that are not properly used ... simply bewilders the workforce".

Bergstrom (1995), Allen (2000), Timco (2001), Muffatto (1999) and Lewis (2001), debate that lean is an entire business philosophy, as instigated by Ohno (1988). Equally, Karlson and Ahlstrom (1996), admit that a total philosophy is needed. Chase (1999, p. 1) considers that getting lean: "also means that the business is examined in its entirety, including how orders are processed, the way materials are purchased and the way manufacturing is done". Whilst Lathin and Mitchell (2001a, b, p. 3), subscribe to the total approach, the issue they stress is the need to combine the "socio-technical systems"; that all work organisations combine a technical, i.e. technology, and a social system, i.e. people and organisational structures. Convis (2001), proposes that the TPS is an interlocking set of three underlying elements: the philosophical underpinnings, the managerial culture and the technical tools. Pullin (2002), insists that to reap these benefits fully, we need to view lean not as an abstract philosophy but one which includes both concepts – a philosophy, and practices, tools or processes.

George Koenigsaecker, in Sheridan (2000, p. 2), who has directed lean conversion initiatives in 18 manufacturing plants comments: "often people who attempt a lean conversion start with one of the tools, or a couple, and they push them through the organisation. They then wonder why things are not flowing in the total value stream. The problem is that there are about a dozen key tools in lean manufacturing and you have to move them all ahead somewhat simultaneously"; he continues, "it is a long learning curve". Pullin (2002), insists that Land Rover, winners of the MX2002 "Manufacturing Excellence Award", showed that not only had it adopted the lean philosophy but that it had adapted it to tackle certain local circumstances.

Whilst Womack *et al.* (1990), popularised lean manufacturing, the text is scant on the details of the methods for achieving it. The common theme regards the need to continuously improve whilst focusing on the customer and eradicating waste as reiterated by Bicheno (1999), Hines (1999), Lewis (2001), Rich (1999) and Repenning and Sterman (2001). Olexa (2002a, b), is adamant that the philosophy needs to be in place for people to look creatively at what they do on a daily basis and do it better; a principle Ohno (1988), developed.

Little published work, contest Jina *et al.* (1995) and McDonnell (2000), exists that explicitly addresses the issue of whether lean methods are suitable and applicable in industrial sectors which are characterised by highly differentiated, low volume production of low repeatability. Adler and Cole (1993) and Needy *et al.* (2000), suggest that the pioneering work within the automobile industry is misleading to draw correlations from as the conditions differ in many other industries. Prabhu (1992), in his study of three disparate industries and non-Japanese companies located in the north-east of England suggests that lean is not restricted to only Japanese companies or mass production firms or larger organisations.

Allen (2000), Nanni *et al.* (1995) and Oliver (1996) insist that there is no "cookbook" to explain each step of the lean process and exactly how to apply the tools. Lathin (2001), Hall (1995) and Lathin and Mitchell (2001a, b, p. 2), insist that quality improvements are only possible if companies implement comprehensive change management programs addressing "both the organisational and technological aspects of quality management". Bicheno (1999), argues lean needs to apply to every aspect of the value chain. Karlson and Ahlstrom (1996), insist lean ranges from an organisation's product development to its distributional logistics:

$$\text{Lean development} + \text{lean procurement} + \text{lean manufacturing} + \text{lean distribution}$$

Karlson and Ahlstrom (1996, p. 7) persist: "the important point to note, however, is that lean should be seen as a direction, rather than as a state to be reached after a certain time". Moreover, all the determinants might not point in the right direction all the time; "there could be instances where they can send mixed signals" (p. 9). Henderson *et al.* (1999), explain how to employ techniques pioneered by Toyota including cultural issues should an organisation wish to succeed in becoming a lean enterprise. Emiliani (2003), documents how the Wiremold Company achieved outstanding success by using lean as a comprehensive management system, rather than a group of tools; a theme reiterated by Bicheno (1999) and Henderson *et al.* (1999).

Lean philosophy

Whilst the literature dwells on the total involvement concept, Olexa (2002a, b), insists it is scant regards the numerous strategies and tactics within the concept and largely fails to demonstrate that to implement and sustain any of these strategies, lean must be viewed as a philosophy; a vision shared by Bateman (2002). Moore (2001), is emphatic that lean should be viewed more as a philosophy or condition than as a process. Nonetheless, Comm and Mathaisel (2000, p. 2), are insistent that "Leanness is a relative measure". Ohno (1988), confirms that the Toyota production system did not happen overnight but through a series of innovations spanning over 30 years.

Hancock and Zaycko (1998), command that alongside manufacturing, all other subsystems need to change if an organisation is to reap the full benefits of lean. Chase (1999, p. 2), proposes that "people say they are implementing lean when they 're just implementing one or two of the elements". In the literature Utley *et al.* (1997) and McNabb and Sepic (1995), express that implementing a lean philosophy is not easy and that corporate culture had been blamed for numerous lean failures. However, Bartezzagni (1999) and Schonberger (1996), contest that it is important to introduce an alignment in the ways the members of the organisation think and behave to reap the full benefits of lean. This perception is reiterated by Henderson *et al.* (1999), arguing that it is essential for the right culture to exist amongst the organisation's employees in order for the business to enjoy the full benefits of lean.

A philosophy, because that the more people that buy into the belief, insists Vasilash (2000), better improvements are feasible which facilitate the implementation process. Moreover, lean needs to be seen as a journey and if viewed as a tactic or process, one could assume that one needs to apply it only to achieve the end result. Elliot (2001) insists that an organisation needs to live, breathe and mentor it in all of its aspects. Essentially, lean needs to be seen as a mind-set that governs how one looks at the business or processes. Liker (2004, p. 306), explains how an organisation can implement the management principles and business philosophy that are the basis of Toyota's reputation for high quality and profitability; he talks about the "lean learning enterprise", and how Toyota continually adapts its culture to the local conditions; he proceeds to provide tips for organisations wishing to convert into a lean enterprise. Nonetheless, some caution is recommended by Hall (2004), as he suggests that the Toyota production system as practiced by Toyota may not be easily emulated by other organisations owing to the variation by which some processes are managed and the prevailing culture.

The aim, according to Turfa (2003, p. 3), is that at some point lean becomes part of the way of doing business; "it's a journey that never ends". Ohno (1998), demonstrated that the Toyota production system, was not just a production system, but a total management system. The Engineering Employers' Federation's (2001) final report, insisted that to enjoy the full benefits of lean, organisations needed to utilise a package of four to five tools and this was not the case with most British companies. Moreover, it showed that a greater proportion of US-owned firms were using more lean tools than the UK-owned companies; equally, on average, productivity growth between 1998 and 2000 of organisations using four or more lean tools was found to be 11 per cent, whilst for those not on the lean path it was deduced to be 7 per cent. Liker (2004) insists that a right combination of long-term philosophy, processes, people, and problem solving is needed to convert an organisation into a lean, learning enterprise.

Lean implementation and its HRM implications

Needy *et al.* (2002), propose companies make broad statements that people are their greatest assets though upon closer examination one often finds that the company pays lip service to this statement. A common theme is the lack of attention to the human element claim Chung (1996), Lathin and Mitchell (2001a, b), Siekman (2000), Prabhu (1992) and Bidanda *et al.* (2001). Human skills such as communication, problem solving, teamwork and leadership debates (Philips, 2002), are vital for success and is resolute that people and cultural change are predominant reasons for lean failures.

Allen (2000), Sohal (1994), Bicheno (1999), Sanchez and Perez (2000), O'Corrbui and Corboy (1999), Rea (2001) and Jina *et al.* (1995), focus on the process of change management. Vasilash (2001), insists an aspect of the Toyota production system which tends to be overlooked is the impact morale and motivation had. Smeds (1994, p. 8), suggests a lean transition involves more than a: "pre-planned transition to a fixed future state, organisation evolution resembles an emergent process of self-organisation, where the objectives have to change flexibly along the road". Ohno (1988), states whilst Toyota production system's important objective was to increase production efficiency by constantly and thoroughly eliminating waste, there was an equally important respect for humanity.

Allen (1997), supports the importance of communication; whilst reinforced by Utley *et al.* (1997), he recommends a change of focus; from controlling to helping; from evaluating to empowering; from directing to coaching and from planning to listening. Dimancescu *et al.* (1997), Standard and Davis (2000) and Capelli and Rogovsky (1996), remonstrate that the issue is not so much that changes must be made but rather how one goes about implementing and communicating those changes. According to Liker (1996), an area that still does not receive enough attention from researchers and companies is the role of top management during this change process. Vasilash (2001, p. 2), discovered the role people play through NOK's CEO Joseph Day: "that lean happens on the shop floor, not in a conference room, that lean must be worked repeatedly".

Seddon (2004), challenges convention; he argues that while many commentators acknowledge command and control is failing us, few provide an alternative. His contention is the alternative can only be understood when one sees the failings of command and control by taking the systems-view. Seddon (2004), is scathing about leadership theorists, maintaining leadership is being able to talk about how the work works with the people who do it. In understanding an organisation as a system, Seddon (2004), draws on the pioneering work of Ohno though from a service perspective; arguing that the bureaucracy within public services is creating waste and he proceeds to recommend the dismantling of the specification and inspection regime.

Involvement of the supplier base

Krizner (2001), proposes that for a lean program to succeed it is vital to bring together different sections that historically erected barriers between them. Elliot (2001), corroborates that the lean philosophy relies on three goals: flow, harmony (pace set by customers) and synchronization (pull flow), and that this needs to exist in all sectors. Baker (2002), insists that as well as extending across the manufacturing enterprise, implementing lean also extends out into the supply chain; that it is essential to get the suppliers on board. Emiliani (2003), documents a company's lean transformation and demonstrates how the Wiremold Company achieved financial and non-financial

rewards by applying lean principles and practices throughout the value stream. Bicheno (1999, p. 189), reflects on how supply chains have altered and mentions "partnership philosophy", and how both parties could benefit from this arrangement.

Conventionally, argue Hines and Taylor (2000), businesses have sought to control the supply chain through vertical integration; recently, this trend has reversed as companies now engage in a high level of outsourcing. In this case, it makes sense to extend the order fulfilment mapping to customers and suppliers; though this is more difficult as one is looking outside the organisation. Liker (2004), proceeds to suggest that in order to attain a lean enterprise it is vital to expand the principles to the whole value chain.

Consequently, supply chain co-ordination should be encouraged, i.e. working to common quality standards, sharing transport and the employment of inter-company communication methods such as EDI. Furthermore, supply chain development should be supported as inefficiencies within the supply chain are examined.

Lean accounting systems

Philips (2002), disputes that conventional financial systems are not structured to look at cost savings in the same way as a lean enterprise would; inventory, for instance, should not be viewed as an asset. Chase (1999) insists that some companies are examining methods of activity-based costing. This technique breaks down the company's processes into specific activities, which allow the company to measure costs relating to those activities. Maskell (2000, p. 47), widens the debate that: "the financial community needs to contribute to the implementation instead of remaining on the sidelines, waiting for improvements to show up on the bottom line".

However, Maskell (2000), suggests Weiss (2001), fails to explore the conflict between finance and the operations personnel. Often a controller will find lean accounting methods disturbing because of the fear that he/she will lose financial control and this often translates into conflict and animosity. Hines and Taylor (2000), urge that many companies have a set of top level finance measures which may not be programmed towards the organisations critical success factors.

Maskell and Baggaley (2004), forward that lean induces excellent examples of operational improvement; some of these are more associated with cost avoidance rather than cost reduction. It could be promoted that if there lies an important significant role for the accountant in a lean enterprise perhaps it lies with this comprehension. Womack and Jones (2003), insist on using the term "creating value" as opposed to "adding value" as the former is the voice of the customer whilst the latter is the voice of the accountant. Many lean proponents correctly sponsor the view that since products come as a bundle of value and costly waste and often the firms mix the two, customers often have no choice but to purchase the waste along with the value. Maskell and Baggaley (2004), focus on the need to measure financial progress from a perspective of relevant business issues and real cost instead of traditional standard cost methods. Bicheno (1999), proposes a reform of the traditional financial accounting needed for tax and shareholder purpose. He promotes activity-based costing is more likely to yield accurate costs but if not properly utilised it can itself be wasteful. Maskell and Baggaley (2004), warns that as companies move ahead with the implementation of lean, financial functions can lag behind; when this happens, not only do they fail to support the effort, but can actually hinder it.

Contemporary situation

Berggren (1992), Bicheno (1999), Hampson (1999), Liker (2004) and Olexa (2002a, b), are unwavering in suggesting that a key component is to identify all the value adding time. Bicheno (1999), claims that in batch production about 98 per cent is not value adding time; in the USA, Sheridan (2000), indicates that less than 2 per cent of all manufacturing jobs are in companies that are truly lean; that they have completed at least 80 per cent of the conversion process.

Substantial contemporary research is referenced back to private agencies; Repenning and Sterman (2001), mention that in 1997, United States' companies spent well over $100 billion on management consultants. However, Parker (2003) suggests that a number of universities have stepped in for the small companies that cannot afford high-priced management consultants. Whilst the automobile industry figures highly, according to Womack and Jones (2003) and Moore and Gibbons (1997), in their survey of automotive manufacturers, suggested that only 41 per cent were assessed as having a high level of lean adoption. However, the study was based on case study comparisons within a relatively short time horizon and focused on what was actually happening as opposed to capturing their "wish list".

Rea (2001), argues that UK industry needs to emulate its US counterparts in adopting the lean philosophy; The Engineering Employers' Federation (2001) report summarises that only 33 per cent of British organisations that have adopted lean undertook it across the whole organisation; yet 40 per cent of their sample of 352 companies were not engaging in lean. Lewis (2001), implies that often organisations free of crisis are not eager to embrace lean thinking. Consequently, there may also be an issue with marketing and promoting lean manufacturing. Lebow (1999, p. 2) promotes the view that "companies rarely pursue lean manufacturing unless they are feeling some pain". Bicheno (1999), insists that the most successful organisations need to integrate systematic change with the needs of the customer, strategy and people in the business; that it is vital to extend lean past the manufacturing process alone. Bicheno (1999), dwells on the concept of a total lean enterprise and suggests that it is in the area of new product development where leading lean organisations are becoming increasingly competitive.

Conclusions

The analysis intimates that the major difficulties companies encounter in attempting to apply lean are a lack of direction, a lack of planning and a lack of adequate project sequencing. Knowledge of particular tools and techniques is often not a problem. Evidently, a cocktail of common ingredients are viewed indispensable for a successful implementation:

- simultaneously apply five or more of the technical tools;
- view lean as a long term journey;
- install a continuous improvement viewpoint; and
- make numerous cultural changes embracing empowerment and sponsor the lean principles through-out the value chain.

It is the authors' proposal to test this hypothesis and it will be achieved through an assortment of interviews corroborated by a survey questionnaire coupled with participant observation.

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