Lean in the Aspect of Sustainability

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SUMMARY

The article introduces the principles of Lean and Sustainability. It will analyze the points where overlaps occur between these two fields and show how a well-functioning unified system focusing on both areas could be developed. It looks at the effects of Lean and its -best-known tool 5S on the pillars of Social, Economical and Environmental Sustainability. Finally, it makes proposals on how to develop a sustainable system and what could be applied.
Keywords: Lean; Sustainability; Social Sustainability; Environment and Economy; 5S
Journal of Economic Literature (JEL) code: Q01, Q56, Q57

INTRODUCTION

There are two systems - Lean and Sustainability -, which operate far from each other, but which I think should work conjointly, since their fundamental conceptions are very similar. Lean is a corporate management strategy oriented to produce the product or service as economically as possible. Its two main principles are the respect of the human being and the elimination of wasteful activities from the process regardless of the nature of the work (blue-collar work, administration or creative tasks). At first sight Lean seems to be in harmony with the concept of sustainable development which "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland 1987: 24). The reason why I emphasize that it seems like that just at first sight is because, like Sustainability, Lean can be understood differently from unique and individual points of view. It is commonly known that, unlike other concepts, sustainability as a word has quite a few definitions; most of them are similar in meaning but still cannot be defined as simply as the laws of acceleration or conservation of mass in physics.

The Lean system has a similar problem, although it is a well-elaborated and logical system, but in general Lean is an approach implemented with a set of tools which is used to achieve positive results towards the most economical direction (Dües et al. 2012) in the most suitable way for people. This means that each and every corporation or firm may use a different set of tools of Lean to improve the efficiency and economic indicators successfully. Therefore, comparing the two concepts is not simple, but even here the possibility is given to analyze the effects from a global point of view. This article introduces the main theories of Lean and Sustainability supplemented by the chances of their realization.

Lean, Sustainability and Real Life

K. Schatzberg and J. Lebica, researchers from Cape Cod Community College, made a comparison between Lean and Sustainability in a study (Schatzberg et al. 2008), but in many cases real-life examples are missing and it considers only bare concepts, leaving out the practical realization and the real background. Because I realize that real life needs to be included, business practice is also taken into consideration in my amplifications. Table 1 contains comparisons made by Schatzberg et al., with observations on the realization of these factors in actual business practice based on my own work experience.

As seen in Table 1, Lean is on the right track, but it has not reached the level need to reach global sustainability. It is also evident that organizations dealing with Sustainability could learn from the Lean system.

Table 1
Comparison of Lean and Sustainability Based on its Realization in Business Practice

	Lean	Sustainability	Reality
1	Long term philosophy - create value for people, community (including environment), economy	Invest in long term - consider people, community, finance and environment	It is true that both systems plan for long-term but in case of Lean the economic consideration is more important unlike Sustainability, where society and environment play significant roles.
2	Create the right process to produce the right results	Ensure the ecosystem is in balance; if necessary intervene in the system	In fact, both systems consider well-functioning procedures necessary and make intervention in them. But while in the second one this happens globally, in the first one they pay only attention to only the sites and factories or those areas which are obliged by law, like emission rates. (Roncz & Tóthné Szita 2011)
3	Add value by developing people and partners	Invest in people - Consider stakeholders including your staff and partners (e.g. suppliers)	At this point the two systems could be in line with each other, but while Lean mainly focuses on only the professional development, Sustainability pays attention to social development as well. The only obvious exception is Japan, where the sustainable approach is really applied towards the employees. (Fazekas & Ozsvald 2000)
4	Continuously making problems visible and solving root causes drives organizational learning	Be transparent and consider the whole system vs. treating symptoms	One of the main points of Lean principles is to reveal problems and find solutions instead of finding someone to blame, then to share our results with other teams, departments and sites. (Cusumano & Nobeoka 1998; Melton 2005; Staats & Upton 2011) Unfortunately, this point is hardly manageable outside the company, where they fight against not the symptoms but the causes. Channels which could transmit the information and the achieved results do not exist and even if they do, they are often so bureaucratic that their efficiency is lost.
5	Minimize or eliminate waste of any kind	Creating waste harms something else in the system	In this point both concepts are on the right track, however the motivation is different. Since companies are profit oriented, this distinction is inevitable. (Dües et al. 2012)

Source: edited by the author based on Schatzberg et al. (2008)

5S IN THE ASPECT OF SUSTAINABILITY

As I mentioned earlier, Lean tools are quite widespread, but the best-known one is still 5S, which derives from the list of five Japanese words (Melton 2005). In order to understand 5S, some explanation is needed (see Table 2).

Table 2
5S in Connection with Sustainability

5S	Equivalents in Sustainability
Seiri – Sorting	Eliminating unnecessary material
Seiton - Straightening or setting in order / stabilize	No more waste of time, clear systems
Seiso - Systematic cleaning	Safer environment, less danger and fewer accidents
Seiketsu - Standardizing	It is easy to follow and understand, more satisfied staff
Shitsuke - Sustaining the discipline or self-discipline	Less maintenance, storage and stock-taking cost, smaller energy consumption

Source: edited by the author

Seiri – Sorting

Due to sorting less unnecessary raw material has to be purchased. The goal is to review the tools, office equipment, and documents which surround us and to decide whether they are necessary or not, based on the regularity of using them. For example, in an office where 10 people work there is no need to have one photocopier or laminator at every desk, but everyone is quite likely to need notepads or pencil boxes. In a case like that one of the photocopiers and laminators would be enough, and the rest of the machines and other redundant equipment can be passed to other departments or even be sold; furthermore, if a specific machine (e.g. shredder) is used only once or twice a year it is worth thinking of possible outsourcing.

With this we become not only economically but environmentally sustainable, since the quantity of purchased products will be less if this principle is considered earlier, during the planning process.

Seiton – Straightening or Setting in Order / Stabilize

The advantage of this S is that in this way the loss of time caused by searching for things can be avoided and we get a clear and transparent system. It can help to make the material needs of the process more traceable. For example, this idea is applied when making containers for maintenance workers to store their tools. Each containers has several shelves, and not only does everything have its exact place on them, but the cases are custom-made and fit to each tool, so it is impossible to place another tool in them. This makes missing tools noticeable immediately; moreover, the long hours spent in searching in drawers can also be eliminated.

Following this, the unnecessary orders can be avoided, meaning the reduction of warehouse, transportation and energy cost and expenses.

Seiso – Systematic Cleaning

Some literature refers to this point as sweeping, meaning constant and systematic cleaning (Melton 2005). Systematic, because one general cleaning is often not enough and it is necessary to follow a list step by step. If at the end of a working

process the proper cleaning is not done, during the production of the next items dirt and other spare parts can get into the newly manufactured goods, making it impossible to sell them, or in the worst case the products may become extremely dangerous.

A safer environment results in safer work and better quality products. Safer working conditions have social effects too, because if the workers feel that they and their environment get attention, they will develop a positive attitude and as a consequence they will care about their work and environment.

Seiketsu – Standardizing

After creating a clear and transparent system, we have to analyze whether it works properly and if some points which do not function accurately occur, further corrections are required to make this operation sustainable in the long-term. If the particular system is accepted by all the participants, it must be standardised. In several cases the leaders' different expectations, the diverse quality of evaluations and feedback, or the lack of these causes problems. In order to solve this issue many companies obligate their leaders to provide feedback and prepare regular evaluations; to do that leaders have to be trained. They use scoring methods on lists which are prepared by HR specialists and accepted at a company level for evaluating their colleagues.

The staff, in this way, can follow the evaluation more easily and can have input into both in their everyday routine and evaluations. Furthermore, in case they have some recommendations, those can be assessed and then can be introduced with less difficulty. Similarly to the previous S, it also has a social effect because it results in staff satisfaction, which has an economic influence on the company, too.

Shitsuke – Sustaining the Discipline or Self-Discipline

At standardization I have already mentioned continuity and the inclination to reformation at organizational level (Staats & Upton 2011) It is such an important point in the LEAN approach that we may even say it appears as a constant catalyst in each and every process, whether it is in connection with work, documents or decisions. The range of Lean tools is inexhaustible and while earlier leaders could make decisions based on economic and production indicators, nowadays other tools are available, such as visual tools. A so-called cockpit chart is one of these, which with its optimal layout of important indexes helps the decision makers to oversee the relevant information. Another one is the andon system (Womack & Jones 2009), which helps people to notice (with visual and/or audio cues) immediately what problem has occurred at which line.

This constant improvement is supported by the fact that even the system of the 5S is still improving; during the years additional 'S's have been added, such as Safety, Security, and Satisfaction, even in this way striving for improvement.

Perhaps the best example for the perfection of processes was the development of poka-yoke tools. As Liker puts it, the poka-yoke means a fool-proof mechanism (Liker 2004). These are creative tools which prevent mistakes from being made by operators. In accordance with this, Womack and Jones (2009) add that these techniques must be complemented with visual feedback from the 5S (where every redundant object is eliminated and every tool has its visible and marked out place) throughout the state variables (often andon displays) and the visible, up-to-date and standard workflow diagrams to the display of essential indicators and cost information. The precise technique depends on the application but the principle is the same: everyone who is concerned always must see and understand all the parameters and the actual state of the work.

LEAN FROM THE ASPECT OF THE PILLARS OF SUSTAINABILITY

It should be mentioned that social sustainability is sill the least analyzed field among the three pillars of Sustainability, so it is understandable that the scientific literature puts more emphasis on the first two, environmental and economical pillars, when looking for similarities with Lean. For that very reason I relied on my experience gained at multinational companies when I drew up Table 3. With this table I demonstrate which of the most common arrangements, actions, processes, effects and emerging problems are the important ones in terms of the three pillars of Sustainability within the Lean system.

Table 3
The Advantages and Disadvantages of Lean in Terms of the Pillars of Sustainability

Lean \ Sustainability	Society	Economy	Environment
Advantages	– Developing own staff and suppliers – Cultural and philosophical background	– Minimize expenses – Better use of raw material, energy and workforce etc.	– Producing less waste which cannot get into the market – Overproduction is smaller, follows the demand of the market
Disadvantages	– Everyone can be replaced – Monotony increases at workplaces	– Less flexible production – Requires a system that operates perfectly (e.g.: JIT)	– Ecological footprint is big (transportation from all over the world) – Concentrating on only internal processes

Source: edited by the author

SOCIETY

The common and at the same time main point of both theories is the human beings. However, Lean examines the role of people only from an economic point of view and regards them as one of many resources. According to Lean every worker has to be in the right place, and to achieve this, their skills are assessed and monitored continuously and if necessary they get training to find the way to the right direction. Nevertheless, that is not enough;, satisfaction requires quite a few factors, as Johansson and Abrahamsson (2009) cite from the congress of The Swedish Metal Workers' Union in 1985, where the nine principles of the "good job" were formulated. We should not forget that in 1987, two years later, Brundtlandt in her report drew up the notions of sustainability for the UN. By that time, in Sweden the effort to provide a safe working environment was already underway, in addition to the demand for co-operative work organization, proficiency in every workplace and for training to become an essential part of work. Although these principles were not formulated in Lean terms, the appropriate approach is reflected in terms of both analyzed concepts. Melton (2005) goes further and compares the old Ford mass production system with the Toyota Production System. As can be seen in Table 4, important steps are made when the new mentality replaces the old one.

Table 4
Production Systems Compared Based on the Human Factor and Philosophy

	Mass production	Lean production
Basis	Henry Ford	Toyota
People–design	Narrowly skilled professionals	Teams of multi-skilled workers at all levels in the organization
Organizational philosophy	Hierarchical - management takes responsibility	Value streams using appropriate levels of empowerment - pushing responsibility further down the organization
Philosophy	Aim for 'good enough'	Aim for perfection

Source: edited by the author based on Melton (2005:p.663)

I often encounter the problem that Lean is held responsible for the monotony of work processes, although it evolved decades ago in Ford's assembly lines, or following the industrial revolution, the time when the beginning of mass production dates back to. It is a fact that in a controlled system it is more difficult to stimulate creativity because the majority of problems are already solved, but it is also true that a person walking with open eyes can always find something to correct. The experiments of Cabris and Simons (2011) prove that the attention required for working safely can be lost even in a well-controlled system, therefore, there is always something to improve and which can increase workplace safety, realizing one of the principles of good work written by Johansson and Abrahamsson (2009).

ECONOMY AND THE ENVIRONMENT

Unfortunately, the economical and environmental interests of sustainability are not yet in harmony, but there are good examples. Like the well-trained workforce, which is economically indispensable not only from the aspect of mass production (Staats & Upton 2011), but also from the environmental point of view. Both Lean method aims for reaching the least possible number of damaged and faulty products, so-called ppm (damaged parts per 1 million ready products). In an ideal case ppm is just only one of the factors that should matter. It would be important to develop a factor that could help to estimate the possible effects of development, the CO_2 emissions and other environmental damage caused by modifications. Later it could build in payback and efficiency calculations, which would increase exponentially by the rate of the environmental impact and would decrease exponentially if the investment is environmentally friendly, i.e. positive in terms of sustainability. According to Melton (2009) such positive development is, for example, when according to the customer's request the production is retooled from big quantities, which mostly meant warehouse production, to the necessary quantities. Naturally, a suitable company is necessary for this modification. Based on the thesis of Shah and Ward (2003) newer and bigger corporations tend to acquire the Lean way of thinking, as opposed to the old and smaller enterprises. Such new and big companies are car factories like Toyota, where they already switched from the traditional mass production to Lean production decades ago (Womack et al. 1990), since no deficit is allowed in this exaggerated competitive environment. Examples for this are the lead time cut, which is done continuously until it causes an increase in cost (Vonderembse et al. 2006), or the intention to minimizing the material handling process (Carvalho & Cruz-Machado 2009).

If the participants (companies, international organizations) involved in one system were fully aware of the processes of the other system, a Globally Sustainable Lean system and approach (GlobaLEANability) could be established, where everyone aims to create a liveable world with the least possible impact and damage.

CONCLUSION

The Lean system provides a good practical basis to manage a company well. Starting from here, I think this system could be developed further if we complement it with Sustainability. Here naturally I do not mean the sustainability of Lean systems, since this principle is a basic requirement of the well-functioning system – as we could see in the case of 5S. The focus on Sustainability should be introduced as an essential viewpoint in Lean, since we should let not just economic interest move the system, but let there also be factors that could make production or a service Lean not only within a particular factory or company, but globally. Both systems have the ability and the possibility to learn from each other; the only missing part is that particular information flow which would be able to link the two systems. Local and international specialists, companies, social organizations and all countries should devote more energy to developing this information flow to achieve global results.

Acknowledgement

The described work was carried out as part of the TÁMOP-4.2.2/B-10/1-2010-0008 project in the framework of the New Hungarian Development Plan. The realization of this project is supported by the European Union, co-financed by the European Social Fund.

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