

# The Lea<sup>®</sup>n Extended Enterprise

## *The Art of continuously achieving benefits through Value Adding Communities*

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**Abstract.** The competition of tomorrow is moving away from the level of the individual company and towards the level of supply chain. It is at this level that Lean organisations should evolve and become more flexible, self organising and self adapting entities. Today Lean implementations are based on principles with no clear scope as to how to achieve middle to long term benefits at the level of the extended enterprise. The objective is mostly based on achieving short term benefits through the implementation of mere techniques at the individual factory level. Therefore a new theory is needed to incorporate a set of practical rules. The approach for the interrelationship between theory and practice of Lean is based on systems thinking and the objectives of the learning enterprise. Lean should be practiced in conjunction with Open Innovation based upon customer-driven value creation and not merely customer-driven demand. The Lean extended enterprise should evolve towards a continuously learning organisation through customer integration in the product development and deployment cycle.

## 1 Introduction

Since Engineer Taiichi Ohno designed the famous Toyota Production System [1], there is a great deal of time elapsed, until Europe much later than Japan and the US has *discovered* that there is something to win, if similar techniques would be implemented in the European Industry. Under the pressure of Antagonism, companies were seeking ways to reduce operation costs in order to stay alive in a continuously globalising and antagonistic economy. The Lean approach has been adopted from an increasing number of companies in Europe slowly but steadily, now days with an accelerating pace, although some time ago many companies, some of

which today do not exist, have rejected the Lean approach as an approach that does not fit the European culture. What has changed today and companies have despite the cultural differences embrace the Lean way? Answer: in our view nothing – A more careful glance at the way companies implement *Lean* has very little to do with Lean. They look at practices and implement merely lean methodologies. They do not view Lean as a different way of managing a company and where the old industrial age attitude must vanish and be substituted by a completely new way of thinking, learning, measuring and acting. What they have in mind are mostly some techniques that act upon their resources in order to become more effective and efficient. Their focus, despite Lean, stays within short term cost reduction everywhere in the company with no middle or long term impact. The results have been significant in production especially in the first couple of years of implementation. However, looking at the middle to long term, benefits are really poor with little or non real improvement on the company competitiveness. It is our belief that *Lean* in conjunction with Open Innovation [2] can set the European industry off the ground if practice is based upon pure customer-driven value creation [3] and not merely customer-driven demand.

This paper looks at the presence and the future of *Lean Thinking* [4] and *Lean Practicing* in Europe and proposes ways as to how companies should be acting as to achieve the middle and long term benefits. Especially companies operating in the eastern part of Europe have the advantage to *do it right the first time* by taking a different way than their western counterparts have taken in the past and even today with the objective of steadily achieving middle and long term viability and competitiveness. The structure of the paper is the following:

- The Lean way in Europe and the US – status review
- The new Lean organisation – the theory behind the practice
- The Lean<sup>®</sup> Supply Chain and how to sustain it

## 2 The Lean way in Europe and the US – status review

A report published recently from the Aberdeen Group in the US, shows that Lean Philosophy has become the mainstream [5] (Fig.1). It is stated however, that although nearly 90% of the respondents in the survey consider themselves Lean less than one-third can be considered to have mature Lean deployments. Many think of Lean as supporting only key manufacturing functions, not broader, related functions. A closer look at the data shows, that there is a wide gap between those companies that deploy some Lean techniques and those that fully embrace the Lean culture it is stated in the same report.

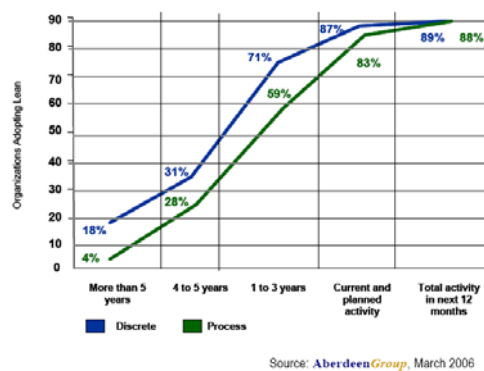


Fig. 1. Lean philosophy has become mainstream

According to the report the Lean operational maturity characteristics are primarily focused on the use of Lean tools and techniques used in production rather than the cultural aspects of Lean. One of the reasons for this is that *culturally, many of the leadership principles espoused in The Toyota Way are at odds with the managerial and facilitator skills taught at traditional U.S. MBA programs* is stated in the report. One of the major drawbacks in deploying Lean is the supplier integration in the Lean program of their customers. Almost a third of respondents are challenged with integrating both other parts of the company and all its suppliers into the Lean program. Meeting customer requirements for just-in-time deliveries requires the support and cooperation of not only finance and logistics, but also the suppliers who provide the raw materials, components, and assemblies that are used early in the manufacturing process. Expansion of Lean in the supply chain is therefore an imminent factor of success. But it is a challenging issue for most of the companies in the US and Europe.

Since most of the major manufacturing companies operate today globally with globally distributed supply networks, Lean means that also the ICT infrastructure (Information and Communication Technology) should be aligned with the business strategy of the companies. ICD has prepared a white paper for reporting on a survey conducted in Europe and published in September 2005 [6]. In their report ICD are reporting that while lean manufacturing is a strategy that has been around since the 1970s, it has traditionally been a cost-cutting strategy. According to the same report commitment to lean principles, in combination with a focus on continuous product improvement and a strong commitment to innovation, are emerging as the preferred strategy for industry thought leaders.

There is a fundamental issue about adding or creating value in the whole discussion about Lean. From the Lean perspective, at least the way this has been implemented in the US and Europe, customer value definition is literally provider-driven and scarcely user-driven. The voice of the customer is effectively echoed rather than heard. Involvement of the user or customer in the definition of what is value for him/her is mostly not an issue. Innovations in product and services are

made for the customer but without him/her. The objective in the new Lean organisation should be to let the customer or user define what value is.

### **3 The new Lean organisation - the theory behind the practice**

Going global is a survival necessity, especially for manufacturing companies, but it means also a horrendous increase in complexity. Complexity at this point implies that new competencies need to be emerged that were not there before, or not necessary. For instance, an organisation to think locally and operate locally meant that they had to cope with a few factors more or less under their control. With stable supply and operational processes and also relatively stable or foreseeable demand, companies could implement their Lean programs and have shown that remarkable results may be achieved in terms of productivity and drastic reduction of delivery times as well as WIP and finished product inventories by the mere use of lean techniques. Local suppliers could align themselves with their Just-in-Time strategies of their customers sooner or later.

However, in the global environment uncertainty in both the supply and the demand processes is increasing, the external market pressures on the organisation are changing scale and the IT infrastructure is not any more suitable to cope with so many simultaneously changing factors that were known and stable before. To continue to be Lean in this environment goes beyond the normal boundaries of the classical principles of the Lean or Toyota Production System (TPS) in our opinion, because the Lean principles, once set and institutionalised through the TPS, are not sustainable any more. To achieve sustainability of Lean in the global environment, organisations should qualify as adaptive and evolutionary systems. Moreover, the question here is not how to sustain a Lean organisation but how the organisation can sustain itself in this new environment [7], in other words to become self-sustainable. Self-sustainability is an emergent characteristic of the adaptive and evolutionary organisation. Lean self-sustained organisations must be able to produce themselves and their requisite knowledge in a changing environment. Therefore Lean adaptive and evolutionary organisations should divert from the classical perception of the Lean philosophy and modify some of its principles to fit the requirements of adaptivity and evolution that may be in certain aspects adversarial to the classical Lean ones. Furthermore Lean adaptive and evolutionary organisations should be able to continuously learn not only from within the organisation [8] but also through the direct interaction with their customers by integrating the customer or user in the value creation loop [3] and expand this knowledge in the supply chain. Especially supply chains structure also divert from the classical model of stable partnerships dominated in recent years, as a principle of Lean philosophy and will move towards more volatile and unbounded constructs. For example it is thinkable that supply chains could be formed in an ad-hoc fashion to satisfy unique requirements of a customer or a group of customers. This type of supply chain may be organised in the form of Value Adding Communities (VAC) as argued and discussed in the work of Tsigkas et al [9, 10]. Below a summary of the five principles is stated upon which Lean adaptive and evolutionary enterprises should be based:

- Enable open innovation and customer-driven value creation
- Embrace evolutionary change
- Encourage variability and tolerate errors
- Strive for dynamic equilibrium
- Nurture emergent properties

### 1. *Enable open innovation and customer-driven value creation*

The driving factor in the adaptive and evolutionary Lean organisation is the origin of value creation. The classical Lean philosophy concentrates on value-adding activities instead of value creating activities. In the Lean environment value is rather seen in a defensive way, as a production disadvantage (an operational cost position) instead of in an offensive way and a marketing advantage (a price and market share position). In the classical Lean organisation the customer (or consumer, or user) is not viewed as part of the value creation loop, reflected at the classical Value Stream Map, which is an open loop construct. In the era of mass customisation and open innovation, the customer is part of a closed loop Value Stream Map, either during the development phase, or during the production phase, until the customer completes it or issues instructions for completing it (mass customisation). Customer-driven value creation and open innovation is the prerequisite for achieving 100% customer satisfaction. In a society that scarcity of goods has been surpassed [11], differentiation can be efficiently delivered through the customer commitment and integration in the value creation loop [7]. The new Lean extended enterprise is engaged in two types of production: *heteropoiesis*, producing the other than itself (i.e. goods and services) and *autopoiesis*, producing itself (i.e. its own ability to produce). Self-sustainability is crucially dependent on the reliability of the second type of production, *autopoiesis*. Only an enterprise (as a system) that could continually produce itself, that is adapting itself to changing environmental conditions can be deemed as self-sustainable. Therefore, a new set of competences are now needed for the new Lean organisation, in order to become self-sustainable. This is an area for further research.

### 2. *Embrace evolutionary change*

It is important to view the organisation as a living system, not an engineered machine according to Taylor [12]. Taylor claims that living systems evolve through incremental changes that confer increased competitiveness in their environment. Unlike machines, they are not centrally controlled and regimented into perfect execution. Self-sustainable, self-organised enterprises are by definition adaptive organisations. According to Bergson [13], who himself was a proponent of creative evolution, “*to exist is to change, to change means to mature, and to mature is to creating oneself endlessly*”. Rephrasing Bergson and according to Zeleny [7], an organization can only exist if recreates itself. Self-sustainability is the objective. The classical lean philosophy treats the organization as a machine, like do Fordism and Taylorism through the approach of the division of labour. To embrace this new perspective, a Lean organisation should be willing to let aside the desire for increased control and begin to encourage the variability and experimentation that are essential to adaptive and evolutionary change. The classical Lean philosophy does not favour variability and experimentation is limited as fundamental issues against standardisation of products and processes. Lean and Six Sigma initiatives strive to

achieve nearly zero variability in the execution of processes by design. Encouraging variability and experimentation necessarily means giving more autonomy to line organisations and individuals. If a person or group behaves in a way that increases the fitness of the organisation as a whole, that person or group should be rewarded with increasing funding or opportunities for growth within the organisation.

### 3. *Encourage variability and tolerate errors*

An organisation that improves through variation must have a high tolerance for errors [12]. This can be achieved through redundant groups throughout value-adding operations. The goal is to allow new ideas to prove themselves while sheltering customers from the effect of ideas that do not work out. This approach is quite different from a zero-defects approach to managing operations in the Lean or Sigma Sigma philosophy. A company with no tolerance for errors at the operational level runs the risk of discovering that it has no capacity for adaptivity and evolution. If a system can be devised that tolerates variation from fixed policies in search of improvements, yet provides quick containment of variation that could cause harm, then we have the right mix for rapid evolution.

### 4. *Strive for dynamic equilibrium*

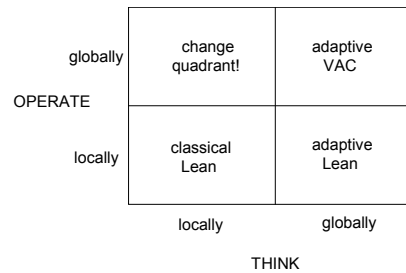
The ability to maintain dynamic equilibrium is essential for an organisation that is thriving on change. This means that we must achieve balance through motion rather than using the status quo as the source of stability. In a business environment that demands constant change, organisations must learn to maintain their balance while moving forward at ever-increasing speeds.

### 5. *Nurture emergent properties*

If a group of collaboration tools leads to a new level of problem solving that could not have been achieved through conventional meetings, that is an emergent property that should be recognised and harnessed for the good of the organisation [12]. Expecting, exploring and expanding on new and surprising behaviours within the organisation, is an important step toward adaptivity. It is also the step that is most likely to propel the organisation into the third level of adaptivity – namely creativity.

## **4 The Lea<sup>®</sup>n Supply Chain and how to sustain it**

From the above it is clear that the classical Lean philosophy does not hold in any situation and especially for globally operating manufacturing companies Lean thinking should be redefined. Below there an attempt has been made to categorize manufacturing strategies according to the way of operations. The independent variable is here the way the company thinks, i.e. understands and position itself. The type of operations should be therefore aligned with the way of *thinking* and not vice versa.



**Fig. 2.** Manufacturing operations strategies as a function of the thinking process

According to the above categorization there are 4 possible types of organisations:

- i. *Companies that think locally and operate locally.* This type of companies can implement the classical lean approach, because they can achieve impressive results. Most success stories have been reported from this type of organisations. Nevertheless these benefits reach fairly quickly their limits, so that it is only a matter of time, when these companies should be reconsidering moving into a different quadrant. The next logical and natural way is the way of beginning to think globally although still operating locally. It is exactly at this point where the organization should be transformed from a pure Lean to a Learning organization [8]. The adaptive lean approach is then the route to take as it has been described in the previous section for achieving sustainability of the benefits already reached. Typical representatives of this category are successful SME that wish to expand their market opportunities.
- ii. *Companies that think globally and operate locally.* For companies that have already embarked on lean initiatives, by implementing classical methods of lean manufacturing, this journey is definitely a learning experience. Nevertheless, it is also an opportunity to move quickly towards an adaptive lean environment, without waiting the results of their initiatives. Learning to become more adaptive will shorten the ROI interval and accelerate the transformation of the company towards an environment that quickly adjusts to new business requirements. Typical representatives of this category are consumer goods manufacturers. Open Innovation and Mass customization is what drives these companies to sustain and expand themselves.
- iii. *Companies that think globally and operate globally.* The classical Lean at that level loses its meaning. The supply chain at this level is materialized on ad-hoc basis in order to fulfill frequently individualized needs. Value Adding Communities (VAC) set up in a very flexible way is a possible solution to the problem as described by Tsigkas et. al. [9,10]. Adaptivity is seen as the way a number of companies can be fairly quickly set up a customized network to respond to specific requirements that can be one-of-a-kind. Information systems based on objects technology as agents plays a major role in this context. We see big opportunities for SME in Europe to operate in the world market by setting up specialized or even ad-hoc networks in the form of VAC for one-of-a-kind activities.

- iv. *Companies that think locally and operate globally.* This type of companies should redirect their strategies, since it is certainly not a winning strategy. From this perspective, the related quadrant should be abandoned as quickly as possible. New strategies and their related paths are to be defined and designed for planning and execution in line with the above.

#### 4 Further research topics

The use of the SCOR model for the design of supply chains for the various types of organizations integrating the customer in the value creation loop is suggested. Moreover, the elaboration on the learning competences for the *autopoietic* type of production for self-sustainability of the new Lean Enterprise is a further topic.

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