Cultural Aspects when Implementing Lean Production and Lean Product Development: Experiences from a Swedish Perspective

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CULTURAL ASPECTS WHEN IMPLEMENTING LEAN PRODUCTION AND LEAN PRODUCT DEVELOPMENT – EXPERIENCES FROM A SWEDISH PERSPECTIVE

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1 INTRODUCTION

Lean principles and methods have spread to a large number of companies throughout the world and more lately also to the public sector (e.g. Poksinska, 2010). Originally, the ideas behind Lean Production (LP) were developed due to resource scarcity and high domestic competition in Japanese automotive industry and with the aim to produce with better quality and lower production costs (Sugimori et al., 1977; Hines et al., 2004). The LP theory spread to other countries in the 1990s after Toyota made a huge move into the automotive industry in USA. The Toyota Production System (TPS) was then introduced as "Lean Production" (Krafcik, 1988). As the concept of LP has been extensively adopted, manufacturers find new product development (NPD) as a bottleneck (Liker and Morgan, 2011). As a result, Lean Product Development (LPD) plays a significant role in US automotive industry, since the product development process mostly affect customer-defined value and product/production costs (Morgan and Liker, 2006).

Both LP and LPD may be regarded as socio-technical systems (STS) in which a social and a technical system interact (Fox, 1995), i.e. interaction between people and technical aspects within an organization. According to Fox (1995), the technical part of STS can be used rather directly, for example, processes, machine and operating procedure. The social part, however, consists of people and social interaction (Fox, 1995) which requires knowledge of human drivers, organizational development, management, and cultural understanding. Thus, the outcome of product and production system development is dependent on the human resources and their capabilities and willingness to contribute to business targets, improvement and development. The development of Lean Production and Lean Product Development have their origin in Japanese cultural contexts

and a question is if there are any implications when implementing these ideas in another cultural context? The aim of this case study research is therefore to identify and compare national cultural aspects that influence Lean Production and Lean Product Development implementation in Swedish companies.

2 THEORETICAL BACKGROUND

2.1 Lean production

The basic concepts of Lean or Toyota Production System are "cost reduction through waste reduction" and "to make full use of workers' capabilities" (Sugimori et al., 1977). The term waste includes eight forms of non-value-added activity − i.e. overproduction, waiting, transportation, incorrect processing, excess inventory, unnecessary movement, defects, and unutilized employee creativity; the latter was added later to the original seven wastes identified by Toyota (Liker and Meier, 2006).

The Toyota Way is based on 14 principles to increase quality and efficiency. These principles are divided into four themes: long-term philosophy; the right process will produce the right results; add value to the organization by developing your people and partners; and continuously solving root problems drives organizational learning. This is referred to as the "4P" model, where the Ps refer to Philosophy, Process, People and Partners, and Problem-solving (Liker, 2004).

As LP consists of both philosophy/mindset, principles and tools, it is not just a toolbox which can be put into use. The main challenge when becoming Lean is "how to create an aligned organization of individuals who each have the DNA of the organization and are continually learning together to add value to the customer" (Liker, 2004, p. 290). This can be achieved through approaches which contribute to learning, such as experience sharing and knowledge re-use. This is incorporated in the fundamental Lean production principles of continuous improvement (Kaizen) and teamwork, including goal orientation and cross-functional work, both within and across teams, thereby facilitating experience sharing and competence development. Team-based production has been regarded as a way to enable learning at work with increasing production demands (Womack and Jones, 1996). Creating an aligned organization can also be achieved through considering human needs and functional requirements which has impact on individuals´ commitment and willingness to do "Right from Me", as described in a Commitment-model (Kjellberg et al. 2014). The model includes four dimensions needed to be considered such as creating an individual learning environment, improvement culture and work structures, opportunities for reflective production, and individual career support.

In Sweden, LP was deployed widely after the success story of Toyota and some US automotive manufacturers. Also, changes of the Lean principles and some

new theories of Swedish LP have been proposed. One example is the linkage of the Swedish way of working to LP, in which Swedish Lean should focus on the employees' quality of working life and learning (Johansson and Abrahamsson, 2009).

2.2 Lean Product Development

LPD was officially introduced for the first time as a small chapter named "Technique for Lean Design" in the famous LP book, "The Machine that Changed the World". Later on, many researchers have tried to identify and categorize LPD principles. One systematic and comprehensive categorization was made in the book named The Toyota Product Development System by Morgan and Liker in 2006 (Table 1).

Table 1 – Comparison between Toyota and Swedish LPD principles in literature

Dimension of principles	Toyota LPD (Morgan and Liker, 2006)	Swedish LPD (Kristofersson and Lindeberg, 2006; Holmdahl, 2010)
Focus for value definition	Customer-defined value [PROCESS]	Giving marketing a stronger formal position / User-focus [VALUES]
NPD process	Front-loading of NPD process [PROCESS]	-
NPD planning style	Levelled NPD process [PROCESS]	Formal project priority / Planning: focus on resources and time not activities [PHILOSOPHY]
Standardization	Rigorous standardization to reduce variation and create flexibility and predictable outcome [PROCESS]	Standardization [PHILOSOPHY]
Control system and leadership	Chief engineer system [PEOPLE]	Chief engineer [PHILOSOPHY] / Support and develop leadership [PHILOSOPHY]
Development team structure	Balance functional expertise and cross-functional integration [PEOPLE]	Measures to increase concurrency and cross-functionality / Equalization between working substance of individual and project [PHILOSOPHY]
Knowledge management	Develop towering technical competence in all engineers [PEOPLE]	Learning strategy which support Kaizen and Lean [PHILOSOPHY]
Suppliers involvement	Full suppliers integration [PEOPLE]	-
Continuous improvement	Build in learning and continuous improvement [PEOPLE]	Continuous improvement [PHILOSOPHY]
Purposes and strategies	Culture to support excellence and relentless improvement [PEOPLE]	Self-discipline / Respect for individual [VALUES]
Systems perspective	Adapt technology to fit people and processes [TECHNOLOGY]	-

Dimension of principles	Toyota LPD (Morgan and Liker, 2006)	Swedish LPD (Kristofersson and Lindeberg, 2006; Holmdahl, 2010)
Visualization	Align organization through simple visual communication [TECHNOLOGY]	Visualization [PHILOSOPHY]
Tools	Powerful tools for standardization and organizational learning [TECHNOLOGY]	Method and tools- e.g. A3 report, LAMDA-process, set-based design [METHOD and TOOLS]
Creativity	-	Creativity and innovativeness [PHILOSOPHY]

Morgan and Liker (2006) proposed 13 principles of LPD divided into three groups, i.e. process, people, and technology. The "Process" focused on tasks and sequence of all tasks needed to design and turn customer requirements into new products. "People" was not just about employees but also organizational culture and learning style. Therefore, this group simply dealt with the social aspect of the STS. Lastly, "Technology" took into account both concrete tools for product design and tools to support the culture suitable for LPD. Consequently, the main purpose of LPD was to improve market responsiveness and customer satisfaction while reduce costs and shorten NPD leadtimes (Liker and Morgan, 2011)

So far in Sweden only parts of the LPD have been accepted and the implementation process usually has begun with visual planning providing information transparency and control from management's perspective followed by set-based concurrent engineering and LPD knowledge management (Kristofersson and Lindeberg, 2006; Holmdahl, 2010). Holmdahl (2010) has defined three important aspects of Swedish LPD including values, philosophy, and method and tools. The "Values" aspect concerns mostly how to define and create values in NPD processes according to Lean. The "Philosophy" focuses on people's ways of thinking of LPD, while "Method and Tools" simply deals with Lean techniques for NPD. In conclusion, comparisons between Toyota and Swedish LPD principles are shown in Table 1 where they are put together according to different dimensions.

2.3 Cultural dimensions

Realization of Lean involves changing processes, products, philosophy, and people (Liker, 2004), including individual's attitudes, commitment, behaviour, and perspectives (Berglund, 2010). Local culture is therefore highly relevant to consider. For example, the Volvo Group has developed their Volvo Production System (VPS) model for use in 60 plants world-wide. Although their objectives are the same, the local conditions, history, and culture govern the roadmap towards Lean implementation (Harlin et al., 2008; Netland and Sanchez, 2011).

Hofstede et al. (2010) define culture as "the collective programming of the mind which distinguishes the member of one group or category of people from

another". Spencer-Oatey (2004) further states that culture influences each member's behaviour and his/her interpretations of the meaning of other people's behaviour.

Even though culture differences are considerable between individuals, studies show clear patterns of national cultures (Hofstede et al., 2010; Trompenaars and Hampden-Turner, 1998). Based on empirical studies, models have evolved that describe and explain cultural differences. Among them, Hofstede's model is one of the most common regarding cultural dimensions, see Table 2.

Table 2 – Cultural dimensions (Hofstede et al., 2010)

Cultural dimension	Description of aspects concerned for each dimension
Power distance (PDI)	The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally
Individualism (IDV)	The degree of interdependence a society maintains among its members
Masculinity -femininity (MAS)	What motivates people, wanting to be the best (masculine) or liking what you do (feminine). (Also referred to as life quantity vs life quality.)
Uncertainty avoidance (UAI)	The extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these
Long term orientation (LTO)	The extent to which a society shows a pragmatic future-oriented perspective rather than a conventional historical short-term point of view
Indulgence versus Restraint (IVR)	The extent to which basic and natural human drives related to enjoying life and having fun is allowed, or if society suppresses and regulates needs by means of strict social norms

According to Hofstede et al. (2010), there are large differences in cultural dimensions when comparing Japan and Sweden. To summarize, Swedish people have lower PDI, UAI, MAS, and LTO as well as higher IDV and IVR compared to the Japanese, see Figure 1. The largest gap concerns MAS where Japan has a score of 95, ranking almost the highest in the world while Sweden has a score of 5, ranking as the lowest.

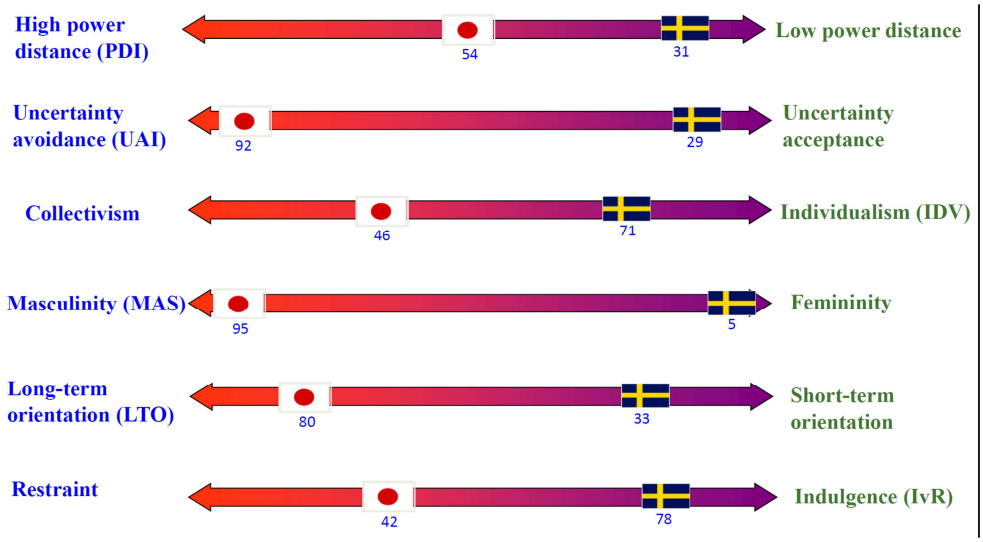

Figure 1 – Hofstede et al.'s (2010) cultural dimensions for Japan and Sweden

3 METHODOLOGY

Data for the LP implementation was collected within the research project "Swedish Production System" (SwePS) (Harlin et al., 2012), a collaborative project between Swedish manufacturing companies within the automobile industry, Chalmers University of Technology and Swerea IVF. One part of the project investigated the relevance of considering contextual and cultural factors for a successful and sustainable realization of LP in Sweden. For this reason, a literature study was conducted on national cultural differences, and contextual factors. The factors were categorized into two main groups: "Human, cultural, organizational factors" (HCO) and "Physical, technical, business factors" (PTB). The latter group included business and product related factors, e.g. suppliers, logistics, automation, products, market, and customers. Furthermore, a cross-organizational industrial workshop was held collecting data on specific considerations required when implementing LP in a Swedish context. There were 20 industrial participants in the workshop representing logistics, Lean coordinators, production managers as well as five academic Lean experts. Following this, a questionnaire was distributed to ten LP practitioners (involved in or responsible for LP implementation) from six companies and three academic LP experts. The aim was to study to what extent the HCO and PTB factors were relevant and important to consider for the LP implementation in various production companies in Sweden.

Data regarding LPD implementation were collected through semi-structured interviews focusing on Swedish LPD and challenges of the implementation in Swedish companies as a part of a Master thesis (Preechachanchai and Wangwacharakul, 2011). The interviewees were one Lean coordinator and one

quality manager who implemented LPD in two Swedish high technology and complex product system companies and two LPD experts from research organizations who had broader experiences of LPD implementation in various Swedish organizations. Furthermore, the interviewees filled in a questionnaire about Swedish LPD in practice, cultural factors influencing LPD implementation, and change management in relation to LPD. The aim of the interviews and questionnaire was to identify and compare Swedish LPD to the one defined in Toyota's LPD by Morgan and Liker (2006). An analysis regarding similarities and differences between Swedish and Japanese LPD was made using Hofstede's cultural dimensions.

4 FINDINGS

4.1 Implementation of Lean Production in Swedish companies

The results of the workshop and questionnaire showed that LP realization often requires more effort and time than initially planned. Also, implementation of Lean requires a strong focus on changing the management and employee's mindset as well as using a number of principles and tools.

The questionnaire demonstrated that the dependencies of the LP sub-areas varied between the contextual factors (see Table 3). Some of the sub-areas were identified to have high dependency and being strongly related to the HCO factors of the local company context and thereby national culture. These sub-areas included operational development, continuous improvement, goal oriented teams, cross functional work, organizational design, leadership, and environment. These required increased attention to the local company context. Sub-areas identified in the questionnaire having a lower dependency on HCO factors were quality planning and assurance, continuous flow, material supply, production levelling, and maintenance system.

One part of the workshop focused on the question "Is there anything that is particularly important to consider for companies in Sweden to achieve sustainable LP implementation?". The workshop participants put forward that skills and expertise within Swedish production organizations as well as their cultural characteristics should be made clear and treated as strengths and success factors. They stated that cultural characteristics of Swedish organizations were low hierarchy, decentralized decision making, individuality, uncertainty acceptance, and capacity of negotiation and compromise. However, they claimed that these characteristics could also hinder the employees' performance, for example, by their taking great risks in projects, having many discussions before making decisions, and being too modest.

Table 3 – Contextual factors dependency on successful implementation of Lean methods

Sub-area within Lean Production	**Contextual factors**	
	HCO Human, Cultural and Organisational factors	**PTB Physical, Technical and Business factors**
Operational Development, Continuous improvement Goal oriented teams, cross functional work, Organizational Design, Leadership, Environment	High dependency	Low dependency
Problem solving, Takt time.	Medium dependency	
Flexible manpower, Zero defects, Standardization, Vision/core values.		Medium dependency
Quality planning and assurance, Continuous flow, material supply, production levelling, maintenance system.	Low dependency	Medium dependency

4.2 Implementation of Lean product development in Swedish companies

The questionnaire results showed that the Swedish organizations which deployed LPD had used many principles, but not all of them, in their NPD processes. However, degrees of use varied depending on the organization's products and organizational maturity. Both the studied companies had their own LPD models. One of the studied companies even had various models for different perspectives. For example, an overview LPD model for top management as well as an LPD model which focused on more practical issues for their R&D manager.

As a result from both the interviews and the questionnaire, the Swedish LPD principles could be identified as follows:

1. **Business, user, and society focus to create value-added products and processes** – Owing to the fact that customers are not always the real users of developed products, Swedish NPD focused more toward users whom they identified as real customers. Also, responsibilities for society and product life-cycle awareness were of importance in practice in Sweden.
2. **Set-based concurrent engineering and front-loading** – This was one of the common principle found in LPD models from the empirical study; in order to get rid of a fuzzy front-end by front-loading and avoid last minute engineering changes by set-based idea. However, one of the interviewee stated that:

"It is sometimes hard to achieve set-based engineering in some specific types of products which require early design freeze. In this case, front-loading should be utilized as much as possible…"

3. **Rated and balanced incremental development** – The Swedish NPD teams paid more attention to resources and time planning for better control on the overall process. In another word, they tried to control and balance their NPD resources by carefully planning the project.
4. **Standardization of processes** – The interviews and questionnaire showed that standardization was one of the most common LPD principles among the Swedish companies. However, most interviewees agreed that the standardization should be done with a bottom-up perspective to reduce detail variation and gain more flexibilities at the higher level in NPD projects.
5. **Supportive leadership** – Special leadership style such as ‘’management by mean’’ aims at process and knowledge management not financial output was needed to cooperate with LPD in Sweden.
6. **Cross-functional teams and learning by doing** – The questionnaire results indicated that Swedish LPD focused on accumulating concurrency and cross-functionality as well as learning by doing, e.g. through job rotation and training workshops. The latter was a session when designers and engineers gathered together in groups and tried to solve some made-up technical problems or brainstormed about possible new ideas of products. All these stimulated the development of broad knowledge in the organization.
7. **Employee development; focus on learning and knowledge management** – The empirical study showed that Swedish organizations were aware of knowledge management among their NPD teams. One of the interviewee mentioned that:

   "Knowledge should be well-managed in all levels- i.e. strategic, organization, and individual… Not only employees development is severe, but to put the right skills, time and opportunity to solve the tasks is also important for LPD."

8. **Supplier involvement in NPD processes** – This LPD principle, which appeared in the studied companies' models, gave advantages to shorten lead times and solve technical problems.
9. **Continuous improvement** – Both the interviews and questionnaire results empathized that the Lean principles of continuous improvement existed in Swedish organizations. One of the interviewees stated that:

   "Everyone must be involved and take responsibility for his own continuous improvement."

10. **Self-discipline / Respect for the individual** – The interviewees put forward that the principles of self-discipline and respect for the individual were present in Swedish LPD and that these fit well with the Swedish culture of equality. One of the interviewees mentioned that:

    "This is to guide the NPD team in the same direction… visual planning with transparent information sharing helps promote self-discipline and knowledge transfer"

11. **Visualization** – This was the first LPD principle or method commonly deployed by Swedish NPD teams as it promoted face-to-face communication, transparent information sharing, and systematic decision making as well as helped prioritizing NPD projects formally. One of the interviewees stated that:

    "It is quite a big trend in Sweden to get visual planning now in organizations following LPD practices… In 1990s, it was a trend to work with IT but personal interaction was strongly decreased, so more people are interested in visualization to get it back nowadays."

12. **Utilization of suitable product design techniques** – According to the interviewees, this was one principle of their own LPD models that helped shorten the NPD lead time and resulted in better products.

13. **Product life-cycle management (PLM) –** The interviewees stated that long-term planning when developing new products would help encouraging PLM. In one of the studied companies, the PLM focus appeared as a formalized principle in the company's LPD model.

14. **Enhancement of creativity and innovativeness** – All interviewees agreed that they tried to preserve creativity in their NPD processes as much as possible, although they tried to be standardized according to LPD. One of the interviewees emphasized that:

    "LPD helps reducing non-value-added activities in the NPD processes, so the team has more time for creativity enhancement."

According to the interviews, the LPD transformation process in Swedish organizations usually occurred in an incremental manner. As described above, they usually began their LPD transformations by adopting visualization. Once the advantages of visualization were realized by the teams, it was proved to be easier and smoother to introduce some other LPD principles and tools, for example, PLM, standardization, and continuous improvement. Besides, all interviewees agreed that management commitment was very important to facilitate the LPD implementation processes. Aligning organizational values and learning with Lean thinking was also found crucial for successful transformation of LPD.

5 ANALYSIS AND DISCUSSION

Based on the definition of culture (e.g. Spencer-Oatey, 2004), it characterizes how people relate to management and colleagues, collaborate with others inside and outside the team, while they solve problems. Furthermore, culture relates to how people are expected to be rewarded, how we relate to new unknown situations, and the acceptance and adherence of rules and standards. All of these are fundamental also for Lean thinking and its implementation.

LP, being a globally adopted philosophy, does not mean it is independent of differences in culture and context. Though the overall visions and targets are common, the roadmap to reach the targets may differ among cultures. As a result, some principles or methods may need to be adapted, the emphasis may differ, or the implementation procedure may need to be conducted differently. The findings show that different LP sub-areas had different dependency levels in relation to the HCO contextual factors. The sub-areas related to people and collaboration among teams resulted in higher HCO level than Lean methods or tools. These high HCO dependent factors were operational development, continuous improvement, goal oriented teams, cross-functional work, organizational design, leadership and working environment. Therefore, it is important to make sure that organizations adopt the high HCO dependent factors accordingly as a base for other Lean principles and tools. In the LP study the dependency of HCO factors were not mapped only towards the culture as the scale and context of the questionnaire lead to the grouping of cultural factors together with human and organizational aspects. Furthermore, it was not considered possible to relate specific dependencies to each of these aspects. However, it is likely that a large part of the identified dependencies towards HCO, is in fact towards the culture, and can be observed at any or several levels − personal, organizational, and/or national level.

Regarding the LPD findings, a comparison between Toyota LPD (Morgan and Liker, 2006) and Swedish LPD (Table 4) shows that most of the differences between Japanese and Swedish LPD were principles regarding “People”, which constituted a high HCO dependent factor. Also, Swedish LPD has an additional principle of creativity and innovative enhancement which is good for NPD and suitable for their characteristics of low UAI (Hofstede et al., 2010).

Swedish companies adopted basic LPD methods and tools rather directly, which is similar to the Japanese, i.e. set-based concurrent engineering and front-loading, rated and balanced incremental development, supplier involvement, continuous improvement, and visualization. Although both Swedish and Japanese have the same idea of continuous improvement, the way to promote and achieve it may differ as a result of the high HCO dependency level of this Lean principle. To be precise, the Japanese organizations focus on culture to support continuous improvement while Swedish treated it with self-discipline and respect for the individual due to their view on equality, low PDI and very low MAS. Regarding visualization, Swedes adopted it as the first step to LPD implementation, as it

together with Swedish low PDI (Hofstede et al., 2010) promoted face-to-face communication, information sharing, and knowledge transfer. This form of communication and knowledge management proved to be the basis for continuous improvement. As for standardization, the studied Swedish organizations and the Lean literature emphasize that it should be done at lower levels to gain flexibilities at higher system level.

Table 4 – Comparison between Toyota LPD and Swedish LPD from empirical findings

Dimension of principles	Toyota LPD (Morgan and Liker, 2006)	Swedish LPD	Remarks
Focus for value definition	Customer-defined value [PROCESS]	Business, user, and society focus	Different
NPD process	Front-loading of NPD process [PROCESS]	Set-based concurrent engineering and front-loading	Similar
NPD planning style	Levelled NPD process [PROCESS]	Rated and balanced incremental development	Similar
Standardization	Rigorous standardization to reduce variation and create flexibility and predictable outcome [PROCESS]	Standardization of processes	Similar
Control system and leadership	Chief engineer system [PEOPLE]	Supportive leadership	Different
Development team structure	Balance functional expertise and cross-functional integration [PEOPLE]	Cross-functional teams and learning by doing	Slightly different
Knowledge management	Develop towering technical competence in all engineers [PEOPLE]	Employee development; focus on learning and knowledge management	Slightly different
Suppliers involvement	Full suppliers integration [PEOPLE]	Supplier involvement in NPD processes	Similar
Continuous improvement	Build in learning and continuous improvement [PEOPLE]	Continuous improvement	Similar
Purposes and strategies	Culture to support excellence and relentless improvement [PEOPLE]	Self-discipline / Respect for individual	Different
Systems perspective	Adapt technology to fit people and processes [TECHNOLOGY]	Product life-cycle management (PLM)	Different
Visualization	Align organization through simple visual communication [TECHNOLOGY]	Visualization	Similar
Tools	Powerful tools for standardization and organizational learning [TECHNOLOGY]	Utilization of suitable product design techniques	Different
Creativity	-	Enhancement of creativity and innovativeness	Different

The high IDV (Hofstede et al., 2010) in Sweden indicates that some of the Lean principles are not built into Swedish values and behaviour, as compared to e.g.

the Japanese who are more group oriented. Implementing and guiding teamwork could therefore be very different in Sweden and Japan. The lower PDI in Sweden compared to Japan (Hofstede et al., 2010) surprisingly helps facilitate respect for people and distribution of responsibilities. Furthermore, Japanese appreciate that rules direct them, while Swedish people want rules to guide them only when required. This is in line with the identified gap in the UAI levels for the two countries (Hofstede et al., 2010). This gap is further related to the higher creativity and acceptance for changes in Sweden which is a bonus in LPD. The gap in LTO and IvR (Hofstede et al., 2010) also indicates that there are different starting points regarding equality, motivation, and personal goals of work which affect implementation of reward systems and other drivers for workers.

With reference to Hofstede et al. (2010), Japan and Sweden are in the opposite positions regarding a number of cultural dimensions. These differences should be taken into account when implementing LP and LPD in Swedish organizations. However, it is important to highlight that Lean implementation in any organization should be designed and executed case by case since each organization has its own characteristics apart from national cultural influences. In addition, product complexity and project size should be considered when designing LPD practices in organizations.

Nevertheless, both LP and LPD implementation should be performed in an incremental rather than radical manner; starting with the development of organizational values, leadership and culture to fit Lean. Then, some basic Lean tools can be put into use together with implanted Lean philosophy and thinking. Finally, continuous improvement should be in place to drive the whole Lean system forward relentlessly and efficiently.

6 CONCLUSION

Regarding implementation of LP, the study shows that LP sub-areas have different dependency levels in relation to HCO contextual factors. This should be taken into account when implementing them in organizations. The sub-areas that have higher dependency on HCO factors require increased attention related to the local company context during implementation. Another conclusion of this work is that any improvement work needs to be prioritized from a contextual dependency perspective, in order to achieve sustainable Lean implementation. Regarding the LPD study, most of the differences between Japanese and Swedish LPD are related to "People"− e.g. value definition, control systems and leadership, development teams, knowledge management, which are categorized as high HCO dependent factors. Therefore, a conclusion from the study is that contextual factors which are highly dependent on human, cultural, and organizational aspects should be considered specially for successful sustainable implementation of Lean in different cultural contexts.

Apparently, Swedish culture of low PDI, low MAS and high IDV supports LP and LPD implementation in different ways. The Swedish cultural characteristics

of individualism, equality, and autonomy promote the Lean principles "Respect for the individual" and "Trust building within the team". Also, Swedish supportive management style fits well with Lean thinking. Nevertheless, it should not be judged which style of Lean implementation is the better. Most important is to design Lean implementation processes which suit the organizations, as well as to interpret and adapt the high HCO dependent Lean principles according to the organizational contexts.

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