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The Change of Production Systems through Consultancy Involved Projects: a Multiple Case Study in Chinese SMEs

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SI: SS The Change of Production Systems through Consultancy Involved Projects: a Multiple Case Study in Chinese SMEs

Production systems, such as Lean Production System (LPS), have been developed to improve organisational performance. In their application to small and medium enterprises (SMEs), resource constraints mean that business assistance from external agencies, such as management consultants, is often required. Building on organisational learning research associated with knowledge flow across boundaries, this study aims to explore the practical issues associated with consultancy-involved LPS implementation in Chinese SMEs and the possible approaches to deal with them. A multiple case study is conducted focusing on four real-life, consultancy-involved, lean projects in Chinese SMEs. Four key problems that arise from consultancy-involved change of production systems are identified and four relevant approaches to handle these problems are also addressed. The case study implies that to better embed new production systems, such as LPS into SMEs, both consultants and SME clients need to adopt a more proactive approach when engaging with each other.

Keywords: Lean Production System, SMEs, consultants, organisational learning

1. Introduction

The increasing competition in the marketplace, driven by forces such as globalisation, deregulation and more demanding customers, has been frequently discussed in the academic literature (for example Christopher 2005, D'Aveni 1994). To better compete, organisations need to improve their production systems. Lean Production System (LPS), which can enable organisations to be more responsive to customer demands yet remain competitive (Bhamu and Sangwan 2014), has been adopted by many organisations

(Shah and Ward 2007) to achieve this. The recent literature reviews of LPS show that although the predominant focus has been on manufacturing (Jasti and Kodali 2015) the application of LPS has been extended from shop floor level to supply chain level (Moyano-Fuentes and Sacristan-Diaz 2012); from manufacturing sector to service sector (Suarez-Barraza et al. 2012); and from private sector to public sector (Pedersen and Huniche 2011). Benefits of implementing LPS, including better product quality, lower production cost, faster delivery and improved customer satisfaction rates, have been reported in the literature (Bhasin 2012, Hines et al. 2011). While many case studies associated with the use of LPS practices can be found in large enterprises (LEs), Achanga et al (2006) and Shah and Ward (2003) point out that it is more difficult for small and medium enterprises (SMEs) to adopt new production systems like LPS extensively due to their resource constraints. Similarly, Dowlatshahi and Taham (2009) indicate that SMEs lack sufficient knowledge to apply LPS. Hence, business assistance is important for SMEs when learning and implementing the new production systems like LPS (Lewis et al. 2007). Management consultancy, as a form of business assistance, is recognised as one of the fastest growing sectors and has come to occupy a significant role in many modern organisations (Kipping and Clarks 2012:1). Statistics show global consulting revenues reached 415 billion dollars in 2014 (Plunkett Research 2015). Thus, this study focuses on consultancy-involved projects to improve production systems through the deployment of lean in SMEs.

Geographically, China, a key player in the world economy, is chosen as the region to conduct this study. Recent statistics from the World Bank indicated China's economy surpassed Japan in 2010 to become the world's second largest economy, a position it still retains (World Bank 2014). SMEs are crucial to the development of China's economy. Over 90% of Chinese enterprises can be categorised as SMEs, which

contribute to more than half of China's tax income and more than 80% of total employment (MIIT 2011). However, Chinese SMEs have encountered many difficulties during their development. The low cost of labour, which was once considered as the main advantage of Chinese SMEs, has increased considerably, especially since 2007. Chinese SMEs are therefore having to confront challenges to innovate at both technological and managerial levels (Cunningham 2011) to drive productivity and standards. The growth plan for Chinese SMEs shows that SMEs need to improve their production systems, and management consultancy is being considered as an important means to facilitate this improvement (MIIT 2011). To support this, the China Enterprise Confederation Management Advisory Committee (CECMAC) has developed a network platform that collects information about consultants who are willing to provide services to SMEs (CECMAC 2014). It is evident that more Chinese SMEs will be encouraged to adopt new production systems like LPS through the use of management consultants in the future. The study is of academic significance, as LPS implementation in an emerging economy like China has received little attention compared to research set in the U.S. or EU (Bhamu and Sangwan 2014). Furthermore, while the importance of external support for SMEs to adopt LPS has been recognised in the literature (e.g. Bhamu and Sangwan 2014, Rich et al. 2006, Panizzolo et al. 2012), little has directly addressed the organisation's learning of LPS practices during external experts' like consultants' intervention.

To summarise, the purpose of this study is to explore the practical issues that arise from consultancy-involved LPS implementation in Chinese SMEs and to examine possible approaches to deal with these issues. The key research questions are:

1.   What are the problems encountered when LPS is introduced to Chinese SMEs through consultancy-involved projects?

2.	How are these problems dealt with to aid Chinese SMEs learning of LPS in consultancy-involved projects?

The remainder of this paper consists of six sections. Following this brief introduction the second section reviews the literature associated with the research questions. The third section explains the use of the multiple case study approach adopted in this research. The results from the case studies are presented in section four and section five analyses the results in relation to the literature. The concluding section reflects on the limitations of the study and the implications for academia and practitioners are also discussed.

2. Literature Review

This section examines the evolution of LPS and its implementation in SMEs. Theoretical perspectives in relation to organisational learning in consultancy projects are also discussed.

2.1 *Lean Production System* (*LPS*)

LPS was derived from Toyota Production System (TPS) which was famous for its Just-in-Time (JIT) philosophy in the mid-twentieth century (Hines et al., 2004). Krafcik used the term "Lean" to describe TPS (Shah and Ward 2007). Later, Lean was popularised by the book entitled "*The Machine that Changed the World*" (Womack et al. 1990). It has since become one of the most dominant production systems in the field of operations management (Shah and Ward 2003, Voss 1995). A number of models and frameworks for lean implementation have been proposed. For example, Womack and Jones (2003) suggest a four-phase framework for lean implementation. This framework not only discusses the adoption of Lean practices, such as 6S, value stream mapping and

visual management on the shop floor, but it also highlights the importance of changes at an organisational level. According to Womack and Jones (2003:249), consultants can be a valuable knowledge provider. However, the learning process in a LPS project is not addressed in detail in this framework.

Rich et al. (2006) point out that the "house of lean" should be built gradually from adopting some basic Lean practices such as 6S and visual management on the shop floor to installing a more advanced LPS that includes, for example, Total Quality Management (TQM), pull systems and Total Productive Maintenance (TPM), which constitute the walls of the lean house. Rich et al. (2006) indicate that the roof of the lean house should include the organisational level change such as changing performance measurement and policies. They suggest in addition to suppliers and customers, professionals from external agencies like consulting companies are also important sources of lean related knowledge (Rich et al. 2006). However, a detailed discussion of how managers and employees can learn LPS practices from consultants or other external agencies is not provided.

Hines et al. (2011) propose an iceberg model for lean implementation. They argue that the enablers for sustaining lean implementation are developing a coherent strategy and communicating this throughout the whole organisation, having innovative leaders and engaging employees in the implementation (Hines et al., 2011:16). Drawing on a systematic review of previous lean literature, Bhamu and Sangwan (2014:917) further propose a general methodology for LPS implementation. Although the importance of using external experts to disseminate the idea of LPS and educate organisation members has been recognised in this methodology, the explanation of the organisation's learning of LPS practices during external experts' like consultants' intervention is missing.

While the idea of LPS has spread widely to LEs, it is still a relatively new concept for most SMEs. Achanga et al (2006) and Shah and Ward (2003) report SMEs have a lower take-up rate of LPS practices than LEs. According to Adebanjo et al. (2014), LEs are more likely to adopt improvement initiatives such as lean related initiatives when compared to SMEs. Bhamu and Sangwan (2014) stress that SMEs encounter difficulties in adopting LPS and have concerns over the cost of LPS implementation. The evidence, which shows LPS implementation beyond the factory level of SMEs, is rare (Stuart and Boyle 2007). SME employees often do not have formal training and education of management practices such as LPS practices (Dowlatshahi and Taham 2009, Panizzolo et al. 2012, Yang and Yu 2010).

In the Chinese context, SMEs are criticised as lacking technical experts and qualified employees. Xie et al. (2010) indicate that more than 65% of surveyed Chinese small manufacturers report that the number of technical experts is below 10% of their total employees. Cunningham (2010) points out that many Chinese SMEs provide limited training opportunities to their employees and most of their training programmes lack the content of sophisticated and specialised practices. Tang et al. (2008) argue that Chinese SME owners and managers lack sufficient knowledge of business planning and human resource management and actually only 20% of colleges and universities in China provide formal entrepreneurship programmes to SME managers. Singh et al. (2010) further demonstrate that SME owners and their senior managers lack expertise of management and finance. Hence, teaching and educating SME managers and employees have been considered as the key tasks in the implementation of LPS (Gunasekaran and Lyu 1997, Dombrowski et al. 2010). Business assistance from external agencies is also required when implementing a new production system like LPS in SMEs (Adebanjo et al. 2014, Panizzolo et al. 2012).

2.2 *Organisational Learning*

Organisational learning has become one of the most important themes in the field of organisation studies since the 1990s (e.g. Argyris and Schön 1996, Crossan et al. 1999, Huber 1991). Organisational learning is a process through which the organisation's mental models, rules, procedures or knowledge can be modified or improved (Chiva et al. 2014, Edmondson 2002, Huber 1991).

The process of organisational learning includes three levels: individual, group/team and organisational (Crossan et al. 1999, Zietsma et al. 2002). At the individual level, organisation members can generate new ideas from their assessment of their past experience or seeking information from their external environment (Flores et al. 2012). When individuals start to interpret their ideas and insights to other members in the organisation through using different languages, the learning process begins to move to the group level (Crossan et al. 1999). Similarly, Dyck et al. (2005) suggest that organisation members transform their tacit knowledge (i.e. difficult-to-articulate and experiential knowledge) to explicit knowledge (i.e. codified knowledge) through dialogue. Refining and developing this common language are the main tasks for the development of shared understanding between group members (Crossan et al. 1999, Flores et al. 2012, López et al. 2005, Wilson et al. 2007). To be organisational, learning results should be embedded and institutionalised into organisational memory, policy, procedures and rules and thereby, the learning results can be accessed by organisation members and be maintained even though the key members may have left (Argote 2011, Argyris and Schön 1996, Crossan et al. 1999). The institutionalised learning results can be diffused to and exploited by groups and individuals and the new ideas explored by organisation members can be integrated into the organisational level (Crossan et al. 1999, Holmqvist 2004, López et al. 2005).

Organisational learning, however, is not a standard or stable process within an organisation (Carlile 2002, 2004) as knowledge is transferred differently within functions compared with the transference across functional boundaries. Carlile (2002) takes a "pragmatic view of knowledge" and highlights that organisational "knowledge in practice" is "localised, embedded and invested in a function". Localised means it exists "around particular problems faced in a given practice", while embedded means "knowledge is embedded in the technologies, methods, and rules of thumb used by individuals in a given practice" (Carlile 2002:446). Finally, the established knowledge is exhibited in practice in a particular function and its value has been demonstrated in achieving past deliverable and deadlines and hence any change to this will meet some resistance (Carlile 2002).

Given these "pragmatic" characteristics of knowledge, it is argued that knowledge transfer between different organisational functions can be a challenging process (Carlile 2002). To deal with this challenge, Carlile (2004:563) has further developed a "3T Framework" for managing knowledge across boundaries. This framework recognises that knowledge transfer across boundaries can be delineated into four stages:

- the establishment of a common lexicon between the actors as a foundation (Syntactic Transfer);

- the development of common understanding so that the interpretation of knowledge when applied to the domain of change can be agreed upon (Semantic Translation);

- putting in place a mechanism to apply knowledge through the process of "propose, negotiate and transform" (Pragmatic Transformation); and

- applying the knowledge in the new arena through a willingness to go through a trial and error problem solving approach (Multiple Iterations).

This framework can aid understanding of how organisational learning practically occurs and in this research that looks at how consultants and clients can co-develop knowledge provides a useful angle of exploration.

2.3 *Organisational Learning from Management Consultants*

Organisations learn from different sources such as their internal members and external professionals like management consultants. Consultants are commonly described as "advisors" or "trainers" who can provide various types of knowledge and fresh ideas to their client organisations. Learning is recognised as the key to consultancy-involved change projects (Kakabadse et al. 2006, Kubr 2002, Lashkarbolouki et al. 2011, Newton 2010). However, according to Gammelsaeter (2002), the consultant's knowledge base differs from the client's because the former is more likely to be embedded in the external environment and the latter is more organisational-specific or contextual. Kipping and Armbrüster (2002) term this difference as the "burden of otherness" of which there are three types.

The first relates to the public image of consultants. Consulting companies often consider themselves as sending smart people to solve difficult problems in their client organisations (Christensen et al. 2013). In other words, consultants are usually viewed as donors of knowledge by their clients (Kipping and Armbrüster 2002). In the Chinese context, the "command and control" characteristic possessed by traditional Chinese culture requires juniors to respect and follow more experienced seniors (Whitley 1992). It implies that when a new production system, like LPS, is introduced to Chinese SMEs, the employees' attitude towards consultants (i.e. as "donors of knowledge and seniors") can inhibit consultants in obtaining contextual knowledge or assistance from the client's employees.

The second type links to the knowledge transfer and transformation in the client organisations, in particular to the transfer of knowledge across boundaries where knowledge is embedded, localised and invested within functions (Carlile, 2002). While the consultants' use of certain management tools facilitates their ability to explicate tacit knowledge from client employees, their insufficient comprehension of daily operations in client organisations may hamper their cooperation with employees and hence the application of their advice (Kipping and Armbrüster 2002). In the Chinese context, SME managers and employees lack sufficient knowledge of management tools and methods (Cunningham 2010). This implies that a significant knowledge gap exists between consultants and their clients. Moreover, since Chinese SMEs lack formal and standardised operations and human resource management procedures (Cunningham and Rowley 2010, MIIT 2011), it can be more challenging for consultants to gain contextual knowledge. This could result in a two-way gap occurring. In the "3T Framework" (Carlile 2004) presented above, the first two steps of developing an appropriate common lexicon and identifying common understanding and meanings are akin to this second type of "burdens of otherness" that consultants need to overcome the problem of a lack of understanding of the clients operations by developing various methods and tools to explain and pass on knowledge. So in effect the "3T Framework" may provide a staged understanding of how this second type of "burden of otherness" can be approached.

Thirdly, the activity system in the client organisation is driven by established routines and rules whereas consultants are keen to promote changes throughout their client organisation. Client employees are more reluctant to adopt change-oriented activities proposed by consultants if consultants fail to familiarise themselves with the context of client organisations (Kipping and Armbrüster 2002). In the Chinese context,

many SMEs invariably still adopt traditional and often outdated practices during their daily operations (MIIT 2011). Their informal and non-standardised operations may prevent consultants from having a full comprehension of the clients' contextual setting. Table 1 summarises these potential "burdens of otherness" in relation to the Chinese SME context.

[Insert Table 1 near here]

Sturdy (2011) argues that many consultants have a rich working experience in their client organisations' industries and the consultants' involvement can be increased when the project goes on. Hence, the consultants and their clients can share some knowledge (e.g. sector or functional knowledge) that may soften the "burden of otherness" (Sturdy et al. 2009). It is suggested that the consultants and clients can develop their knowledge base of new concepts or production systems and work out solutions jointly during the projects (Fosstenløkken et al. 2003, Nikolova et al. 2009).

Similar to "burden of otherness" Czarniawska and Mazza (2003) explore another interesting, related concept of liminality. The concept of liminality (Czarniawska and Mazza 2003) describes the space and time where usual practices and work systems are suspended and replaced by a new order. In effect what this study focuses on is a liminal space that exists in the co-relation of the consultant and its client organisations as recognised by Czarniawska and Massa (2003). Liminal spaces can be envisaged as a virtual area which may be a highly structured, conservative concept and very challenging or alternatively they can be infused with high levels of creativity and dynamism although potentially quite unsettling as well (Czarniawska and Mazza 2003, Sturdy 2006).

This research is focussed in this liminal space. It builds on organisational learning research exploring the problems associated with knowledge flow over boundaries and how these problems are dealt with, where there is a need for further research (Sturdy et al., 2009:629). The case studied is when LPS is introduced to Chinese SMEs through consultancy projects.

3. Research Methodology

A multiple-case study research method was adopted in this study. Yin (2014) points out that case study is most suitable for "how" and "why" questions as well as exploratory "what" questions. In this study, the key research questions are "how" and "what" questions justifying the choice of a case study approach. Meredith (1998) and Stuart et al. (2002) propose a case study can be considered as the appropriate method to explore new phenomena and generate new knowledge. As discussed in the literature review, in comparison to LEs, LPS is relatively new to SMEs, particularly in China, and little research has directly focused on how the SME organisation learns knowledge of new production systems like LPS through a consultancy project. A multiple-case study method was employed, as it is more suitable for exploring a complex phenomenon (Eisenhardt and Graebner 2007). It also enhances the robustness of research findings, compared to a single case study, by reducing the risk of observer bias (Eisenhardt 1989).

To ensure the external validity of this research, the selection of cases is a critical decision (Stuart et al. 2002). According to Miles et al. (2013), sampling in case study research should be purposive to optimise the learning opportunities. Yin (2014) suggests that the selection of cases should follow replication logics such as literal replication (i.e. cases can predict similar results) or theoretical replication (i.e. cases can predict contrasting results). In this study, the selection of cases mainly reflects upon

theoretical replication. The cases selected deliberately varied in the consultants'
knowledge base of their clients' context and consultants' roles in projects. The basic
unit of analysis was the LPS consultancy project undertaken in each Chinese SME
client organisation.

Sturdy (2012) argues that it is difficult to gain access to consultancy projects
since often these are politically or commercially sensitive. In this study, four lean
consultancy projects undertaken in four Chinese SMEs were selected from AB
Consulting Company. To open up access, one of the researchers linked up with AB
Consulting Company, which provided better accessibility to managers and employees in
the client organisations. Since these four client organisations were at the mid to end
implementation stage of their LPS projects, it further ensured better availability of
project materials. Located in the eastern part of China, AB Consulting Company is one
of the leading consulting companies in its local area with 58 full-time employees and 98
part-time employees. It has been recognised as one of the "most influential consulting
companies in China" and "the outstanding management consulting companies in 2011
and 2012". They provide a range of management consulting services, including strategic
management, performance assessment, human resource management, marketing
strategy, and, recently, LPS, to their client organisations (most of whom are SMEs). The
four selected SME-client organisations operate in various industries. This multiple-case
study was conducted between November 2012 and March 2013. Table 2 provides the
background information of the selected client organisations.

[Insert Table 2 near here]

Multiple data collection instruments were adopted in this case study including semi-structured interviews, direct (non-participant) observations and documentation. Table 3 summarises the average duration of interviews in each case. To ensure construct validity, various managers and employees in each client organisation were interviewed, such as the owner and senior managers who made the strategic decisions and middle managers and employees who were more familiar with operational issues. Informed consent was obtained from all interviewees. The interviews, that were audio recorded and supplemented with field notes, were later transcribed and the interviewees were offered the opportunity to review the transcripts.

[Insert Table 3 near here]

The project steering team meetings (where consultants and clients jointly managed the project and implemented changes) held in client organisations' meeting rooms, training courses held in client organisations' training rooms and changes on client organisations' shop floors were all observed. Table 4 summarises the number of observations in the case studies. Each observation lasted between 1 to 1.5 hours. Project-related materials, such as project plans, project progress reports, LPS implementation guidelines, rules and policies, which were made during the project and training materials, were obtained to validate the interview and observation data. This again improved the construct validity of case study (Yin 2014).

[Insert Table 4 near here]

All data were coded after being transcribed. A template coding approach was adopted in this study (King 1998). Template analysis is a widely applied data analysis

approach in qualitative research, which in essence involves using a list of codes (i.e.

template) representing themes identified from the textual data (King 1998). In

comparison to an open coding approach, template analysis allows a list of codes to be

developed before data analysis (King 1998). For example, based on the literature review,

codes that link to three types of burdens of otherness (e.g. "clients' view of consultants

as experts") were created to identify the problems that arise from consultancy-involved

projects. However, Miles et al. (2013) point out that many codes emerge empirically

and these empirical codes can help researchers to better understand the research context.

Instead of being restrained by the pre-developed codes, the use of template analysis also

enables researchers to modify the pre-developed codes and add new codes into the

initial list during the data analysis process (King 1998). For example, two types of

consultants' roles were identified in this study. Hence, two new codes named

"consultants in residence" and "consultants as external advisors" were created to label

them. These provided two contrasting examples of liminality. Table 5 summarises the

characteristics of these two types of consultants' roles.

[Insert Table 5 near here]

A combination of within-case and cross-case analyses was adopted to enhance

the external validity (Yin 2014). Within-case analysis aims to identify the problems

encountered by each client organisation in the consultancy-involved LPS project and the

approaches adopted to deal with these problems. In the cross-case analysis, similarities

and differences in relation to problems encountered and approaches adopted in

"consultants in residence" and "consultants as external advisors" were identified. To

ensure the internal validity of data analysis, group meetings were held between the

authors to review the results from the case studies. The initial results were also presented to practitioners (e.g. senior managers and consultants who were involved in the projects). Their feedback helped to further improve the internal validity of this study.

4. Results from the Case Study

This section reports on the findings, which are summarised in Table 6. Four key problems encountered when introducing LPS to Chinese SMEs through consultancy-involved projects are outlined and four approaches to deal with the identified problems are proposed.

[Insert Table 6 near here]

4.1 *Problems*

4.1.1 *Clients' view of consultants as experts*

The first common problem relates to the clients' attitudes towards consultants. The issue revolved around the fact that the consultants were commonly perceived as the experts. Client personnel were reluctant to be involved in the process of developing LPS implementation guidelines and training materials because they believed that consultants possessed more expertise to carry out these tasks. This meant that managers and employees in these four client organisations relied too heavily on guidelines, advice and training or even decisions (i.e. "consultants in residence") made by consultants. For example, at the pre-implementation stage of LPS projects, on-site investigations were conducted by the consultants at each client organisation for the duration of between two and three weeks. Consultants were responsible for identifying operational areas of concern in their client organisations and proposing project plans. Table 7 summarises

these areas of concern identified from the on-site investigation in each client organisation and the relevant key tasks included in the project plan.

[Insert Table 7 near here]

At the implementation stage of LPS, consultants needed to deliver training courses to managers and employees. The themes included training associated with the key tasks of the project plans. For example, LPS practices such as 6S and visual management were the common themes across the investigated consultancy projects. Training themes related to performance assessment and job design were included in Client 1 and 2 which focused on the organisational level of change. Moreover, the owners and senior managers in Client 1 and 4 (i.e. "consultants as external advisors") required consultants to develop procedures and guidelines for LPS implementation and consultants employed by Client 2 and 3 (i.e. "consultants in residence") were further asked to make decisions for LPS implementation. All of the interviewed consultants deemed that they were working in a stressful and demanding environment. They argued that it was difficult to carry out all the required tasks without managers and employees' involvement since substantial contextual information was needed to develop training materials and LPS implementation guidelines.

4.1.2 *The "command and control" culture in Chinese SMEs*

The second common problem follows on from and compounds the first problem and is associated with traditional Chinese culture that possesses a "command and control" characteristic. By triangulating interview data from consultants and managers who were involved in the project steering teams and observation data from project steering team meetings, it was found that middle managers were more likely to passively follow consultants' ideas rather than actively engage in the development of training materials

and LPS implementation guidelines. These middle managers commonly believed that consultants were more professional and experienced in LPS implementation and they should respect and follow ideas and advice offered by consultants. The consultants were commonly titled as "*lao shi*" (meaning teacher in English) by managers and employees in these client organisations. Particularly, in "consultants in residence" (i.e. Client 2 and 3), managers in the project steering teams actually felt comfortable with the "decisive" role played by their consultants. Given the consultants' extensive experience in LPS implementation and working in organisations that were similar to Client 2 and 3, managers believed that the consultants were proficient in dealing with tasks in relation to LPS implementation and daily operations in their organisations. The consultants employed by the four client organisations were commonly concerned with this passive role played by managers stemming from Chinese culture and the viewing of consultants as experts (to be fully respected and unchallenged). This, in turn limited the consultants opportunities to gain valuable insights into the details of daily operations in their client organisations.

4.1.3 *Consultants' lack of contextual knowledge*

Prior to LPS implementation, daily operations in these four SME client organisations were informal: for example, procedures of operations, performance assessment, quality control, equipment management as well as warehouse management were not standardised or well documented. This made it difficult for the consultants, who were external to these organisations, to gain sufficient contextual knowledge within a relatively short period of time. Compared to consultants "in residence" (Client 2 and 3), the consultants employed by Client 1 and 4 ("consultants as external advisors") needed to spend a lot of time understanding the technical language and jargon used by the

managers and employees. The interviewed managers and employees commonly mentioned that the language used by consultants (particularly in the early training sessions) seemed abstract and inaccessible. Case examples included in the training sessions were irrelevant to their existing operations. The deputy general manager in Client 4 pointed out it was crucial for consultants to "*dive deeply into*" the shop floor to capture the details of operations.

4.1.4 *Consultants' limited accessibility to feedback from employees*

The interviews with consultants and managers showed that they were required by the senior managers to revise and improve the LPS implementation guidelines, rules and procedures that were issued to the shop floor. However, in comparison to "consultants in residence" (Client 2 and 3), consultants in Client 1 and 4 reported that they struggled to obtain direct feedback from lower management layers such as workshop directors and supervisors as well as front-line employees due to their limited accessibility to the shop floor. It was confirmed by senior managers in these two client organisations that in addition to project steering team meetings, consultants were only allowed to attend other meetings related to daily operations and management when invited. Hence, the consultants were also concerned that some important feedback from lower management layers and employees may be overlooked, particularly when there were no formal records of meetings.

4.2 *Dealing with problems*

4.2.1 *Proactively engaging clients*

The first approach adopted by all the consultants to deal with the four key problems identified above links to their proactive engagement of clients in LPS implementation.

All of the interviewed consultants agreed they needed to proactively approach middle managers and front-line employees and welcome comments about LPS implementation, for example, by talking with employees after training sessions. They also pointed out that it was critical to create an open and friendly atmosphere that could enable managers and employees to freely express their thoughts and concerns.

In "consultants as external advisors" (Client 1 and 4), to develop training materials that were more accessible to all the employees, the consultants invited middle managers and experienced supervisors to join the drafting process of training materials and selection of case examples. In Client 4, the consultants further adopted a "*going out*" (the term used by consultants) approach to enhance employees' learning of LPS. For instance, to illustrate the importance of visual management, the consultants organised a field trip for middle managers and supervisors to the supermarket. During the trip, the middle managers and supervisors discussed the feasibility and potential benefits of using visual management. A new term, "*big tag*", was created by the managers and employees to label the visual boards during this trip and this term was later used widely in their training materials. The interviews with managers and employees in both Client 1 and 4 showed their positive perspectives on the training.

In "consultants in residence" (Client 2 and 3), although the consultants could directly make decisions about tasks related to LPS implementation, they stressed that comments from managers and employees were needed to validate their decisions. Both of the consultants agreed that it was useful to transparently communicate their rationales of decision making and to explicitly highlight employees would not be punished or blamed by any of the negative comments.

4.2.2 *Jointly embedding LPS at the organisational level*

The triangulation of data from interviews with consultants and managers, observation of meetings and documents of project progress showed that changing rules, policies and procedures constituted critical parts of LPS projects undertaken in all four client organisations (see Table 8).

[Insert Table 8 near here]

New rules and policies were determined and issued by the project steering team in each client organisation. Both the consultants and managers involved in project teams recognised the importance of this changing of rules, policies and procedures. From the consultants' points of view, being positioned as experts and professionals, this allowed the consultants to meet what was always expected of them, to provide solutions and training to managers and employees (particularly, in the investigated clients where managers and employees were not familiar with LPS implementation). This also allowed the consultants to deliver against their intention to ensure the sustainability of the use of LPS in these client organisations after leaving. Similarly, from the managers' points of view, enacting rules, policies and procedures could standardise employees' behaviour, providing greater consistency and control of operations. For example, the standard operating practices (SOPs) provided step-by-step guidance on tasks that needed to be completed at each workstation. Also, the change of performance assessment methods drove employees to abandon their old practice of only focusing on the quantity (rather than quality) of products.

4.2.3 *Employing consultants with good contextual knowledge*

The consultants "in residence" (Client 2 and 3) had more extensive experience in working in organisations that were similar to their clients. Hence, they were more

familiar with general operations procedures, technology, equipment, technical language and even jargon that were commonly adopted and thus more capable of gaining a quick understanding of the context in their client organisations. They were also able to interpret LPS by the use of common language, which was accessible to the managers and employees, and to make their advice on the implementation of LPS more realistic and suitable to their client organisations. Training materials were practical and easy-to-understand with a large number of examples directly from their shop floor operations.

4.2.4 *Giving consultants appropriate accessibility and authority*

In comparison to "consultants as external advisors", consultants "in residence" were given more access to sensitive information and more authority to decide LPS implementations tasks. Being employed as senior managers, the consultants in Client 2 and 3 had good access to the sensitive information like sales, technological and financial information as well as the shop floor in their client organisations. They had more opportunities to gain feedback from employees; for example, they walked around the workshops to observe or chat with supervisors and operators, organised regular meetings to listen to the reports from middle managers and directly joined the learning activities on the shop floor. The collected feedback would then be sorted and discussed among the managers in project steering teams and they confirmed that the revision of LPS implementation guidelines and procedures was completed efficiently. Moreover, although the consultants in Client 2 and 3 had authority to decide and approve LPS implementation tasks, they pointed out that this should not be misinterpreted as forcing managers and employees to comply with them. They still needed to justify their decisions by showing the extent to what the guidelines and procedures could be applied in their client organisations.

Table 9 illustrates the performance indicators observed from the case studies. The table shows that the firms where the consultants were in residence were quicker to move to establish an effective key performance indicator (KPI) system and were also showing faster improvements across the range of indicators that had been identified. However, it is worth noting that this table only provides a "snap shot" of the very early indicators of performance that were observed and a follow-up longitudinal study would be required to be conducted in the future to verify the findings.

[Insert Table 9 near here]

5. Discussion

In line with Dowlatshahi and Taham (2009), Panizzolo et al. (2012) and Yang and Yu (2010), the Chinese SME client organisations found themselves lacking internal expertise to carry out LPS implementations and thereby, the assistance from external agencies such as management consultants was needed. Problems identified from this case study showed that "burdens of otherness" (Kipping and Armbrüster 2002), which inhibited SMEs to learn new production systems like LPS, existed in the investigated consultancy projects and some were even reinforced in the Chinese context. Moreover, building on research associated with management consultancy and organisational learning, this study also investigates possible approaches to deal with these problems. The identified problems and approaches will be discussed below followed by a reflection of the findings in relation to the previous body of research in the field of managing knowledge across boundaries with a focus on the concept of liminality and the "3T Framework".

In consultancy projects, it is not unusual for clients to position consultants as experts or "donors of knowledge" who supply knowledge to their client organisations

(Christensen et al. 2013, Kubr 2002, Lashkarbolouki et al. 2011), particularly in these investigated Chinese SMEs where managers and employees have only gained limited training about new and advanced production systems like LPS (Cunningham 2010, Singh 2010). In the Chinese context, the clients' view of consultants (i.e. expert or donors of knowledge) was also reinforced by the "command and control" characteristic of its traditional culture (Whitley 1992). The consultants in this case study were considered as more experienced seniors by middle managers and employees and thereby, they were more likely to respect and passively follow consultants' advice.

However, it is problematic to merely position consultants as "donors of knowledge" (Kipping and Armbrüster 2002). The adoption of LPS in an organisation requires changes at both organisational and shop floor levels (Hines et al. 2010, Rich et al. 2006) and various levels of contextual information as well as human resource development was needed to support these changes. In this case, the consultants commonly recognised the importance of proactively involving clients in LPS projects through various activities such as field trips and individual meetings. The open and friendly atmosphere created in these activities also loosens the "command and control" environment in the consultancy project.

Furthermore, both consultants and managers were keen to embed LPS into the organisational level. It is suggested by the organisational learning literature, to ensure learning occurs at the organisational level, learning results should be documented and institutionalised (Argote 2011, Argyris and Schön 1996, Crossan et al. 1999, Dyck et al. 2005). Institutional mechanisms such as organisational rules, policies and procedures can be used to maintain learning results (Crossan et al. 1999). In this study, new rules and procedures associated with the use of LPS were developed, for example, SOPs and new performance assessment methods. By implementing these new rules and

procedures, the existing and outdated practices, could be abandoned and unlearnt and the use of LPS could be better regulated and legitimised. As consultants needed to leave their client organisations when the project tasks were finished, these new rules and procedures could further assist client organisations in sustaining their adoption of LPS.

Another problem found in this case study associated with the role of consultants in transferring and transforming knowledge. Gammelsaeter (2002) and Kipping and Armbrüster (2002) point out that differences exist between consultants and their clients' knowledge bases. In this study, it was found that there was a knowledge gap between consultants (who possessed good knowledge of LPS) and their clients (who had limited or even no training about LPS) in general. In addition, the diversity of consultants' knowledge base of their clients' contexts was also identified in this study. In "consultants as external advisors" (Client 1 and 4), the consultants possessed limited contextual knowledge of their client organisations. To develop a consensus of LPS among managers and employees (Flores et al. 2012), the intensive engagement of managers and employees was needed by the consultants to refine their existing language or develop new languages (Crossan et al. 1999, Flores et al. 2012) to interpret LPS (e.g. the co-development of training materials in Client 1 and the use of "*big tag*" in Client 4). In contrast, consultants "in residence" (Client 2 and 3) had more extensive contextual knowledge and through their good accessibility to clients' internal information enabled them to gain more useful insights into clients' contexts. The results showed that they were more capable of interpreting LPS through the use of language that was highly accessible to manager and employees. Hence, the extensive contextual or sector knowledge (Sturdy 2010, Sturdy et al. 2009) possessed by the consultants reduced the knowledge gap between consultants and clients. The consultants' sector knowledge also accelerated the development of a shared understanding of LPS. For example, the

consultants and managers did not need to spend much time in clarifying technical terms or explaining jargon when developing training materials or drafting rules and procedures.

The results also showed that both types of consultants were keen to promote and diffuse new rules and procedures associated with LPS implementation throughout their client organisations, such as the use of visuals and on-site training. This confirms Kipping and Armbrüster's (2002) argument of consultants' change-driven activity system. However, since the owners and managers in the investigated SMEs recognised the importance of improving their current performance, they were less resistant to new ideas like the adoption of LPS initiatives proposed by consultants. Additionally, new rules and procedures also helped the adoption of LPS in these client organisations.

While employees were required to implement new rules and procedures associated with LPS, a further issue emerged from this study surrounded the integration of the comments from groups or individuals into the organisational level (Crossan et al. 1999). Although the consultants were required to revise the rules and procedures, it was found that revisions of LPS implementation rules and procedures were constrained by consultants' accessibility to employees' feedback. For example, the consultants "in residence" (Client 2 and 3) reported their direct access to employees' feedback of the newly issued rules and policies, whereas there seemed no guarantee of the revision of the rules and procedures in "consultants as external advisors" (Client 1 and 4) because there was no formal feedback or information system which directly connected consultants with client employees.

On a broader stage the research provides a study that empirically examines many of the issues identified in the previous literature on managing knowledge across boundaries. The concept of liminality highlighted that a fresh space in this boundary

spanning area can be created when consulting firms inter-relate with their clients. The findings indicate that in the Chinese SME context, when implementing a new production system like LPS, that there are significant differences that can be observed between the approach and success of consultants in residence compared to consultants as external advisors. This is shown by deploying Carlile's (2004) "3T Framework" in assessing the different adopted approaches of the two consultant types. Table 10 takes each of the four characteristics of the "3T Framework" and assesses these against the qualities and capabilities of the two alternative consultant approaches in turn.

In summary, what it indicates is that in each of the four stages identified by Carlile (2004) the consultants in residence possess clear advantages over consultants as external advisors. Consultants in residence previously had developed sector knowledge which helped but in addition, they were able to more quickly identify lexicons, common meanings, and empathy in establishing appropriate ways forward. They were also more engaged in the LPS implementation as managers and thus more able to learn quickly and adapt approaches required in the multiple iterations that Carlile (2004) identified were required to put new knowledge in practice.

In the notion of liminality the consultants in residence, in this case study, appeared to be more effective in knowledge transfer, translation and transformation. By being embedded in the client organisation and in being positioned as a decision maker they were able to interact more capably, intensively and directly which facilitated a faster, more attuned and respected platform for knowledge exchange and realisation. Finally, the idea of exchange between consultants and their clients was important. This is in line with the existing research, which underlined the criticality of contextual knowledge being passed and enacted upon from client to consultant to enable contextual

understanding as well as the obvious knowledge learning that moves from consultant to client.

[Insert Table 10 near here]

6. Conclusion

Drawing on organisational learning literature, this study offers new insights into the process of and problems associated with learning a new production system like LPS via consultancy projects, rather than the success, or lack of it, in implementing LPS. It also investigates the possible approaches to deal with these problems and has provided empirical insights and learning in the field of managing knowledge across boundaries by using the liminality concept and applying "3T Framework" (Carlile 2004).

This study has managerial implications for both SME managers and consultants. First, SME managers need to be aware of their attitudes towards consultants and think of their own roles in setting up a new production system like LPS when consultants' support is sought. Given the existence of the "burden of otherness" between consultants and clients, it is problematic for SME managers to purely rely on consultants' ideas and suggestions. SME managers and employees are encouraged to become actively involved in the learning process of new production systems. Secondly, SME managers need to revisit their criteria for selecting consultants. In SMEs, particularly Chinese SMEs where the level of standardisation and formalisation of management practices is relatively low, priority should be given to the criterion in relation to the consultant's sector or contextual knowledge base to reduce the knowledge gap between themselves and consultants. Moreover, SME managers need to provide appropriate accessibility to assist consultants in gaining sufficient contextual knowledge in the project. Fourth, an interactive communication system such as the virtual discussion board which connects consultants with client employees in an open and no-blame atmosphere is needed. This

loosens the "command and control" culture in Chinese SMEs and further aids learning results to be integrated into group and organisational levels. For consultants who wish to provide service to SMEs, attention should be given to develop their knowledge of clients' contexts. They are also suggested to adopt a proactive approach to better engage SME clients in the learning of new production systems. Block (2011) identified "authenticity of the consultant approach and fully completing each consulting phase" as the two key ideas behind "Flawless Consulting". Intriguingly, this research has exposed that it may be easier for consultants in residence to be "authentic" and, if it is assumed that the "3T Framework" is a simple distillation of Block's consulting phases, be capable of effectively managing knowledge across boundaries. But whichever type of consulting is deployed the research has shown the consultant and client should work together to overcome the "burdens of otherness" to better manage knowledge exchange across boundaries.

This study is not without limitations. First, the client organisations investigated in this study are from one consulting company and secondly, this study focussed on the implementation stage of the consultancy projects undertaken in these four client organisations. Therefore, the generalisation of the findings is limited. Thirdly, this research is carried out in a Chinese context where the traditional culture possesses a "command and control" characteristic. This may limit the results being extended to other contexts. These limitations open up avenues for future research. The results from this case study research could be tested in other contexts (e.g. a Western context) through comparative case studies and focus group interviews. More longitudinal case studies could be carried out to further investigate how LPS can be sustained in SME client organisations after consultants' leaving. Since this study uses LPS as a proxy for new production systems, future research could proceed to test whether the results in this

study are valid in other production system developments such as Six Sigma systems and agile production systems.

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Table 1. A summary of "burdens of otherness" (Kipping and Armbrüster 2002) in the context of management consultancy led change in Chinese SMEs

Burden of otherness	The Chinese SME context (potential issues)
1. **Public image of consultants:** Clients view consultants as donors of knowledge and view themselves as the recipients of knowledge – this inhibits consultants in gaining contextual information from employees.	• **The "command and control" culture:** Clients may be more likely to follow consultants who are perceived as experienced seniors, but may be inhibited from feeding back valuable contextual knowledge to the consultants.
2. **The role of consultants in transferring and transforming knowledge**: Consultants use various management methods and tools to explain and pass on knowledge without a good understanding of the details of their clients' operations – this hampers the necessary cooperation from employees.	• **Lack of knowledge in relation to management tools and methods**: A significant knowledge gap may exist between consultants and clients. • **Informal and non-standardised production system**: It may be difficult for consultants to gain insights into clients' contextual setting.
3. **The activity system for clients and consultants**: Clients have regulation-driven activity systems while consultants have change-driven activity systems – clients are more likely to be reluctant to change and consultants' lack of sufficient contextual knowledge further inhibits the application of their change-related advice.	• **The adoption of outdated management practices**: The government has recognised the importance of improving SMEs' management practices – but this need may not be fully shared by SME employees. • **Informal and non-standardised production system**: It may be challenging for consultants to have a full comprehension of clients' contexts.

Source: Developed by the authors

Table 2. Background of the client organisations observed in this multiple case study

Background	Client 1	Client 2	Client 3	Client 4
Ownership	Private	Private	Private	Private
Company age	29 years	14 years	12 years	10 years
No. of employees	296	330	155	127
Industrial sector	Automotive	Textile	Glass	Machinery
Market position	Tier 2 supplier	Tier 2 supplier	Tier 1 supplier	Tier 1 supplier
Main products	Auto parts	Grey fabric	Toughened glass, ply glass and insulating glass	Fasteners
Main markets	China, Japan	China	China	U.S.A
Previous experience of LPS projects	6S training	None	None	6S knowledge from books
People involved in the project steering team	Two consultants, the general manager, two deputy general managers and operations manager	The senior consultant, two deputy general managers and production manager	The senior consultant, the general manager, one deputy general manager	Two consultants, one deputy general manager, the production manager
Main reasons to adopt LPS	To improve operations performance (e.g. quality, cost and delivery) To deal with the increasing competition in the marketplace To emulate "best practices" in LEs			To improve the efficiency of the shop-floor management To satisfy customer requirement of applying 6S

Source: Adapted from the internal documents provided by these client organisations

Table 3. A summary of the interviews

Interviewees	Client 1	Client 2	Client 3	Client 4
Owner	1.5 hours (1)	1 hours (1)	1.5 hours (1)	2 hours (1)
Senior managers	2 hours (4)	1.5 hours (2)	1.5 hours (3)	1.5 hours (3)
Middle managers	1 hour (4)	1.5 hours (5)	1 hour (4)	1.5 hours (4)
Supervisors/operators	0.7 hour (14)	0.6 (14)	0.7 hour (15)	1 hour (12)
Consultants	1.5 hours (2)	2 hours (1)	2 hours (1)	2.5 hours (2)

Note: ( ) indicates the number of interviewees
Source: Developed by the authors

Table 4. Number of observations

Direct Observation	Client 1	Client 2	Client 3	Client 4
Project steering team meetings	7	9	5	6
Training courses	2	3	2	2
Shop floor	3	2	3	2

Source: Developed by the authors

Table 5. Two types of consultants' roles

Type of consultants' roles	Characteristics
Consultants as external advisors **(in Client 1 and 4)**	Consultants played an advisory role in decision-making. (These consultants possessed extensive experience in LPS implementation but limited experience in working in the industries that are similar to their clients)
Consultants in residence **(in Client 2 and 3)**	Consultants played a decisive role in decision-making (i.e. acting as senior managers). (These consultants possessed extensive experience both in LPS implementation and in working in the organisations that are similar to their clients)

Source: Developed by the authors

Table 6. Positioning approaches against problems

Problems	Approaches adopted to deal with Problems			
	Proactively engaging clients	**Jointly embedding LPS at the organisational level**	**Employing consultants with good contextual knowledge**	**Giving consultants appropriate accessibility and authority**
Clients' view of consultants as experts	Enabling consultants to work more closely with their clients	Reducing clients' reliance on consultants	Communicating with clients effectively	
The "command and control" culture in Chinese SMEs	Creating an open and friendly atmosphere to aid learning			
Consultants' lack of contextual knowledge	Gaining more insights about clients' daily operations		Familiarising consultants with clients' contexts	Accelerating consultants' understanding of clients' contexts
Consultants' limited accessibility to employees' feedback	Gaining more comments from clients			Helping consultants to directly access to employees' feedback

Source: Developed by the authors based on the triangulation of interviews, project documents and observations of project steering team meetings.

Table 7. A summary of operational areas of concern identified by the consultants and the relevant key tasks proposed in the project plans

Areas of concern identified from on-site investigation	Key tasks included in the project plan	Client 1	Client 2	Client 3	Client 4
Unclear job responsibilities for managers and employees	Revise and change job responsibilities for managers and employees	√	√	√	
Lack of knowledge of LPS practices	Train managers and employees	√	√	√	√
Inappropriate performance assessment criteria: solely quantity based assessment	Redesign the performance assessment criteria and processes	√	√	√	√
Disorganisation of shop floor	Improve shop floor management – 6S and visual management	√	√	√	√
Informal operation procedures: potential quality and safety issues	Standardise operation procedures	√	√	√	√
Informal quality control process: high rate of defects	Standardise the quality control process	√	√	√	
High cost of equipment maintenance	Set up equipment maintenance procedures - TPM	√	√		
Disarrangement of warehouse	Improve and standardise warehouse management procedures	√	√		√

Note: although the key tasks were identified in the project plan, the actual application of key tasks could be changed due to unexpected circumstances during the implementation stage

Source: Developed by the authors based on the triangulation of interviews with consultants, owners and senior managers and project plans

Table 8. A summary of the changed policies, rules and procedures in each client organisation

Policies, rules and procedures	Client 1	Client 2	Client 3	Client 4
Job responsibilities for managers and employees	√	√	√	√
Policy and rules for performance assessment	√	√	√	√
Rules for shop floor management	√	√	√	√
Standard operations procedures	√	√	√	√
Procedures for warehouse management	√	√		√
Rules and procedures for equipment operations and maintenance	√	√		
Rules for work safety	√	√	√	√
Quality control procedures	√	√	√	

Source: Developed by the authors based on the project documents

Table 9. Performance indicators observed from the case studies

Key performance indicators	Client 1	Client 2	Client 3	Client 4
Productivity	---	*Improved by 2.4%*	---	---
Production cost	*Reduced by 0.3%*	*Reduced by 0.5%*	*Reduced*	*Reduced by 0.1%*
Cost of raw materials	---	*Reduced by 0.9%*	*Reduced by 0.6%*	---
On-time delivery	---	*Improved*	*Improved*	*Improved*
First pass yield	*Improved by 0.1%*	*Improved by 0.2%*	*Improved by 0.23%*	---
Completion of production plan	---	*Improved by 0.9%*	---	---
Safety accident	*No accidents were recorded post LPS project start*			
Inventory turnover rate	---	*Improved*	---	---

Note 1: a specific figure of the improvement measure is provided where possible
Note 2: --- means that no performance indicator had been set up at the time of research
Source: Developed by the authors based on the interviews with owners and senior managers and internal company documents

Table 10. Assessing the 3T Framework against the qualities and capabilities of the two

alternative approaches

3T Framework	Consultants in Residence	Consultants as External Advisors
Syntactic Transfer	More capable to quickly deploy appropriate lexicon as consultants had previous sector knowledge	Slower and less able to identify and utilise appropriate lexicon as consultants had no previous sector knowledge
Semantic Translation	With faster lexicon deployment and by working in residence were quicker and more skilled in developing common understanding to translate knowledge to domain specific areas. Also as managers were more able to go beyond the tool based level of LPS and to incorporate the strategic and systemic levels of changes required in lean projects.	Were "burdened" by the fact that they were slower and less able to interpret and make sense of clients' context specific domains as not in residence and had a poorer lexicon foundation. The challenge of introducing LPS at tool based, strategic and system levels simultaneously is very demanding and exposed the weakness of the external advisor approach in being able to translate LPS into the range of domain-specific settings that were required.
Pragmatic Transformation	As decision makers acting as senior managers as well as consultants, consultants in residence were better able to appropriately reach transforming actions. Aided, in this, by the Chinese "command and control culture" as consultants in residence were in a position to be respected as decision makers.	As external "advisors" we're less able to be effectively pragmatic in attaining appropriate blend of contextual understanding and project ambition to propose, negotiate and transform knowledge required.
Multiple Iterations	In residence, consultants have greater access to employee and function feedback from initiatives that have been put in place. So consultants in residence are able to work through required iterations more quickly and effectively.	As external advisors, consultants are more detached and hence less able to glean timely and effective feedback. As a result, the iteration process required to implement LPS which is a multi-faced concept is slower and less aligned to contextual issues.

Source: Developed by the authors