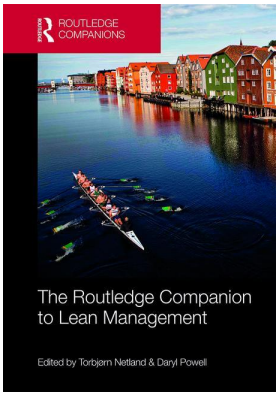

The Routledge Companion to Lean Management

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Lean IT

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LEAN IT

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Introduction

To put it simply, *lean IT* is the application of information technology (IT) solutions to further the positive effects of adopting lean management principles. Separately, the application of lean management principles and the use of IT are undoubtedly two of the most powerful ways to improve organizations. Hence the importance of IT in operations management has escalated over the years and there is a strong interest in lean IT in both manufacturing and services. However, these two avenues for organizational improvement are often not well attuned. Although combining lean management with extensive use of IT in operations may seem to be an attractive option for achieving operational excellence, it is definitely a challenging one. Consider the following example taken from our research into a manufacturing company well known for its highly mature and developed lean practices:

In this company, one of the core practices is the involvement of production workers in continuous improvement. When identifying an opportunity to improve assembly routines, production workers pull an *andon cord* to stop the line and then gather the team at the assembly station to observe the problem and discuss possible solutions. When a solution is identified and decided upon, it is typically documented and implemented immediately, and the assembly process restarted. One such improvement cycle might take 15 minutes to complete.

In contrast, however, when the same team identifies an improvement opportunity requiring a modification to an information system which supports the production processes, an entirely different process takes place. Rather than pulling the andon cord, a team member brings the matter to the attention of the team and the team leader at a regular improvement meeting. If the team decides that a modification of the information system is necessary to improve assembly, the team leader writes up and submits a formal change request, which includes a required assessment of the potential monetary benefits of changing the production information system. The internal IT department receives the request, assesses it (and may even reject it due to budget restrictions or priority considerations), and then enters the change request into a queue to be submitted to an external IT service provider responsible for implementing the modification. This provider then implements the received modification requests in sequence and invoices the company.

Typically, this process takes between six and nine months to complete, and during this time period, other improvement efforts might be held up while waiting for the new IT functionality.

Not surprisingly, we learned that continuous improvement activities routinely include "workarounds" (Boudreau and Robey, 2005) that enable improvements to be made without necessitating changes to the information system. When such workarounds cannot be introduced, production teams might refrain from implementing improvements that require changes to the information system. In effect, the company is an industry leader in lean management only when the IT infrastructure, applications, and services are not involved in the improvement efforts.

This tale of two very different improvement processes (the andon cord pull and the IT change request) illustrates a deeper-lying phenomenon, indicative of the often-conflicting nature of the relationship between lean management and IT. As such, the example illustrates the challenges of lean IT. A fundamentally important principle of lean management is continuous improvement, which implies *in situ* identification, assessment, and resolution of problems. In contrast, the use of IT typically leads to automation of processes through taking a moldable technology and fusing it together with physical and social processes in a way that—paradoxically—creates a stable "compound" (Lee, 1999). This compound is a sociotechnical system where procedures and activity sequences are partly embedded in the deployed technology in intricate and highly specified ways, which typically require extensive time and effort to change.

In this chapter, we discuss critical issues associated with lean IT by summarizing underlying reasons for the complex relationship between lean management and IT, as well as outlining some potential avenues for creating a more productive symbiosis between them. We do so by describing key attributes and principles underlying organizational improvement efforts based on lean management, and on IT deployment, respectively; discussing how these attributes can lead to conflicts between lean management and the use of IT in operations, and hence create the challenges of lean IT; and outline ways in which these conflicts might be resolved in order to succeed with lean IT.

Lean IT: From a Conflicting to a Supporting Relationship

Succeeding with lean IT involves finding a productive symbiosis between lean management and the application of IT. The literature on lean IT has over time changed its view on the relationship between lean management and IT, from viewing the relationship as conflicting toward viewing it as potentially supporting.

The research regarding lean IT can be traced back to Sugimori et al. (1977), who argued that using kanban is more advantageous than using computerized systems for organizing production logistics in terms of cost, acquisition of facts, and responsiveness. Whereas lean management emphasizes simplicity, IT tends to add unnecessary complexity. The argument has also been made that the push logic of material requirements planning (MRP) or enterprise resource planning (ERP) systems conflicts with the customer demand-driven (pull) characteristic of lean manufacturing (Olhager and Östlund, 1990). IT systems also encourage workarounds instead of fixing the root cause, and remove control from the plant, centralize it, and create a disconnect between the reality and the abstract information generated by information systems. This view advocates the need to understand and protect the unique nature of lean management and stresses the need to use IT in a way that follows lean principles (Bruun and Mefford, 2004; Hicks, 2007).

However, particularly since the 2000s, there has been a view that ERP systems can support lean production (Riezebos et al., 2009). The main argument is that ERP systems, as higher-level planning systems, support the implementation of lean principles at the shop floor. For example, based on a survey, Ward and Zhou (2006) state that IT integration, such as IT embodied in ERP systems, facilitates the implementation and use of effective lean/JIT (just-in-time) practices. More recently, based on case studies of small and medium-sized enterprises, Powell et al. (2013b)

showed that ERP systems have the ability to support pull production practices. ERP systems may also help in automating repetitive tasks, and thereby enabling workers to have more time to engage in continuous improvement (Powell et al., 2013a). The systems may also be used to visualize important information which can be used in the work of continuous improvement (Bell, 2006).

Consequently, based on a critical review of the literature on lean IT, Powell (2013) proposes the concept "ERP-enabled lean." The main idea is that synergies could be realized by combining ERP systems with lean production principles. Since ERP systems share many attributes with other types of information systems, it seems reasonable to assume these and/or similar arguments could be applied more generally to combining extensive IT use with successful application of lean management principles.

Lean IT: Our Conceptual Basis

Before going into the details of the challenges involved in lean IT, it is necessary that we clarify our conceptual basis. This particularly concerns how we view IT and what we see as the core of lean management. It is through explicating these two concepts that we are in a position to understand what contributes to the challenges of lean IT, and how these challenges might be overcome.

Information Technology

So far, the debate on lean IT has focused primarily on specific types of information systems. While it is of interest to consider specific types of information systems, such as ERP systems (Powell, 2013) or *manufacturing execution systems* (MES) (Cottyn et al., 2011), it is important for our purposes to take a broader view and also include organizational practices related to IT.

Just as lean management consists not only of specific tools, but also of principles and values, so does the use of IT. For example, in our introductory case above, we could see that a modification to an information system required the team leader to make an estimate of the benefits beforehand. The effort was then assessed in relation to a specific IT budget, while such hurdles or control mechanisms were absent in situations when the andon cord was pulled. In other words, it is not only the characteristics of IT artifacts that contribute to rigidity, but also common organizing practices related to IT (Beath and Orlikowski, 1994; Boudreau and Robey, 1996).

Hence, in order to capture the areas where lean management and the use of IT potentially conflict, and to understand the challenges of lean IT, we find it important to take a broad view of IT. In IT we therefore include the infrastructure (hardware, communication and operating systems) and applications that are part of value-adding operative activities (information systems supporting value-adding processes). However, we also take into account IT development activities that have the purpose of implementing information systems into these environments, the IT maintenance activities that provide the service of modifying existing systems, and the IT governance arrangements related to controlling how these activities are carried out.

While novel ways to conduct IT activities continuously emerge, including variants of lean and agile software development that emphasize iterative development with frequent user input (Conboy, 2009), the practices from the past few decades remain dominant, particularly in large organizations (e.g. Gregory et al., 2015). Furthermore, while most companies routinely outsource some of their IT activities, including operations and development work, and this places a commercial vendor as the supplier of IT services, this does not necessarily create a more flexible supply of services (Choudhury and Sabherwal, 2003; Anderson and Dekker, 2005). As our initial

example shows, an external vendor typically requires formal control means and specified procedures that might further increase bureaucracy and reduce responsiveness in IT service delivery.

Continuous Improvement: The Cornerstone of Lean Management

To understand the challenges of lean IT, it is particularly necessary to focus on the mechanism of continuous improvement that forms one of the cornerstones of lean management. In doing so, we see lean management as closely associated with the Toyota Production System (TPS), essentially a bundle of complex routines that originally emerged through trial and error (Fujimoto, 1999). Lean management can be seen as a flow-focused operations strategy, consisting of values, principles, methods, and tools that are also applicable in non-manufacturing environments (Modig and Åhlström, 2012). The principles can be summarized into JIT and jidoka, the two pillars of the TPS.

In order to create a smooth flow of value toward the customer, Toyota puts a focus on JIT and jidoka (Ohno, 1988). JIT aims to create and regulate flow based on actual customer demand. Jidoka aims to improve and ensure the quality of the flow through visible control, implying that problems should be identified and addressed on the spot. Through creating a tension around the streamlined flow, the two principles continuously challenge workers to engage in continuous improvement (Ohno, 1988).

It should be noted here that this continuous improvement builds on an evidence-based, systematic scientific inquiry (Spear and Bowen, 1999). Consequently, process improvement rests on developing and using human capability, rather than technology. This is the core idea behind Toyota's value of "respect for people" (Sugimori et al., 1977). In essence, what lies at the core of lean management is flow-focused continuous improvement underpinned by developing and making use of human capability. Ultimately, continuous improvement may lead to an evolutionary capability, which has enabled Toyota to learn from any experience including unexpected failures (Fujimoto, 1999). It is this dynamic nature of lean management that we believe can be in conflict with IT.

The Challenges of Lean IT

To better understand the challenges of lean IT, we believe that it is necessary to take a step back and look at the underlying assumptions of lean management and of IT deployment and use. On a philosophical level, lean management and IT build on fundamentally different logics. To a considerable extent, the established ways to deploy IT in organizations are at odds with the fundamental principles of lean management. Table 11.1 illustrates some of the underlying assumptions about or approaches to organizational improvement underlying lean management and IT respectively.

Table 11.1 illustrates fundamental differences in the assumptions underlying improvement work based on lean management and IT, respectively. In essence, lean management builds on continuous, local, and often small-scale change and improvement based on human capability. On the contrary, IT deployment regularly builds on large-scale initiatives aimed at automation of defined processes. Once implemented, IT tends to make processes rigid and difficult to change. Lean management is about making continuous improvements; this means that entire systems and databases need to be updated frequently, quickly, and accurately, and this is extremely difficult to achieve with most information systems.

This difficulty has partly to do with the fundamental attributes of IT. IT is an extremely malleable technology before it is implemented. Under development, IT can be molded in

Table 11.1 Underlying assumptions about or approach to organizational change and process improvement

	Assumptions and values typical to lean management	*Assumptions and values typical to IT deployment and use*
Processes	Processes are a source of competitive advantage and deserve attention and focus of improvement work	Efficient operations often require that processes are adapted to what standard application packages can do, which means that they become more generic
Improvement work	Continuous activity built into organizational culture and work processes	A planned activity taking place as part of IT projects
Operational excellence	Something you work toward every day	Something achieved through intelligent design of clever IT tools that support, and extensively automate, well-designed processes
Organizational change	Continuous change; planned change is an exception when processes have been neglected for too long or when there are fundamental problems with overall process design	Planned change organized and executed through projects
Information technology	IT is often useful for solving specific tasks, but can potentially rigidify processes	IT makes companies more competitive
Responsibility	Rests with production teams and is integrated into line functions	Assigned to project team by management when improvement is deemed necessary
Competence	The people doing the work are best equipped to improve their processes	Experts, such as management consultants and IT professionals, are essential for designing and implementing new processes and IT tools
Learning and competence development	Continuous learning and competence development related to process execution and improvement is essential for the development of each individual and the whole organization	It is not efficient or possible to educate all personnel in IT development; even the role of and training for a user representative needs to be selectively assigned
People	People are the origin and drivers of process improvement	The key to improvement is often to automate processes and thus remove people and labor costs; people are often a hindrance to radical IT-based solutions due to organizational politics, self-interest, and "not-invented-here" syndrome

almost any conceivable way. When implemented, however, IT "gels" with business processes in a way that conserves the processes that the information system is designed to support and/or execute. Operative processes and information systems together form a "compound" that tends

to be difficult and time consuming to modify. ERP systems and production and control systems, for example, can be understood as examples of "recalcitrant technologies" with a rigidly defined hierarchy of components and operations bound together by a set of rules determining both their functional dependence and temporal sequence (Elbanna, 2006). It is highly unlikely that this IT/process compound will allow itself to be modified as frequently and rapidly as required when working along lean principles. Consequently, the best-established ways to acquire and deploy IT in organizations are more or less conflicting with fundamental principles of lean management.

Furthermore, many methodologies for IT development commonly build on what can be called a "*systems engineering mindset*" which includes the assumption that an "optimal" information system should be designed, built, and implemented. The idea that systems should be built to be continually modified after implementation is not well developed in the IT development literature. IT systems tend to induce inertia by automating the status quo, freezing the organization into patterns of behavior and operations that resist change (Allen and Boynton, 1991). The inertia induced by IT systems can also be attributed to capabilities, cognition, and culture developed around the existing technology. They constrain the organization's future behavior in that learning tends to be premised on local processes of search (Tripsas and Gavetti, 2000).

Different Approaches to the Successful Achievement of Lean IT

Given the fundamental differences between assumptions underlying lean management and IT, what can companies do to resolve the conflicts between the two? As both approaches to improve organizations have great potential, we believe that finding ways to combine lean principles for organizational improvement with the use of IT will become essential for organizations. In practice, some companies that excel in lean management are finding ways to resolve the conflicts and use IT to further the positive effects of adopting lean management principles. There are understandably different approaches to take, depending on the characteristics of processes, competencies, products and services produced, customer interaction patterns, and other key elements of value creation. Below, we briefly outline three different approaches and illustrate each with an example from our own ongoing research. Together, these examples show that fusing lean principles with IT can take very different forms.

Evidence-based Lean IT

This is a careful and stepwise approach that uses small, reversible investments and experimentation upon identification of improvement potential related to new IT at a production site. Our example here is the Global Manufacturing Company, a benchmark in lean management, which has elected to develop and maintain most of its production-related information systems in-house. It has developed an approach where production facilities around the world are allowed to develop local IT solutions to specific problems. These local solutions are subsequently evaluated by the central IT function and considered for inclusion into a subsequent release of the core production information systems. Locally, the principle for new IT tools is to always begin with the simplest solutions—often an Excel spreadsheet—to ensure that substantial experimentation and related process development has been conducted before an IT project is initiated. Bridging of perspectives and shared learning is also achieved by furthering cross-disciplinary knowledge of IT among the production staff and about production among the IT staff, respectively. The company eschews the standard procedure of initiating feasibility studies and subsequently full-scale IT projects early after problem/opportunity identification. Instead, it initiates this only after

conducting reversible proof-of-concept experiments in operations. Only in a second step, if and when a viable and value-adding solution (i.e. an IT-supported or IT-based process) has materialized and stabilized, is a "regular" IT project initiated. Finally, the practice of centrally evaluating and including locally developed IT applications in the core information systems provided across the organization further emphasizes learning and continuous improvement. The practice of cross-disciplinary learning also helps build a lean culture that integrates IT challenges and IT professionals.

Customer Value-focused Lean IT

Another approach is to direct IT deployment efforts to those aspects of service delivery where customers perceive clearly visible benefits. For example, the Private General Hospital takes such a customer-centric and value-adding approach to IT, using IT tools to improve patient experience with healthcare services. It also predominantly relies on in-house development of IT tools rather than standard application packages to attune functionality closely to patient needs and care processes. An IT-based access system makes it possible for admitted patients to receive visits from relatives and close friends at all hours. Patients can select their food from a personal bedside monitor and learn about surgical procedures, treatments, and rehabilitation procedures from the system at their own leisure. While the ever-increasing demands of patients drive in-house development of IT tools, we can also see in this example that IT applications do not necessarily automate whole operative processes, but rather provide delineated and specific services that can be managed and improved separately from core medical and care-taking procedures, or as service modules that contribute to core processes without enmeshing deeply into them. For example, an automated access system for relatives does not materially affect how operative healthcare processes are conducted, but increases patient well-being and reduces manual administrative workload. Similarly, helping patients become better informed ahead of physicians' visits empowers patients and improves the perceived quality of care. Thus, IT either simplifies or improves patient–physician dialogue, without necessitating major changes in core processes.

People-centered Lean IT

Finally, a third approach is to tie IT development and deployment intimately with operations and develop new IT capabilities in a collaborative and iterative fashion with operational staff. Our example here is Kanagawa Toyota (see also the separate case study), a major car dealership company in Japan affiliated with Toyota Motor Corporation. Kanagawa Toyota learned from experience that IT could hinder, rather than support, the realization of JIT customer contact: contacting each customer at the right time and in a manner the customer appreciates. In their initial attempts to utilize advanced IT tools to improve customer management, Kanagawa Toyota relied on a purchased *customer relationship management* (CRM) system that calculated the "right" time for each salesperson to contact their allocated customers in a standardized manner. However, the system's lack of ability to flexibly adjust the timing parameter became an obstacle and, consequently, Kanagawa Toyota decided not to rely solely on IT but instead to follow the "respect for people" philosophy. After investing in developing skills and the mindsets of salespersons as well as IT personnel, Kanagawa Toyota focused on in-house development of a new generation CRM system. This system is continuously modified based on daily dialogue between salespersons and IT personnel. This approach also builds on iteratively adapting IT applications to retain and improve their fit with continuously improving processes, but does so

through partly different organizational arrangements than the previous examples. Here, the focus is on establishing a close dialogue and collaborative partnership between the in-house IT unit and salespeople.

The Future of Lean IT

The three examples above and the different approaches to lean IT that they represent are of course neither mutually exclusive nor collectively exhaustive. However, they do illustrate that lean IT can take different forms, and above all that lean IT can be achieved in spite of the traditionally often contradictory assumptions and approaches of lean management and established practices of IT deployment and use.

Based on these three examples, as well as other ongoing research, we would like to propose a few principles for successfully marrying IT solutions with operative processes and with continuous improvement efforts to further leverage the positive effects of adopting lean management. The principles relate to the approaches introduced previously, but are articulated in a way that is more general and allows for additional approaches or new combinations of approaches to be employed.

Increasing Flexibility of IT Systems and Services

The first principle is to increase the flexibility of the IT systems and services. This could be achieved, for instance, by using a presentation layer separate from core systems and databases. In this way, flexibility can be increased as only the presentation layer has to be modified instead of the core ERP system or similar systems. This allows the complexity of core systems to be "hidden" or black-boxed. It also opens up the possibility for front-line personnel to take an active role in modifying the presentation layer, which is a practice used by Kanagawa Toyota. The increased use of cloud computing (e.g. Bharadwaj et al., 2013) is likely to open up new opportunities for creating IT applications that can be flexibly tailored to fit the need of core operations.

Increasing the flexibility of IT can also be achieved by choosing in-house developed proprietary information systems for functions where continuous development is crucial, such as when systems support core processes. For systems supporting core processes, continuous improvement directly affects competitiveness. This may require building in-house IT competencies with extensive first-hand knowledge of core processes, partly through job-rotation and recruiting IT staff from operative personnel. It may also require organizing IT development processes to support process innovation (such as in the Global Manufacturing Company example in the section on evidence-based lean IT).

Rethinking IT Development Practices

Organizations that wish to productively combine lean management and IT also need to learn to look for small and simple solutions rather than complete and ostensibly "ideal" solutions (as supported by all three of the examples above). There is a need to develop a continuous improvement approach to IT implementation that goes beyond iterative systems development (which still has an end goal). The improvements should expand IT implementation to include iterations between use and development involving the use of minimum viable systems, and the joint development of these systems and the processes they support together with operative personnel. This will focus on local learning in practice as a means for gaining knowledge of how processes should be supported.

Rethinking Responsibility for Integrated Process and IT Development

Not only do the IT development practices need rethinking, but also the division of responsibilities between IT development activities and core operations. As IT becomes more central to core processes, IT systems cannot be viewed as beyond the influence of operative personnel involved in continuous improvement (cf. the initial example in this chapter). IT development needs to become more integrated with other continuous improvement practices. This requires the competencies of operative personnel to include sufficient knowledge of IT tools such that these personnel can take an active and guiding part in developing and modifying IT tools to further improve processes. This is one of the principles behind Kanagawa Toyota's approach to lean IT (see the case study at the end of the chapter).

Developing a Joint Lean Culture that Includes and Integrates IT Professionals

Finally, as discussed in depth by Mary Poppendieck in Chapter 34 of this book ("Lean Software Development"), IT development practices need to evolve along the lines of lean principles. However, while lean and agile practices are beneficial for the efficiency of IT operations there is still a risk that IT processes are viewed as separate from core operations processes. Thus, as illustrated in our example from the Global Manufacturing Company, there is a need for the development of a joint lean culture encompassing IT personnel. The focus of the development should not be on improving IT development or IT operations per se, but rather on collaborative efforts involving operative and IT personnel in lean activities targeting core processes of the organization. In essence, this implies a weakening of the boundaries between IT services and processes, and core value-adding processes of the firm.

As these boundaries become blurred, it is likely that all organizations will become more similar to IT-based organizations, embracing digitalization as a core part of lean activities. Meanwhile, IT personnel will be challenged to take joint responsibility for operations rather than IT processes only. Further, they will be challenged by working in mixed teams and perhaps letting go of their belonging to a separate IT profession in favor of belonging, and bringing a core specialty, to integrated improvement teams.

Case Study: Lean IT in Kanagawa Toyota Motor Co., Ltd

Background: Lean Transformation and Just-in-time Customer Contact

In 2000, Kanagawa Toyota Motor Co., Ltd., a Japanese car dealership company affiliated with Toyota Motor Corporation, initiated a lean transformation program aiming to apply the tools and philosophies of Toyota Production System in order to eliminate waste and increase customer value. One of the major problems facing Kanagawa Toyota at that time was a lack of a consistent customer relationship strategy. Traditionally, each salesperson had their own portfolio of existing customers. They were supposed to contact the customers to promote various maintenance services, as well as build long-term relationships that would hopefully lead to repeat purchases of cars. In reality, however, salespeople were mostly inclined to achieve short-term sales results due to competitive peer pressure as well as monetary incentives. In fact, it was up to each salesperson to decide how and when to contact which customer. With the lack of process control at the company level, the inevitable consequence was a shrinking customer base and sales volume in the long run.

With the help of Toyota Motor Corporation, Kanagawa Toyota sought to address the problem by developing a process for contacting each customer at the right time and in a manner that the customer would appreciate. This was essentially an application of JIT to customer contact.

Learning from a Failure

Initially, the goal of the JIT customer contact was to simply remind customers of the maintenance services required by law, and the existing customer database came to play a key role here. The customer database was utilized to provide information regarding when to contact a customer to offer regular maintenance services. The simple CRM system calculated the "right" time for each salesperson to contact their share of customers in a standardized manner (e.g., 45, 30, and 20 days before the required date). The contact timings were visualized using printed "*follow-up cards*" and were stored on a shelf (see Figure 11.1).

However, it soon became clear that the CRM system was rigid in that it lacked the ability to flexibly adjust the timing parameter according to each customer's situation. This meant that customer contact was bounded by the system's constraints. In fact, many of the salespersons perceived it as a hindrance rather than a helpful tool to realize JIT customer contact. Consequently, management decided to abandon the IT part of the CRM system, emphasizing that what matters most is to take the customer's perspective in each contact situation. In fact, the attempt to realize JIT customer contact resulted in a perception of IT as controlling rather than supporting operative processes.

This experience made Kanagawa Toyota cautious about developing and using IT for customer contact purposes. Unlike many other companies that still sought to purchase advanced CRM

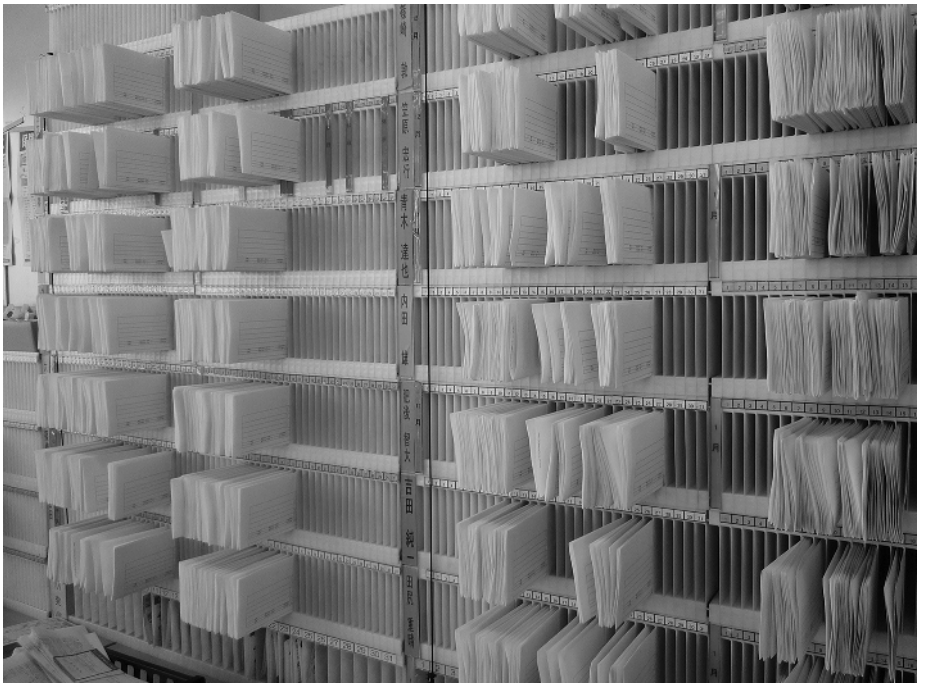

Figure 11.1 Visualization of customer contact tasks

systems, Kanagawa Toyota's attitude was that IT should always be able to meet the needs of the salespeople who actually interact with customers. In essence, Kanagawa Toyota started to follow the "respect for people" philosophy instead of relying on the capability of IT to automate processes. The core of the new policy was to shift the focus of IT initiatives to the in-house development of an extensive customer database that could support the work of identifying customer needs. The intention was to facilitate IT personnel to closely collaborate with salespersons to make IT more user-friendly and accessible.

Continuous Improvement of Both Processes and IT Applications

Kanagawa Toyota's renewed efforts bore fruit with the arrival of a next generation CRM system. Presently, a new CRM application is introduced to users when roughly one-third of the configuration and specification work has been completed, and small-scale, local experiments are conducted to modify the functions. What distinguishes Kanagawa Toyota's approach is that, because of the initiative being based on "respect for people," users become able to recognize and voice their own needs, i.e. what information they want in what manner in order to realize JIT customer contact. To sense and respond to the emerging needs, IT personnel frequently visit sales sites and have a constructive dialogue with users. Consequently, an IT application that enables salespersons to achieve JIT customer contact has been developed. Specifically, salespeople can develop a sales scenario based on information about the customer's life situation and past relationship with the company that is summarized in the application. The application also enables jidoka, as managers can see the customer contact process and, if there is a concern for quality, can provide a salesperson with on-the-job training regarding how to develop a sales scenario utilizing available information. In sum, continuous improvement is now facilitated by IT, which in turn drives IT development.

Kanagawa Toyota is now recognized as one of the leading car dealership companies in terms of using IT in harmony with lean principles and values. The next step on the journey is to further develop a customer-focused, joint lean culture that includes and integrates IT personnel, as well as everyone else in the company, so that JIT customer contact can be realized across multiple channels in a coordinated manner.

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