

Chapter 2

Clarification of the Lean Concept

Abstract This chapter explores the concept of Lean in detail and will attempt to tackle many of the existing misconceptions regards Lean. Lean is a complex ideology that requires considerable effort if implemented appropriately. The procedural aspects will be discussed at length, outlining the importance of implementing the Lean principles in a systematic fashion. Furthermore, there exists empirical evidence that suggests that most Lean initiatives fail. The literature and evidence available is analysed to explain possible causes. HR, culture, and change management are often cited as prominent reasons for Lean not being successfully implemented. This aspect will be further scrutinised. Furthermore, as this investigation hopes to consider whether Lean aids competitiveness of organisations, a thorough evaluation will be undertaken to judge whether existing empirical research verifies or refutes this assertion.

Understanding the Concept of Lean

As intimated earlier, it was the Toyota Production System (TPS) that developed the relevant approaches, Lean practices, and instruments. The phrase “Lean” is attributed to John Krafcik who in [1988](#), as an undergraduate at the MIT, worked under the guidance of Jim Womack stated that:

“Lean production is Lean because it uses less of everything compared with mass production – half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also it requires keeping far less than half the needed inventory on site, results in fewer defects and produces a greater and ever-growing variety of products” (page 43). An exploration undertaken by NIST ([2003](#)) has complete prominence in reference to this pursuing investigation; it suggested that Lean is “a systematic approach to identify and eliminate waste through continuous improvement; flowing the product at the pull of the customer in pursuit of perfection” (page 1).

Liker and Franz ([2011](#)) suggest that there are still only two per cent of Lean programme implementations that reach their expected results. The rationale for this is that there is often little understanding of organisational factors that enable successful

implementations and continuation. There are many obstacles that a Lean journey encounters (Henderson and Larco 2003). Ransom in his investigation (2008) states that “*there are really only 5 % who practice the art skilfully in a world class master practitioner kind of way*” (p. 4). Liker’s earlier work (2004) reviewed that “*50 % of the auto suppliers are talking Lean, 2 % are actually doing it*” (p. 2). Likewise, the “*Manufacturer*” (2002) authenticated this whereby it suggested that whilst one hundred Lean companies were questioned regards their proximity towards becoming a total Lean organisation; only 3 % suggested that they were beyond “doubt” Lean; however, 22 % implied that they were only approaching this state.

Toyota’s philosophies were moulded by the personalities, ethics, and capabilities of its creators in the Toyoda family. The Lean principles are firmly founded on shrewdness and scientific methods (Bicheno and Holweg 2009). Koenigsaecker (2005) proposes that Lean success as a strategy necessitates imagination, reflection, and trialling. Taiichi Ohno, Shigeo Shingo, Sakichi, and Kiichiro Toyoda reflected this doctrine. The prevailing assertion within a substantial amount of the literature states that the main objective for Lean “*is to eliminate waste*” (Lewis 2008). In practice, the chief driver for Lean is the need to construct a thriving and resilient company (Singh et al. 2010). Unfortunately, there still persist misconceptions regards Lean; this is in spite of hundreds of books and proportionately more papers and articles coupled with supplementary resources devoted towards Lean.

Radziwill (2013) suggests that Lean is principally and notably a system, in essence an assimilated sequence of portions with a noticeably defined objective. Lean expects total dedication and should be extended further than just the engineering and management disciplines whilst stressing the concept of value in its endeavour to eliminate waste in a sustainable manner. Similarly, it is important that the companies distinguish the Lean ideology from the techniques and tools such as Six Sigma utilised to maintain the ideology. Whilst proponents of Lean such as Toyota inform us of the Lean instruments, organisations need to discover their own methods of improving these instruments (Liker 2004). The Toyota way fundamentally outlines the doctrine of the Toyota culture, allowing the TPS to operate successfully. Regrettably, many organisations consider the TPS has a collection of tools aiding better effectiveness. Instead, they should view Lean as a complete system which persuades its employees to constantly advance the processes they utilise (Singh et al. 2010). Consequently, often countermeasures were instigated and these have become a necessity for engineers and others in their manufacturing processes (Womack and Jones 2005).

The TPS should be viewed as facilitating a complete management ideology focused upon overall customer fulfilment. Equally, Montgomery (2010) suggests that it promotes a setting of teamwork and enhancement simultaneously advancing quality in the process. Organisations hoping to demonstrate that Lean aids performance levels for their own company are required to implement a more wide-ranging approach to performance management (Neely et al. 2005). Dimancescu et al. (1997) made an initial breakthrough to measure the impact Lean makes on an organisation though the analysis was somewhat restricted. The reimbursement an organisation accrues from Lean is not always obvious and not captured

appropriately through traditional accounting methods. Further work from Bond (1999) and Wade (1997) coupled with the comprehensive addition to the field of performance management by Kaplan and Norton (1992, 1993, 2001, 2005) proceeded to provide a more comprehensive system to gauge the performance of an organisation.

Nonetheless, the study by Maltz et al. (2003) will be analysed as they were able to extend the principles of the balance scorecard further by looking at sustainability of an organisation's performance levels. Lean needs to be viewed as an overarching strategy or a prominent strategy as has been advocated (Atkinson 2010). Fullerton and Wempe (2009) suggest that too often, there still exists a profound prejudice towards viewing Lean as a manufacturing concept rather than viewing it as a company-wide notion. The Lean success requires total devotion from all tiers of an organisation (Hines et al. 2008; Jones 2009). There is a consensus amongst academics (Cocolicchio 2008; Haskin 2010; Koenigsaecker 2005) that the main objective of Lean is to secure organisational profitability resulting from superior performance levels.

Lean Development

A truly Lean organisation such as Toyota communicates that Lean is more than a compilation of tools and that its ideology focuses upon a need to reduce three categories of waste (Koenigsaecker 2005), namely Muda (non-value adding work), Muri (overburden), and Mura (unevenness). Liker (2004) suggests Lean is both challenging and needs to be innovative. Whilst an organisation could learn from benchmarking exercises, it needs to recognise that the Lean journey for any one organisation is a unique experience and needs to be handled as such (McVay et al. 2013). Ohno (1988) reflects that the TPS was more than a simple production system since it was developed into a wide-ranging management system. Bicheno and Holweg (2009) suggest that to reap the full benefits of Lean, it needs to be extended to the complete value chain. It needs to be recognised that organisations operate uniquely with each one displaying idiosyncratic struggles and limitations (Cross 2012). It is vital that the company in question adopts all the Lean principles that will help it find its own solutions (McVay et al. 2013; Cocolicchio 2008). A company on the Lean journey is required to appreciate where it is heading (future position) and its present position (Johnston 2009).

It is fair to say that over the last quarter of a century, the term “Lean” has spread to almost every sector. In the early days of implementation, the manufacturing companies visiting Japan to see what Toyota was doing had a number of false starts or lessons learned (depending on whether your glass is half empty or half full!). Early implementations focussed on empowered teams and continuous improvement (kaizen) or attempts to replicate a pre-defined box of tools such as 5S, Single Minute Exchange of Dies (SMED), SPC, and kanban. Likewise, for many, Lean became synonymous with kaizen events—which were actually *kaikaku*—radically

reconfiguring individual operations. For some, this led to them developing their version of Toyota's famed Production System (TPS) including their own schematic "house" or "temple" of Lean along with departments of continuous improvement specialists.

Procedural Requirements for Lean

A fundamental prerequisite is the need to ensure that the suitable tools are put into practice within the right circumstances and contained in a manner that proceeds to support the organisation's value chain (Bicheno and Holweg 2009). A kanban system, for instance, when operational in an environment of fluctuating demand would be regarded as waste (Womack and Jones 2005). Research (Angelis et al. 2011; Black 2007; Conner 2009; Dalal 2010; Henderson and Larco 2003; Laureani and Antony 2012; Wheatley 2005) implies that any organisation hoping to implement Lean has to guarantee that it does not utilise a few exceptional tools, and that instead, it is vital that the company uses and applies the majority, if not all, of the following:

- Cellular structures since it is imperative that the requirements to produce a product(s) are grouped closely for efficiency (Lee 2008)
- Kanban methodology needs to be fully embraced (Smalley 2009)
- Kaizen which focuses upon the constant quest of advances in quality, cost, delivery, and design
- This also requires the need to detect problems with feedback loops ensuring modifications are implemented (Campbell 2006)
- Single-piece flow systems to be adopted need to be geared towards adding value (Bartels 2005)
- This needs to be combined with process mapping indicating the product and information flows (Jones 2009).

Furthermore, an organisation needs to actively work towards supplier development (Bicheno and Holweg 2009); likewise, this needs to be combined with supplier base reduction which aids scheduling and planning; equally, the relationship with suppliers needs to be one of collaboration and not an antagonistic one (Hines et al. 2008); SMED attempts to reduce hold-ups in changeover times on machines (Bicheno and Holweg 2009); kaikaku attempts to support the incremental changes required as opposed to kaizen, when appropriate (Sim and Rodgers 2009); 5S and common visual organisation are needed to reduce untidiness and disorganisation (Womack and Jones 2005); and total productive maintenance (TPM) is required focusing upon dependability, reliability, and capability of equipment through maintenance as forwarded by Ohno (1988). Imperatively, an organisation should never lose focus upon the concept of value and the wastes should always be considered, namely over production, waiting, transportation, inappropriate processing, inventory, unnecessary motions, and defects; proponents have recently added an eighth waste, underutilised people.

Predicted Benefits of Lean

There exists an accumulation of literature and empirical evidence suggesting the benefits of Lean. Subsequently, primary empirical research has been undertaken as part of this investigation. However, the intention of this chapter is to provide an indication of the more thorough and robust considered research that has been undertaken. Bicheno and Holweg (2009) advocate that the effective companies assimilate methodical variations to align the demands of the customer, strategy, and stakeholders within the business. Lean has to extend behind manufacturing to be successful (Womack and Jones 2005; Stump and Badurdeen 2012). Inherently Lean endeavours to fulfil customer requirements through timely delivery, reducing variability and consequently the overall cycle time at an enhanced quality level (Waurzyniak 2009; Wilson 2010; Halliday 2005). Empirical evidence (Hines et al. 2008; Laureani and Antony 2012; Marksbury 2012) suggests that the more competent companies abridge and level the flow from raw material input to the final product; whilst managing to reduce waste, followed by a certainty of what they are doing. Likewise, the strictly world-class companies, i.e., Toyota, exhibit several distinctive management behaviours; the prominent one being quoted is the ability to link the respective organisation's strategy to action (Jones 2009).

Empirical Evidence on the Benefits of Lean

"The Lean Strategies Benchmark report" (Bartels 2005) discovered when an organization realistically adopts Lean across the entire organization, that it is three times more likely to be regarded as industry best-in-class. The NIST report (2003) discovered Lean can result in operational improvements such as cycle time being condensed by 90 %. Likewise administrative benefits including a reduction in order processing time are also possible as suggested by the McKinsey & Company's Production System Design Centre (PSDC 2002); They proceeded to suggest that 60 % of the better performing companies had adopted Lean effectively.

The EEF final investigation (2001) conducted in companies that had adopted four or more of the key Lean tools reaped greater benefits from their Lean journeys. Shah and Ward (2007) discovered a positive association of Lean with operational performance. Koenigsaecker (2005) summarises an investigation undertaken by the Association of Manufacturing Excellence (AME) whereby the quoted benefits included a saving of 95 % in lead time. The Manufacturing Foundation findings (2004) stated that 62 % of their sample reaped benefits from Lean. Ransom (2008) quotes that Lean awards companies a competitive edge, namely a revenue expansion of 10–12 %, and an income development rate of 12–15 %.

Rationale for the Low Numbers of Successful Lean Initiatives

Similarly, Lean initiatives suffer from a low record of successful programmes; once again, the subsequent section highlights the existing evidence. Nonetheless, an attempt is made to subsequently provide the reader with a more detailed input regards how the record of successful Lean initiatives could be improved. A considerable literature exists which dictates the reasons for the low numbers of successful implementation; Table 2.1 summarises the empirical evidence of the possible hindrances towards Lean and the mindset change required from proponents should they hope to combat the existing trend of experiencing low numbers of successful initiatives; this proceeds to recognise the contribution made from the main literature sources.

Table 2.1 Main hindrances to successful implementations

Literature explanations for the low numbers of successful implementations	
Rationale forwarded	Literature sources
Improve the internal communications systems; required to aid empowerment and to adopt the principles of Lean	<ul style="list-style-type: none"> • Angelis et al. (2011) • Camp (2013) • Eisenhardt and Martin (2010) • Hines et al. (2008)
Need to observe Lean more than a manufacturing improvement strategy and allow its remit to surpass outside manufacturing	<ul style="list-style-type: none"> • Koenigsaecker (2005) • Liker (2004) • Shook (2010) • Spear (2004)
Effectively manage the sub-cultures; no company has a homogeneous culture and it is important to retain focus upon the Lean mission and vision	<ul style="list-style-type: none"> • Stefanie et al. (2012) • Wincel and Kull (2013) • Angelis et al. (2011)
Recognise that every Lean journey is distinctive; there does not exist a stable formula to achieve Lean success; and the respective companies commence with a dissimilar arrangement of constituents (or influences and restrictions)	<ul style="list-style-type: none"> • Sim and Rodgers (2009) • Johnston (2009) • Laureani and Antony (2012) • Bartels (2005) • Campell (2006)
Customised accounting procedures need to be adopted; both standard costing or activity-based systems are unable to accommodate the complexities of Lean. Preferably, value stream/product-based costing taking into consideration product development whilst vending alongside production and supplier costs is required; in this way, the personnel involved within the value stream are able to detect if they are influencing a greater degree towards value instead of costs	<ul style="list-style-type: none"> • Neely et al. (2005) • McVay et al. (2013) • Schonberger (2008) • Singh et al. (2010) • Tangen (2005) • Saurin et al. (2011) • Baggaley (2006)
Promoting the Lean paybacks; there is a sketchy record of organisations treating Lean as an business initiative	<ul style="list-style-type: none"> • Gremyr and Fouguet (2012) • Cocolicchio (2008) • Doolen and Hacker (2005)

(continued)

Table 2.1 (continued)

Literature explanations for the low numbers of successful implementations	
Rationale forwarded	Literature sources
Lean has to be considered as a long-term venture and one whereby the benefits may not be obvious within the first year	<ul style="list-style-type: none"> • Wheatley (2005) • Cross (2012) • Fullerton and Wempe (2009)
Companies are required to adopt appropriate compatible IT systems; there exists a need to link the operational level to effective enterprise software proceeding to extend it to the customers' value chain	<ul style="list-style-type: none"> • Cross (2012) • Marksbury (2012) • Montgomery (2010) • Williams and Duray (2012)
Adapt the organisational structures; a definite requirement exists to shape in line with the “ <i>value streams</i> ” concentrating upon the customer and product groupings	<ul style="list-style-type: none"> • Radziwill (2013) • Mehta and Shah (2005) • Montgomery (2010) • Jones (2009)
A need to sustain the Lean momentum; it is essential that the company intermittently elucidates objectives for individual value streams whilst deducing the accomplishment disparity between the customers' requirements and the actual provision	<ul style="list-style-type: none"> • Wilson (2010) • Motley (2005) • Pullin (2005) • Ransom (2008) • Camp (2013)

HRM Implications for Lean

Relevance of an Organisation's Culture

The entire concept of Lean cultures has a dedicated section subsequently, and this notion should be awarded total prominence. Most Lean journeys suffer as a result of prevailing cultures, and this section provides an indicative clue to the surrounding issues. Liker and Franz (2011) suggest that Lean should be viewed as a journey and at the onset, it is essential to decipher the current state; the current stated ideals and behaviours have to be contrasted with the Lean principles and behaviours. The part played by managers is the essential component of supporting progress (Celani and Singh 2011). Employees cannot just be viewed as a significant resource to the company; instead, they need to be viewed as the organisation (Skabelund 2012). Fundamental factor to most Lean initiatives failing can be attributable to an organisation's culture and change (Mann 2005; Hines et al. 2008; Montgomery 2010). A company's culture encapsulates the conventions, principles, norms, and noticeable artefacts of its employees and their behaviours (Wincel and Kull 2013). Daft (2001) captures the concept as he suggests a company's culture “*is the set of values, guiding beliefs, understandings and ways of thinking shared by members of an organisation and taught to new members as correct*” (p. 322). Managing around the culture is a distinct possibility; however, this may not result in sustained success (Marksbury 2012; Angelis et al. 2011; Zokaei et al. 2013). In order to induce organisational change, there is a need to initially change behaviour (Laureani and Antony 2012; Montgomery 2010; Stefanie et al. 2012). Efforts to replicate a

formula that has proven effective in one organisation under different restrictions has proven to be irresponsible (Camp 2013; Skabelund 2012).

It is vital that the Lean organisation develops a more conducive culture, whilst managing around the culture is a distinct possibility as there exist several ways to achieve the desired goals (Angelis et al. 2011). However, this may not result in sustained success (Marksbury 2012). A popular view (Montgomery 2010; Shook 2010) suggests that it is futile to bring about organisational change by attacking attitudes and values. In order to induce organisational change, there is a need to initially change behaviour (Laureani and Antony 2012). Zokaei et al. (2013) suggests that companies hoping to secure Lean success need to relinquish the conventional disciplinary and personnel administration and instead look to adopt strategic human resource management (Montgomery 2010; Stefanie et al. 2012). Knowledgeable leadership encourages the motivation and enthusiasm of employees. The research shows that this will facilitate fresh resolutions, a quicker acceptance of innovative ideas with the intention to fulfil customer needs (Johnston 2009; Wincel and Kull 2013). Lean proponents suggest that a company's organisational strengths and faults are often varied to those discovered in another organisation; consequently, an intention to replicate a formula which has proven effective in one organisation under different restrictions would be irresponsible (Camp 2013). The association between Lean and HRM is obvious (Skabelund 2012). It is essential that HRM needs to absorb techniques in order to apply the Lean principles and especially the Plan, Do, Check, Act (PDCA cycle) to all of its undertakings (Wilson 2010).

Considerations for an Appropriate Change Strategy

Alongside culture, the literature focuses upon an appropriate change strategy in order to achieve a successful Lean implementation (Wilson 2010). The recommendations forwarded concentrate on the key requirements for success: to create and then communicate a vision and an overarching comprehensive plan that all the employees can both comprehend and share with (Ohno 1988), and to develop an awareness of determination to succeed in a concentrated fashion and to try and cascade this principle to the entire organisation (Liker and Franz 2011). It is also suggested that there has to be an internal sensei whose responsibility centres on the Lean initiative whilst cascading its principles in order to encourage empowerment and self-ownership (Shook 2010). To accomplish Lean, it is vital that the organisation views training as an asset (Stephanie et al. 2010). Likewise, the training needs to be directed towards resolving issues within a specific area (Camp 2013). Value stream mapping, for instance, is an imperative aspect for Lean to flourish, though it is frequently snubbed because it can seem dreary and theoretical (Wilson 2010). Similarly, whilst formal training continues to contribute a crucial role, the developmental aspect needs to be embedded within the culture of the organisation (Mann 2005). Managers should be required to provide team members with persistent feedback and coaching (Wincel and Kull 2013).

From a performance gauge perspective, it is vital to utilise an appropriate Lean performance management system (Camp 2013); this will be clarified at length within the course of this investigation. It is vital that an organisation on the Lean journey views the Lean initiative as an investment with greater returns to be reaped subsequently, as expenditure is required for aspects such as reorganisation and training (Henderson and Larco 2003). It is also crucial that a conducive culture is instigated as discussed earlier; this needs to link the remuneration systems with performance management and the reorganisation necessary (Wincel and Kull 2013). In this context, there exists a need to guarantee strictness and entrench the modifications in formal policies, procedures, processes, work standards, job specifications, and competence classifications (Marksbury 2012). In many recent Lean initiatives, the process of piloting the Lean principles and procedures before cascading them to the remaining parts of an organisation have yielded positive results (Sim and Rodgers 2009). The importance of commemorating and broadcasting the triumphs has operated effectively in many recent initiatives (Mann 2005).

Potential Issues Associated with Lean

Similarly, in a dedicated section later in the book, the author analyses potential issues with Lean if executed incorrectly. This chapter again provides a sense of the existing thinking.

It is important to evaluate some of the literature that is critical towards Lean. Cooney (2002) argues that in certain circumstances, alternative manufacturing strategies may prove more beneficial and essentially that the market characteristics prevalent in a sector may dictate the choice of the production strategy selected. Critics have suggested that some aspects of Lean such as mixed model scheduling or heijunka attempt to squeeze or limit the demand supply (Kincaid 2004). Consequently, agile production focusing upon customer demand variability can provide other options. The nature of long-term contracts found within Japanese organisations is not often the norm (Mehta and Shah 2005). In situations whereby companies are expected to make low amounts of dissimilar and fluctuating product lines, whereby it then becomes extremely difficult to attain a stable flow of product centred on the standard times (Kincaid 2004).

Stump and Badurdeen (2012) mention the concept of the decoupling point that has appeared within literature and essentially that stock could be held in a modular form and only pursued to completion once the exact customer specifications are known. In this case, an organisation could utilise the Lean principles up to decoupling point and pursue agile for the remaining stages. In essence, an increase in the organisation's products or a change in the volumes ensures that the decoupling point shifts upstream permitting the value chain to become more agile (Stump and Badurdeen 2012). Sceptics of Lean have also focused upon the association of Lean upon personal stress (Sawhney and Chason 2005). Gill (2003) intimated that Lean can pose greater stress levels that are manifested by employee attrition and

absenteeism as a result of accidents. He suggested that Lean can prove challenging for managers.

Lean and Performance Measurement

Baggaley (2006) suggests that any organisation needs to recognise the prominent performance measures that can assist to influence higher results in particular areas. The literature suggests that by overseeing and enhancing the processes, coupled with customer and employee relations, which the commercial perspective should progress as a result (Haskin 2010; Malone and Sinnett 2005; Maskell and Baggaley 2004). Current research has shown that numerous standard businesses concentrate on the performance measures linking the internal processes without a strong association to the customer needs in their particular targeted markets (Singh et al. 2010; Wan and Frank 2008). Likewise, whilst benchmarking systems can harvest encouraging results, if particular care is not taken, the organisation could be heading in a false direction through its focus on the identical processes and practices of the prevailing sector, without awarding appropriate importance on the customer (Malone and Sinnett 2005). A disparity in both time and quantity exists in all processes within a supply chain; this is a major issue that Lean has to address; consequently, an appraisal of Lean would need to ensure that this is considered (Baggaley 2006).

Neely et al. (2005) insist that performance indices need to be selected which allow an organisation to assess whether improvement is occurring against objectives and check points (milestones). Too often, companies select generic indices with very slight thought of their significance. The test for any company, which is serious about ensuring that Lean improves its competitiveness, is to select measures for the proper level of the company (Tangen 2005). Wan and Frank (2008) propose that too often, the true gains secured as a result of Lean are difficult to quantify. It is also important to try and ensure not only that the indices selected proceed to reflect the product portfolio and their respective life cycles, but also that they gauge important parameters for the organisation both internally and externally (Shah and Ward 2007).

The literature suggests that there has been a huge augmentation in the scope of global competition which now concentrates upon the service levels, degree of flexibility, customisation, and extent of innovation (Womack and Jones 2005; Shah and Ward 2007; Shetty et al. 2010; Singh et al. 2010). Montgomery (2010) proposes that an organisation cannot be outstanding at all of its competitive priorities concurrently, i.e., cost, quality, delivery, flexibility, and service. Terry Hill's "order qualifiers" and "order winners" principle needs to be considered alongside its links with the decoupling point which proceeds to offer a better indication when choosing the performance factors (Neely et al. 2005). Furthermore, the conventional accounting systems tended to focus upon apportioning overheads largely centred upon direct labour (Neely et al. 2005; Tangen 2005). The systems and structures of

manufacturing have altered to such an extent that this does not provide an accurate assessment; in modern times, direct labour forms a very tiny proportion of the cost of goods sold.

The empirical research draws attention to the conventional metrics that have been utilised and proven to be unsuitable for modern progressive organisations hoping to compete on a global scale. By way of summary, the limitations are mentioned within the literature regards the standard metrics, namely the conventional indices are often historical which makes it harder to make correlations (Lawson et al. 2003); many of the standard financial accounting instruments are not appropriate for the types of strategic decisions organisations presently; cost alone cannot always be the prominent factor (Kaplan and Norton 2005); and that they present modest amounts of information on the actual source of particular issues that the organisation may be truly facing (Malone and Sinnett 2005). Often, the association between both the financial and non-financial measures is delicate and not obvious which specific indices need to address (Tangen 2005). A greater emphasis is needed towards the intangible assets that are often neglected in many performance measurement systems (Lawson et al. 2003; Shah and Ward 2007). For Lean, the concept of value adding needs considerable emphasis which is often neglected in many systems (Bicheno and Holweg 2009; Womack and Jones 2005).

Empirical evidence (Baggaley 2006; Haskin 2010; Shah and Ward 2007) reflects that effective metrics do facilitate an efficient execution of strategy; conversely inadequate or bias gauges can actually be detrimental to an organisation (Neely et al. 2005). At a strategic level propose Shah and Ward (2007) that it is vital:

- that the measures selected strengthen an organisation's strategy,
- are conducive to the prevailing culture, and are
- constant with the established existing acknowledgment and reward systems.

Montgomery (2010) suggests that a high degree of consideration is required to ensure that the performance measures selected enable an organisation to progress, for instance, different products on varied stages of a product life cycle may need differing measures.

In the case of organisation-wide measures, a high technology business, for instance, at the start may need to focus upon reliability, speed, and efficiency in order to secure credibility and brand awareness. At the growth phase, the prominent gauge may then become market share. On the other hand, within mature industries, price, operational costs, and capacity utilisation may play a more prominent role. Likewise, in the case of an ageing industry, the respective cash flow indices may begin to take on a greater significance (Schonberger 2008). Tangen (2005) suggests that there exist three categories of performance indices:

- the basic measures concentrate upon the traditional measures such as finance,
- the intermediate levels focus on a more balanced perception, and the
- uppermost level, analyses the connecting interaction across the entity.

Table 2.2 summarises this process aptly by describing which measures apply at differing stages:

Table 2.2 Performance gauges

Varied indices and their appropriate standard		
Categories	Criteria of measures for this class	Operational considerations
Strategic level	Look at the associations between the indices	Ensure all sections are covered and utilise IT to support this process
Transitional	Widen the scope by analysing internal and external stakeholders; start considering the mid-term and long term	The information to be cascaded to the respective personnel in order to aid decision-making
Basic level	Largely very internal concentration	The strategic objectives need to be covered at the basic level

By way of example, reducing defects may be an internal objective, although in proposing this, the organisation might be perceived pessimistically by the market with the end result being a worsening of its share price. The non-financial measures such as product and service quality, client fulfilment, and originality are now more evident. By definition, the financial indices focus upon the past, whereas long-term sustainability of an organisation relies upon customer service (Tangen 2005); the types of factors include:

- quality,
- dependability,
- speed,
- cycle time,
- employee competencies, and
- efficiency.

The literature does indicate the problems associated with decoding how the qualitative targets lead to measurable indices. Neely (1999) proposes that the “Stockholm School of Economics” determined an affirmative association on how customer satisfaction impacted upon an organisation’s financial viability. The findings suggested that a yearly point increase in customer satisfaction proceeded to impact to the degree of \$7.48 million over five years for an archetypal company within Sweden.

An analysis of KPIs can be laborious, and it is important that organisations work efficiently with the data capture and subsequent analysis. The literature (Kaplan and Norton 2005; Neely et al. 2005) does suggest that companies need to utilise IT with superior eagerness in reference to performance measurement. An IT-balanced scorecard assists to spotlight on the connecting associations and linkages whilst assisting the managers to enhance value. The literature reflects upon acronyms CPM, BPM, or EPM (Corporate, Business and Enterprise performance management) with the obvious advantages of focusing upon areas for concentration at an earlier stage.

Tangen (2005) has suggested a possible method of assessing the indices that a company uses. Table 2.3 proceeds to build upon the initial concept that allows an organisation to effectively analyse the indices utilised. This process is effective in identifying those gauges that may no longer serve a useful purpose.

Table 2.3 Assessing indices

Factors used to appraise the indices utilised			
Essential criteria	The appropriate standards expected	Level of success Score 1–10	Time lag to make a change (days)
Fundamental requirements	<ul style="list-style-type: none"> – Precise data and information – Assists to secure aims – Accurate dimension – Outcomes are understood 		
Association to the performance	<ul style="list-style-type: none"> – Monetary concentration – Non-monetary – Associations are analysed 		
Relation to the stakeholders	<ul style="list-style-type: none"> – Internal focus – External perspectives – Are all or some stakeholders considered? 		
Decision-making levels considered	<ul style="list-style-type: none"> – Strategic concentration – Applied to all levels – Whether only basic levels are considered 		
The possible time frames involved	<ul style="list-style-type: none"> – Intermediate targets – Lengthy emphasis 		
The level of analysis required	<ul style="list-style-type: none"> – Obtainable information – Concentration on particular aspects – IT considered further 		

Summary

Whilst the concept of Lean has been largely associated with manufacturing and production processes, its principles embrace the entire business. Lean needs to be viewed as a voyage necessitating a strong start and one that never concludes. Essentially, Lean is a commercial ideology. The literature suggests that Lean does support effectiveness by refining the general performance levels of a company. Any organisation hoping to implement Lean needs to review it as an emerging concept and vigorous since it is developing continuously. Despite some of the criticism, it is feasible to assimilate other tactics without confronting the essential intentions of Lean; ideal examples would be overall equipment effectiveness (OEE) along with overall supply chain effectiveness (OSCE). The literature dictates that a significant confusion exists regards Lean only focusing upon manufacturing. The ideology and concept of Lean is largely successful when pertained to a complete organisation. The Lean ideology is unrestricted and enables the acceptance of other instruments and methods such as TQM and Six Sigma. The strategic components of Lean are multifaceted, though the empirical evidence to date suggests that when managed

well and executed as a total ideology, the organisation will reap major financial benefits. Lean has strategic significance; it makes good business sense. Nonetheless, Lean cannot be implemented in a haphazard fashion as all the relevant components within the value chain have to be managed including the logistics, accounting, HRM, and suppliers whilst developing a conducive culture for Lean to flourish.

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