THE EVALUATION AND SELECTION OF SUPPLIERS – IN A LEAN APPROACH

Laszlo Berenyi, PhD
Lajos Banhegyesi, PhD Student
University of Miskolc, Hungary

Abstract

Lean management has become a popular concept in the last decades, the principles permeate the present business strategies as well. Of course, lean management goes beyond the limits of one company. The real benefits are reflected if it is applied for complex supply chains. An important challenge is enhancing the lean approach to direct partners. The paper draws up the possibilities from the viewpoint of quality management that can cover the fact that a supplier is the source of both opportunities and risks. The focus is on the supplier evaluation and selection in order to explore and to prevent the potential losses of poor external compliance. Next to the theoretical reasoning the paper includes some short case studies based on the author's experiences in order to present the limitations and the considerable good practices.

Keywords: Lean management, risk management, supplier evaluation, continuous improvement

Introduction

Nowadays, business development strategies are determined by the principles of the lean management theory. The elimination of waste in order to make the production and the operation more efficient, to provide a high quality customer service, or even to improve the flexibility in the service are indeed attractive goals. However, companies have to bear in mind what serious efforts should be made to reach the above aims, which usually goes beyond one company's boundaries. Hence, the supplier's performance fundamentally influences the company's operations and through this the customers' satisfaction. Regarding the customer complaints, the responsibility may not be passed onto the supplier in connection with the products and services, because from a costumer's point of view, these are internal quality assurance issues. In this study, the factors and their relationships are analyzed, which designate the suppliers' role and determine

their interfaces in the companies' effective operation. The supplier is both a partner and a risk factor at the same time, thus a balance needs to be maintained between these two features. The improvement of the business partnerships always requires an active, problem oriented approach from the management.

The paper summarizes the theoretical frames gained from the good practices of the authors' experiences. The practical experiences are formed as case studies about understanding and managing the suppliers' role in harmony with the lean management principles.

Applying the lean principles

The lean management – although using different expressions – is based on five generally accepted principles (Womack & Jones, 2003): identifying value, mapping value stream, creating flow, establishing a pull system and improvement designate a comprehensive management and operation philosophy. The fundamental goals remain the best quality, the shortest production time, the safety and the high morale (Liker, 2004), in a similar manner as were applied in the Toyota Production System (TPS) which provided the main basis of the lean thinking.

It is obvious that principles above cannot be simply implemented in case of taking only one single company into consideration, because success factors of lean management go beyond the organizational boundaries. The customer relations have a determinant role in the identification of value, while the other principles perceive rather the supplier as decisive factors. The value stream identification mean more than the internal "tidying up", the suppliers can also contribute to the creation of waste. For example, if not the proper part arrives, it can lead to major forms of waste, including:

- waiting: delay in the production procedure, because the new parts should be checked, repaired,
- excess inventory: stocks are over-sustained to ensure that the production never stops due to the improper parts,
- defects: failure of the component is not revealed, especially if it results faulty products etc.

Connecting the just in time principle with the pull production system is a fairly usual business idea, even the kanban is accompanied (Chan, 2001). The fact that the Toyota co-applies these does not mean that there are no other feasible way to follow. The stock reduction may be used even in a push production system; or the kanban applied alone will not lead to improvement in the proper function of the pull approach (Harangozó, 2012). A basic prerequisite of the just in time supply is that the production should be able to foreseen further than the replenishment period of the product or service to be purchased (Hutchins, 1999). However, the use of a kanban system requires

strict discipline and strong standardization of the product kits as well as that of the entire procedure. Actually, it only works properly in case there is a stable and continuous demand for the end product (Cimorelli, 2013).

The performance of a company is fundamentally influenced by the performance of its suppliers, that is why the establishment of partnerships with the suppliers goes far beyond the formal business politeness or beyond the making the supplier accept and follow the corporate's own organizational thinking (Marjolein et al., 2007). Ensuring the proper rate of production is possible only if the business partners coordinate their operation in the relevant task at a high level. None of above can be achieved without the commitment and active participation of the leadership (Bodek, 2008).

The suppliers' impact on the company operation may be examined from the quality point of view. An automatic loom incorporating one of his important inventions was developed by Sakichi Toyoda: there was a mechanism fitted into the loom to shut down the machine if the thread had been broken (Liker, 2004). Later, this kind of error detection with having incorporated multiple tools and methods (jidoka) became the foundation stone in the Toyota Production System and was applied for the visualization and the solution of the problems arisen (Feld, 200; Morgan & Liker, 2006; Tyagi et al., 2015). Jidoka helps in maintaining the proper flow of the internal processes, but these processes are not independent from the suppliers' performance at all. The reason for the activation of the automatic stopping may be caused by an inadequate product's arrival in the machine, moreover, this may lie behind andon information indicating a low level of performance. The maintenance of the quality and the minimization of the waste require the continuous quality control (by inter-operational checks), but this is only suitable for the revealing of any waste and for the stopping their spill over. Thus, avoiding the problems requires a complex approach that includes the ensuring of the availability of the material and spare parts needed for the production. Moreover, the maintenance of the failure free operation and the problem solving by terminating the root causes can be achieved only in cooperation with the suppliers as partners.

The supplier: partner and risk factor

There are three main activities regarding the executive tasks in connection with the suppliers and delivery companies:

- the quality control of incoming products,
- the selection of suppliers,
- the evaluation of suppliers.

Quality control of products and services can be carried out by the company itself or it can be a passed on the supplier by declaring the necessary tasks in the supplier contract. The latter option decreases the

number of the company's own activities not directly linked to production but it may increase costs and/or other risks of purchasing. It is also useful to examine this from a different point of view, which shifts to the justification of the "selection and evaluation" approach: the incoming delivered products represent risk factors for the company. The risk refers to a situation in which an event occurs at a given probability, so that the number of probable future events are higher than the actual ones, but a certain probability value can be ordered to each of these events (Fekete, 2000). Thus, the risk is a negative future event which may but will not certainly occur. The company (and not its suppliers) risks the costumers' satisfaction, the profit and the improvement are also at risk. Consequently, the supplier's proper performance is indeed part of the successful strategy. The pure fact that the company does make its supplier carry out the quality control, does not mean that the company does not take the responsibility concerning its customers. There are various strategies that deals with the questions concerning the possible ways for risk management (Farkas & Szabó, 2010; McNeil & Frey, 2005):

- Risk aversion: it means the elimination of the risky activities. Regarding the subject of the paper it means the fundamental question well known from the purchasing logistics: "To produce or to purchase" with answering "to produce". However, in practice, it commonly contradicts the business interest and possibilities (in case of the big corporations because of their good treaty position, while for small businesses because of their limited possibilities).
- Risk reduction: it is a comprehensive concept which covers activities to prevent or relieve the possible losses, furthermore it includes the disregarding of the risk considered to be negligible.
- Passing, shifting and sharing the risk: the company cannot or does not want to take on the risks by its own. There are numerous tools available for this, e.g. it can be regulated by contracts or insurances etc.

From a legal point of view, the supplier risk and the physical actions behind it belong to the concept of passing, shifting and sharing of the risk, however, these are irrelevant from the quality assurance point of view, the main aim being the risk reduction in co-operation with the suppliers.

The proper selection of suppliers (in case of new partners) and their continuous, regular evaluation make achievable the reduction of wastes and as an end-result the risk of losing customers. Expansion of the lean management is feasible if these evaluation actions are carried out with the appropriate content (Gordon, 2008).

The guidance of international quality management standards

Morauszki (2011) underlines the competitiveness (lack of trust in suppliers, suppliers as opponents) and the cooperation (partnership), including the conditions on possibilities of improvement for describing the nature of relationship between suppliers and companies. Both the general business thinking and the quality management standards tend towards this direction. It would be easy to say that these were also perfectly compatible with the principles of the lean, but it may be much more correct to say that the current lean efforts seek to achieve the elimination of waste in this way as well.

The principles of quality management include the mutually beneficial relationships with the suppliers, which declares the mutual dependence of the participants, therefore, calls for the establishment of such a relationship between the partners in order to increase their ability to create value. The benefits of this approach comprise the improving of flexibility and the optimization of costs and resources, respectively. Based on the explanation of ISO 9004 standard related to this principle – among other things –, the identification and selection of major suppliers is achievable.

The ISO 9001 standard requirements provide a general point of departure because of the wide range of their applications. The regulation related to the outcome of the procurement process means a provision for the purchased product's meeting the specified purchasing requirements. The suppliers should be evaluated and selected on the basis at what extent they are able to deliver products in accordance with the company's expectations.

The ISO 9004 standard also applies other proposals that have already proven their usability at the Toyota, for example (based on the comparison of Liker (2004) and ISO 9004 standard):

- providing investment opportunities between the partners and the possibility of sharing profits and waste,
- promoting each other's improvement,
- taking into account the risks associated with the relationship of partners, namely the use of effective risk management solutions,
- learning from the successes and the failures, as well as from the almost happened situations,
- gathering the knowledge from all partners.

At the higher levels, the ISO 9004 standard defines an active and deep relationship when interpreting the maturation level of an organization:

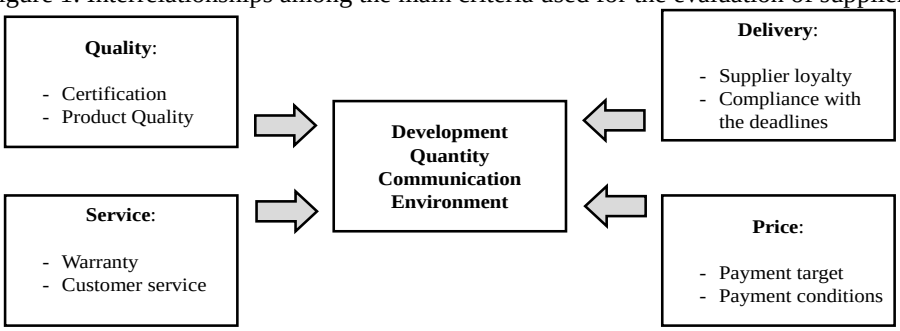
- "Level 3: Suppliers and partners are identified in accordance with strategic needs or risks. Processes for developing and managing the relationships with suppliers and partners exist.
- Level 4: Open communication of needs and strategies occurs with partners.

- Level 5: Data demonstrates that partners are engaged in and are contributing to the organization's successes" (ISO 9004 p.30.).

Suppliers' evaluation and selection criteria

The soul concept behind the selection and the continuous evaluation of the suppliers is the criteria upon which the company decide with whom they are willing to work. A wide array of examples of the factors to be considered can be found in the literature and may arise in the practice as well. The most important elements are summarized in Figure 1.

Figure 1. Interrelationships among the main criteria used for the evaluation of suppliers



Source: Morauszki (2011)

The array of the evaluation factors can be markedly wider than mentioned above, also involving the quantitative and qualitative (not directly quantifiable) requirements for the products, the services connected to the products as well as the company's information system and operation, along with the reputation at the market level and in the society (Dickson, 1966). When revealing the risk factors – seeing it as a decision problem – it is always practical to aim at making a list with the greatest possible number of elements (the more aspects and the more opinions may lead to a more objective judgment), which are useful to be separated in distinct groups prior to the qualitative evaluation (Galambos & Fekete, 2005; Ho et al., 2010; Lolli et al., 2014).

The present study tries to arouse the attention on a strategically important problem, namely, the interrelation between the supplier evaluation and the lean management, because if the emphasis has been shifted in this field, even the correct application of different assessments and selection techniques can only achieve an incorrect result.

Suppliers' evaluation by the lean principles

The lean management aims at eliminating the waste which can be arisen during the production and of which emergence (and prevention) is greatly affected by the suppliers as well. Examining the evaluation criteria detailed and the requirements of ISO 9001/ISO 9004 standards, it is easy to

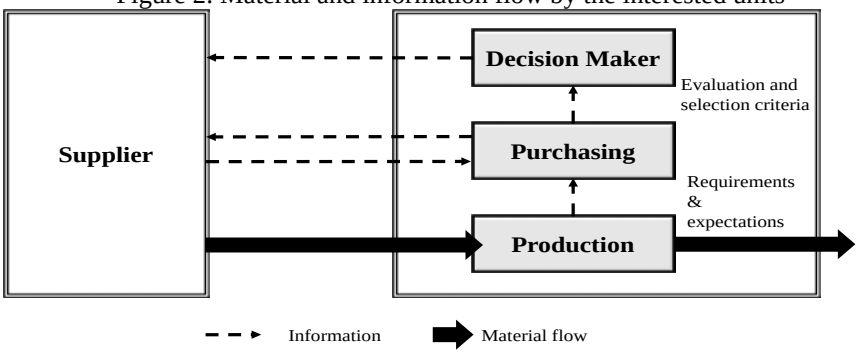
understand that the actions for the evaluation and selection of suppliers serve only indirectly the goals of the lean management, because these basically focus on the organizational and constitutional features and skills. The applicable quality management principle emphasizes the identification and selection of the major suppliers, while the ISO 9001 instructs the arrangements with the organizational requirements. The need for considering the contribution to the organization's activities first comes up in the ISO 9004.

In theory, that may appear as a wordplay with the definitions: because if the processes and the system of the processes are clearly defined, the tasks and the responsibilities are also clear cut, that means the organizational requirements are the same as the requirements for the construction and the operation. In practice, however, biases are to be expected:

- The information can be distorted even within the company because of the diverse skills and interests (Bíró, 1997). The requirements faced by the supplier and the requirements of the processes may differ from each other, even if the information source was chosen accordingly (for example, in case of choosing a raw material the representatives of the production must be asked about what, when, how is required). The possible places for the distortion are summarized in Figure 2.
- Different management decision-making traps may occur, e.g. one partner or the other may be favored or suppressed; respectively, because of purely subjective reasons (sympathy) or being under the stress of a rapid decision-making etc. (Simon, 1983).
- The evaluation is primarily on the basis of past data and experiences, which means no warranty for the future.

In a significant number of companies, the evaluation means a ranking scale, which sorts the partner organizations into categories (Hallikasa et al., 2005). If the evaluation is only undertaken because it is written in the quality control regulations, its effectiveness will be fairly questionable.

Figure 2: Material and information flow by the interested units



Source: created by the authors

In order to have an access to the benefits of the lean management, the evaluation should not (only) be comprehensive, which means it comprises the organization as a whole or the skills in general, but it should be connected to the value stream specified. Although the decisions based on the evaluation of the organizational aspect may reduce the risks, but those do so to a lesser degree than expected. The efficiency depends on how practical the evaluation criteria are managed to be chosen, what the evaluation procedure (timeliness) is and the background support. Proper results can be expected if the evaluation framework based on continuously updated database, and it is accompanied by thorough and regular audits. However, not all organizations can operate with such a comprehensive solution, in fact, it may happen that the supplier seems to be excellent one according to each criterion applied in the evaluation (having stable financial background, good references, excellent machines and people etc.), but even this does not guarantee that it would help to meet the customer needs regarding the specific products delivered for a given task or service. This means that even in case of a supplier selection based on an in-depth comprehensive evaluation, the risk remains that the supplier will not be able to fulfil the expected requirements.

What could be suggested as the solution? The supplier's poor performance can be minimized if the two conditions as below are met:

- the supplier is treated as an equal partner by the company, what is reflected both in the communication and in the setting of matching goals,
- the decision of the selection and evaluation of suppliers is based on not only the former experiences, but the evaluation of each task as a movement of a value creation chain.

To overcome the challenges summarized above, it is not the application of some new methods which provides the solution, but the extension of the lean thinking into. This may be difficult, but as Husi (2007) points out, it is not the complexity of lean tools what makes their use problematic, but the cultural implantation and harmony. By the lean approach the usefulness of all delivered products and services along with the related services must be questioned to see whether they create value or not. The questions must be formulated and asked on functions instead of products, processes and partner companies. The relationship between needs and functions defined by the value analysis (Miles, 1972) should be applied for the external suppliers too. The supplier requirements deduced from the processes are to be known exactly (the supplier must be let know about those) and having formulated the related functions, they should work as partners to reach the mutual beneficial solutions. It is difficult to learn whether the partnership or the waste elimination comes first, but they surely support each other on the long run.

Case studies

The application of lean principles and techniques requires creativity. The improvement possibilities can turn up in many areas and in many apparent form. Some case studies may illustrate the good practices.

Modifying a component's packaging

A large company purchased rubber rings for the manufacturing of a product of its own. By applying more lean principles together, they help to spare significant amount of time and money if the company and supplier co-modify their processes. The purchasing department mediated the quality requirements for the supplier, an important element of which was that the rubber rings should hold a given flexibility during the assembly. To this end, the supplier treated the rings with special protective substance and delivered in gas filled foil package. The packages were unpacked at the company place and the special lubricant had been wiped before installing into the product. Analysis of the value stream pointed out that there is a mutually non-beneficial process running. At the company's side, waste was arisen because of the time needed to unpack and to wipe the rings, also because of the labor dedicated, the transport and the storage as well. Moreover, a significant amount of garbage was generated (the packaging and the cloths contaminated with chemicals). Additional costs were arisen also at the supplier's side, due to the pre-treatment of the rubber rings and the gas protection as well as during the packaging. The idea of transporting untreated rubber rings in bulky package – even as much as 100 in the same pack – came up, thanks to the analysis based on the lean thinking. However, they had to be careful with the untreated rings, because they lost their elasticity after 24 hours, which means they could not be installed after that. When the company has rethought the production procedure and schedule, a new agreement was settled with the supplier: when the need for rings had been indicated 2 working days prior to the commencement of production, the rubber rings could have been manufactured and delivered in time. Although the administrative review of the supplier has not changed (it was excellent as before), the partners realized financial benefits thanks to the value identification and the coordination of the functions accompanied by the omitting of unnecessary activities.

Supporting the partner

There was a small company providing a very specialized metallurgical service: they were able to do elaborated manufacturing on even very large metal pieces. No ISO 9001 certification they had and none of the most modern machinery fleet, nor a serious financial background were available, but they still received orders permanently because they offered a

unique service in the county. The small company had a "limited" ranking in the supplier evaluation system of its business partners, however, co-evaluating its services and prices usually convinced them. Part of the service was the delivery of the work pieces manufactured with their own truck. Once this truck was broken, and they had to wait several months for a spare part. After that, a key customer terminated the contract and started looking for another supplier (this partner must face a cost-increase due to the longer transport distances, moreover, the spare part had to be sent back and forth due to its poor performance a good couple of times).

Another partner of that small company offered to take over the transportation in exchange for some price reduction. The costs and foregone financial effects for both companies were negligible compared to the key partner mentioned in this example, and it was not the bargain price which meant the real profit, but the long-term active cooperation gained here.

Systematic but ineffective evaluation

There may be cases when it is the evaluation system itself which is needed to be re-considered. A company wanted to obtain an ISO 9001 certificate so they hired an outsider consultant to help, who proposed a procedure for supplier evaluation. Every new partner was evaluated individually by the company at the beginning of the cooperation, followed by an annual re-evaluation, but the method did not work well. There were no sign of any problems in the quality management system records. The effects were indirect in the field of delays, number of production failures, rejected products and finally decreasing financial coverage. The official ratings were excellent for about the 90% of the suppliers. However, a supplier with certified ISO 9001 or ISO 14001 management systems includes in the best category according to the approach suggested by the consultant. It was obvious from the above that the results by this approach were only suitable for displaying them on the notice board, but the executive director (who was also the main owner of the company) was not willing to hear or see that the whole procedure should have been re-thought. He was absolutely convinced the consultant, especially because other companies use a seemingly similar approach. What is more, in the ISO 9001 supervisory audits, the precise completion and documentation of the evaluation were always underlined. It resulted in the same phenomenon than the one applying a superficial, administrative procedure: the obtained fake information about the suppliers' potential and even about the improvement possibilities were missed.

Waiting times in health care

A medical institution which provided screening examinations for managers operated a separate facility for sterilizing the medical equipment.

The sterilization process itself was not a time-consuming step, but the maintenance and operational costs were rather high, which affected the selling price of the medical services. Because other institutions started to work in the market providing the same service, the price became the key factor in the business survival. While the sterilization was a fast and effective process, it might as well occur that the sterilization equipment needed to be repaired, which, in turn, was a time consuming step lasted for even several weeks. That made the service unpredictable. The institution had to choose between two alternatives: one was the fast sterilization with an expensive extra maintenance cost to ensure the permanent proper condition of the equipment for providing the health service or the other one was the switching to the purchase of disposable equipment. The latter one seemed to be more expensive than the continuing of the sterilization of the non-disposable equipment, but at the same time, considering the requirement for a proper sterilization facility and the fact that the disposable ones were available with a predictable timing, the medical operations could be sold at a better price in case of the use of disposable equipment, which also meant an improved patient satisfaction with the service. The switching process proved to be feasible, the costs became predictable and the long waiting times vanished.

Continuous monitoring of customer satisfaction

A medical institution provided health care primarily for foreign citizens and for a charge, usually treatments which required minor medical treatments only. The process began when the patient first appeared at the place of the patient's care. However, a common problem was that foreigners did not find – or they did so only with difficulty – the place of the patient care. Consequently, the administrators spent much time for giving guidance about the right directions. In addition, many patients did not appear in time or were indignant at not knowing neither the place nor the language.

In order to make the patients satisfied, the institution tried to establish a more complex service based on the ongoing evaluation of costumer (patient) satisfaction. Thanks to this, the health care offered for foreign patients were accompanied with a shuttle transport from the city limits and also interpreters took part in the new transport service. This additional service produced a minimal increase in costs, but reduced the burden on the administrators, increased the patient satisfaction and helped to meet the timetable of doctors and infrastructure.

Conclusion

Regarding the customer satisfaction, the products, the components and the services, which are purchased by the particular company are indeed

key factors. Although the features are usually covenanted in writing, it is always the company who will take the responsibility towards the costumers. At the lowest level of trust, every purchased product is going to be approved prior their entering the production process. In this way, the risk of faulty production can be lowered, however, several extra activities (which means eventually extra costs) must be undertaken by the company. Based on the approach of lean management, that means one form of the waste production (faulty production) converting into another one (waiting, unnecessary deliveries and movements etc.). By using the methods of the value identification, which always questions the usefulness of each products and activities, a partnership can be established with the suppliers, in which it is possible to relocate or eliminate these activities. This view should be mirrored in the suppliers' evaluation as well.

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