The Integration of Lean and Socio-technical Practices in Sweden

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Abstract: Though lean production has its origin in the Toyota Production System (TPS), it has become popular across various industries. During this process, a striking situation has occurred in Sweden, particularly in its service industry. This paper aims to discuss the background and context of this phenomenon. In Sweden, work and management styles based on the tradition of socio-technical systems (STS), as embodied in Volvo’s Uddevalla plant, used to be competing with lean production as a collection of practices observed in the Japanese automobile industry. However, once lean was viewed as a management approach that aims to create a smooth flow of value towards the customer, the integration of the two occurred. To illustrate this point, a case of a school is considered. It shows that reflection by autonomous teams of teachers play an important role in problem solving that accompanies the implementation of lean. Such an integrated style draws out workers’ intrinsic motivation through involvement in problem solving, and thereby embodies the “respect for the people” philosophy in TPS. It is expected to be suitable particularly for the service context.

Keywords: socio-technical systems, lean, Toyota Production System, reflection, respect for people

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1. Introduction

This paper aims to describe the integration of lean and practices of socio-technical systems (STS) in Sweden while considering its background and context.

Toyota Production System (TPS) was formulated and developed in a high-mix, low-volume production environment in post-war Japan, and a quarter century has passed since it was conceptualized in the West as “lean production” (Womack, Jones, & Roos, 1990). Lean production has not only been an important paradigm in manufacturing, but has also been transferred to a wide range of industries (Hines, Holweg, & Rich, 2004). For instance, its applicability has been reported in supply chain, banking and insurance, healthcare and other social services, and software services since the latter half of the 1990s.

Although the lean production concept has become influential throughout the world, circumstances in Scandinavia, and especially Sweden, deserve particular attention (see Sederblad, 2013). After the initial boom in the early 1990s, there has been a renewed interest in “lean” at a national level. Particularly, “lean” has been implemented in the large public sector that is in need of efficiency improvement. As of 2012, 80% of healthcare organizations and 30% of municipalities implemented “lean” in one form or another. In addition, critical government agencies such as the immigration office, tax agency, and police department are a part of this movement (Hillberg, 2012). Currently, labor unions are also starting to participate in it (Johansson, Abrahamsson, & Johansson, 2013).

Why has “lean” been implemented to such an extent in Sweden, particularly in its service industry? Sweden is a country known for specific work and management styles based on principles and practices of STS (Trist & Bamforth, 1951) that emphasize the humanization of work and quality of working life. Furthermore, STS
and lean production have traditionally been viewed as competing concepts. Therefore, the above circumstances seem paradoxical and confusing to Swedish researchers (see Sederblad, 2013). This paper examines this paradox based on the literature and the author’s own observations. Specifically, this paper focuses on conceptualizations of “lean.” Initially, U.S.-based researchers of the International Motor Vehicle Program (IMVP) viewed characteristics of the production in the Japanese automobile industry, typified by TPS, as “minimum waste,” and labeled it as “lean” (Womack et al., 1990). Since then, however, there has been no agreed-upon definition, resulting in conceptual confusion (Shah & Ward, 2007). In order to deal with this issue, this paper focuses on the flow-management aspect of Japanese manufacturing that is at the heart of “minimum waste” operations. Fujimoto (1999, 2012) summarized the characteristics of “monozukuri capability,” which is the foundation of Japanese style manufacturing, typified by TPS, as the capability for controlling and improving the flow of design information (i.e., value-added) toward the customer. Furthermore, James Womack and his colleagues focused on the design, implementation, and improvement of value flow based on “pull,” and presented “lean thinking” as applicable beyond the context of automobile manufacturing (Womack & Jones, 1996). In accordance with the above views, this paper defines lean as a management approach that aims to create a smooth flow of value towards the customer.

2. STS and the Swedish-style Management

In STS, an organization or a work unit is a combination of social and technological parts, with the purpose of joint optimization of quality of working life and technological performance. Although STS originated with the Tavistock Institute in the UK, it spread widely throughout the Scandinavian countries as part of the labor
movement calling for workplace democracy. Those who promoted STS in Sweden were blue-collar labor unions centered around the Swedish Trade Union Confederation (LO) and associated researchers. This movement was influential particularly in the 1970s and 1980s. In 1985, Swedish Metal Workers’ Union (Metall—currently “IF Metall”), the labor union under the LO umbrella which had the greatest influence, laid out a strong proposal for the ideal work conditions, workplace, and labor market using the catchphrase “good work” (Johansson et al., 2013). This labor movement maintained a cooperative relationship with the Swedish Employer Association (SAF), which was facing labor shortages and the necessity to improve production quality and productivity.

Characteristics of Swedish style management based on STS principles and practices include the following: participation and union influence; flat hierarchies; informality, open dialogue, and consensus among levels and parties; autonomous workgroups (Sandberg, 2013). Out of this tradition, one idealized system was born out of Volvo’s effort to develop new work organization (Ellegärd, Jonsson, Engström, Johansson, Medbo, & Johansson, 1992). A key word here is “reflection.” Reflection is “the process of stepping back from an experience to ponder, carefully and persistently, its meaning to the self through the development of inferences; learning is the creation of meaning from past or current events that serves as a guide for future behavior” (Daudelin, 1997). That is, reflection becomes the basis for learning by looking back and forming implications of one’s own experience from a holistic perspective. Furthermore, when an individual forms implications of experience, the exchange of implications through dialogue with others plays an important role. This can also lead to reflection at an organizational level (Vince, 2002). Due to the emphasis on reflection in the above sense, Volvo’s production system that originated at the Uddevalla plant came to be called Reflective Production System (Ellegärd et al.,
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1992). The education expert, Lennart Nilsson, who actually had a hand in the development of this production system, argued that learning does not occur in a fragmented environment, as in an assembly line, and should instead comprise the work in its entirety (Nilsson, 1995). In his view, workers themselves should be able to view their work from a holistic perspective, and autonomously control the processes and tools for assessing quality. Essentially, it is important to conceptually comprehend what one actually does and what one is actually doing through “inner monologue” to develop the competence to master a greater part of the total work (Nilsson, 1995). In such a view, the assembly line was abolished, and parallel production was introduced in its place. It was based on long cycle times and emphasized individual and team level autonomy with the understanding of the overall assembly process. That was the essence of Volvo’s production system that originated at Uddevalla plant.

3. STS and Lean Production: From Opposition to Integration

While lean production was advocated as a universally effective production system in The Machine that Changed the World (Womack et al., 1990), Swedish researchers involved in the development of Reflective Production Systems leveled criticism at it. The reality of strict performance demands, long work hours, health risks, and rigorous factory regimes observed in Japanese automobile manufacturing formed the basis for such criticism (e.g., Berggren, 1993). In the meantime, however, Sweden fell into a financial crisis in the early 1990s resulting in favorable conditions for the adoption of lean production (Sederblad, 2013). Furthermore, the Uddevalla plant ceased operations in 1993 out of strategic reasons, but that led to a perception that it failed in the end. Consequently, a conclusion was reached that there are advantages with lean production at least in terms of organizational learning (Adler & Cole, 1993).
Thereafter, Swedish researchers reflected on the significance of Reflective Production System from an objective perspective (Sandberg, 1995), and the foregoing debate died down. However, since the dawn of the 21st century, a new situation has appeared: “Lean” (rather than “lean production”) has rapidly gained popularity in Sweden, a country renowned for STS. As of now (2014), “lean” has been established as a promising management approach in Swedish industries.

The reason behind this is the acceptance of lean as defined in this paper. As mentioned earlier, lean production in the 1990s referred to production methods that minimize buffers, exactly as the “lean” label suggests. Some examples cited were Japanese automakers’ overseas and domestic plants. However, as the interest in transferring lean production to the service industry gradually increased, perspectives with higher levels of abstraction became necessary. The definition of lean in this paper—management approach that aims to create a smooth flow of value towards the customer—is based on such a perspective.

The literature supports the definition. For instance, the five principles of “lean thinking” presented by Womack and Jones (1996) are (1) identify value, (2) map the value stream, (3) create flow, (4) establish pull, and (5) seek perfection. Fujimoto (1999, 2012) formulated a model of Toyota-style manufacturing. Viewing manufacturing systems as a process that transmits “design information” (i.e., value-added) toward the customer, he identified organizational capabilities that increase the density and accuracy of design information transmission. The improvement of both the reception side (i.e., process design) and the transmission side (i.e., work design) is seen as a core characteristic of Toyota-style manufacturing. Even though flow-based production was already embodied in the Ford Model T production (Yamada, 2014), the high-mix, low-volume production environment in Japan brought...
forth TPS, which is not only flow-focused but also market-driven (Ohno, 1988). It should also be noted that *The Toyota Way* (Liker, 2004) by Jeffery Liker indirectly supports the definition of lean in this paper. The book described general characteristics of Toyota-style management based on observations at Toyota USA and suggested that lean is not confined to Japan.

Under this background, recognition grew that Swedish management styles based on STS principles and practices do not necessarily need to be discarded in order to implement lean as a management approach focusing on flow creation. In fact, Volvo, a company known for embodying STS principles, also began to implement flow-focused production (Pil & Fujimoto, 2007). Furthermore, empirical evidence from the Swedish industry suggests that high performance is exhibited by a hybrid production system consisting of elements of both STS and lean (Dabhilkar & Åhlström, 2013). Moreover, the movement to implement lean while taking

![Diagram](image.png)

**Figure 1.** Integration of lean and STS practices
advantage of the tradition of STS has been echoing the perspective that lean should be implemented in a form that fits each organization’s context (Modig & Åhlström, 2012). Such an adaptation has been argued to be the key to workers’ acceptance of continuous improvement (Oki, 2012). Under the circumstance, labor unions that previously raised concerns against lean production altered their stance to a more open and realistic position, trying to reflect STS practices in lean implementation (Johansson et al., 2013). Figure 1 shows the integration of lean and STS practices in Sweden.

4. Evidence of Integration of Lean and STS Practices in Service

This section exemplifies the integrated style of lean and STS practices based on a case of a school where reflection by autonomous teams of teachers plays an important role in creating flow.

Located in the southwest portion of Stockholm County, Sodertalje city has implemented lean in all operations since 2009 while receiving support from Scania, a truck manufacturer that has its headquarters there. The symbol of the overall initiative is the “greenhouse,” implying that the development of people, as if growing vegetables in a greenhouse, is a primary focus. The author visited a school where lean had been implemented to address its challenging problems. There was some difficulty implementing educational activities for students at the elementary level; some with immigrant background did not speak Swedish and lacked basic education. Daily activities were chaotic, and there were not enough resources to provide adequate attention to each student. As a first step, a study was conducted to examine the value flow from the students’ viewpoint. Specifically, the following crucial steps were identified: students entering the classroom, taking their seats, confirming attendance, reviewing lesson material, individual and group work, wrap up, conclusion, and leaving the classroom. Subsequently,
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despite causes of flow impediments at each step were thoroughly investigated and countermeasures were developed to smoothen the flow. As a result, it was decided to reduce unnecessary meetings and miscellaneous duties so that more time could be spent on monitoring student problem behaviors and problem solving in the workplace.

Besides, three types of visualization called “signaling system” were developed with regard to the reception side (i.e., student learning) and the transmission side (i.e., teaching). As for the reception side, status of each student’s learning outcomes is shown on the whiteboard, using magnets of three different colors (i.e., green, yellow, and red). The three colors each indicate how well each student has been learning, taking account of the student’s self-assessment. This enables to grasp the overall learning conditions and identify students that need support. Based on this information, discussions are conducted regarding how to allocate resources in terms of time and effort to improve the situation.

Furthermore, there are two types of signaling system on the transmission side. The first is called “people who grow” that signals teachers to look back on their own experience for that day as human beings in the workplace, and generate dialogue for creating a better workplace. As shown in Figure 2, daily self-reflection is done regarding the three items: “I feel that I am important,” “I have control over my work situation,” and “I feel the sense of job satisfaction.” For each item, self-assessment is conducted at three levels, using the colors of green, yellow, and red. Similarly, the second type of signaling system is called “lectures that grow” that signals teachers to learn from each other about teaching and handling of students, and thereby improving the quality of lectures. Reflection is conducted based on how many of the students were performing well in terms of listening and concentrating on in-class work. Assessment scores for each signaling system are aggregated weekly and monthly, and are displayed in graphs on whiteboards so that trends in workplace
conditions and quality of teaching could be recognized at a glance. In this manner, a long-term effort of improving lectures as well as developing people is ensured.

In sum, at the heart of the efforts of this school is continuous improvement in both the reception side (i.e., student learning) and the transmission side (i.e., teaching) for a better value flow towards the students. Furthermore, it should be noted that the efforts are undertaken by autonomous teams of teachers. The management group plays the role of observing the actual workplace (“gemba” in Japanese) and conducting dialogue with the teachers. In this manner, reflection at the level of the whole school is conducted.

In essence, what is observed at the “lean” school shows resemblance to what was once observed in Volvo’s Uddevalla plant.
5. Discussions

This paper described the integration of lean and socio-technical practices in Sweden. Lean production used to be associated with practices observed in the Japanese automobile industry, and looked upon with suspicion as a powerful rationalization tool that would conflict with the humanization of work. However, by viewing its essence as a management approach that aims to create a smooth flow of value towards the customer, recognition has grown that it is beneficial for workers too if implemented in a manner that reflects socio-technical practices. Currently, the Swedish industry is proactively moving forward with the integration of lean and socio-technical practices at a national level.

The main implication of the integration is that management style based on socio-technical practices can fit well with problem solving that accompanies the improvement of flow. Although STS principles do not emphasize flow creation, they can be adapted to focus on systematic problem solving, particularly in the form of reflection by autonomous teams. The case of the school suggests that this integrated style facilitates problem solving based on intensive worker input. The important point here is that worker involvement in problem solving activities result in intrinsic motivation (Adler, 1993). In other words, workers gain a sense of self-determination based on utilizing their competence (Deci, 1975; Takahashi, 2002). Providing and ensuring environments and opportunities for that is equivalent to the “respect for the people” philosophy in TPS (Ohno, 1988; Sugimori, Kusunoki, Cho, & Uchikawa, 1977). It can be assumed here that the concept of “leaning on future,” generally seen in Japanese firms (Takahashi, 2013, 2014), plays an important role; however, this point is overlooked in the existing research outside Japan (e.g., de Treville & Antonakis, 2006). On the other hand, the “respect for the people” philosophy seems to have been embodied in
the Swedish industry in the specific form of reflection by autonomous teams. It could be argued that the importance of “respect for the people”, which is an integral aspect of lean implementation, has been rediscovered in Sweden. The integrated style of lean and socio-technical practices seems to be offering a balanced and practical approach to creating a system that develops both process and people.

This paper suggests that the integrated style of lean and socio-technical practices is particularly suitable for the service context where improvisation in the face of uncertainty introduced by the customer is the norm of everyday working life. In such a fluid environment, a holistic and organic perspective based on the autonomy of individuals and teams, will be helpful. Here, continuous improvement centers not on highly specified standards but rather on behavioral guidelines to be shared within the organization. Accordingly, there is a possibility that this integrated style will spread to even service industries of countries that do not have a tradition of lean or STS. Regarding Japan’s service industries, socio-technical practices might well come to be embraced in the future.

References


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