Lean Management in the Product Development

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The most dangerous waste is the waste we do not recognize.

Shigeo Shingo (1909–1990)

8.1 Design for Lean Manufacturing

Design for lean manufacturing is the process in the product development phase, in which lean principles will be applied in the design and product development phase. The term describes methods of design in lean manufacturing companies as part of the product development and concept phase.

Lean design utilizes methods such as process simulations or modelling tools for achieving the optimal design of a product or process in the most efficient way. Preserving value with less work can be accomplished through "lean" methods of design and problem-solving.

Figure 8.1 shows the value chain with functions like bidding, product development, production, and after-sales. The lean vision including design for manufacturing will allocate resources to the development phase in order to have a robust product and production process. The term frontloading is associated with this concept and will prevent from fire fighting due to a better design.

Design for lean manufacturing is a process for applying lean concepts to the design phase of a system, such as a complex product or process. The term describes methods of design in lean manufacturing companies as part of the study of Japanese industry by the Massachusetts Institute of Technology. At the time of the study, the Japanese automakers were outperforming the American counterparts in speed, resources used in design, and design quality. Conventional mass production design focuses primarily on product functions and manufacturing costs; however, design for lean manufacturing systematically widens the design equation to include all factors that will determine a product's success across its entire value stream and life

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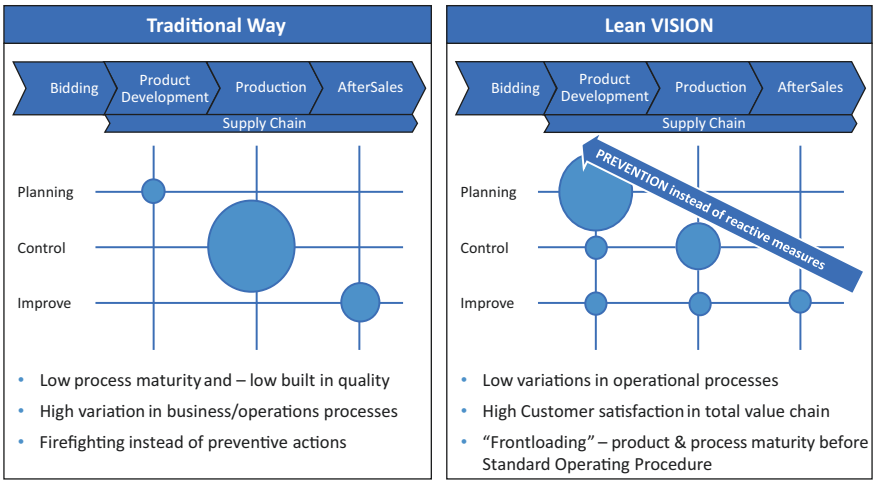

Fig. 8.1 Lean management in product development. (Source: Author's source)

cycle. One goal is to reduce waste and maximize value, and other goals include improving the quality of the design and reducing the time to achieve the final solution. The method has been used in architecture, healthcare, product development, processes design, and information technology systems and even to create lean business models. It relies on the definition and optimization of values coupled with the prevention of wastes before they enter the system. Design for lean manufacturing is system design.

8.2 Lean Management Concepts in Product Development

8.2.1 Case Study: Apple's Design Strategy

Lean is optimizing a process to preserve value with less work. Lean manufacturing is a management philosophy derived mostly from the Toyota Production System (TPS). Lean aims to eliminate waste in the entire value stream, by creating processes that need less human effort, less space, and less time to make products and services at lower cost; therefore, lean simply means creating more value for customers with fewer resources. However, how does this relate to Steve Jobs and iPod in particular or all Apple's iDevices in general? Steve Jobs used lean in another way; instead of thinking of lean as a way of minimizing waste in the production process, he looked at how to eliminate waste in the way the customer interacts with the iPod. For example, the volume up button could have different functions such as selecting a menu choice or taking a photo. This approach enabled Apple to produce mobile phones with just five buttons. Apple's (or perhaps Steve Jobs') innovation is by focusing on customers and how to offer them products without the unnecessary extras from design stage until displayed in an outlet.

There is a fine line between valuing the lessons demonstrated by great leaders and slipping into a blind devotion that masks the inevitable flaws to be found in every human personality. Steve Jobs had more than his share of flaws, and he possessed more than his share of genius. Reading Walter Isaacson's recent and excellent biography of Jobs, I am struck by the intuitive sense of lean, of flow, and of simplicity that he demanded from both the aesthetics and the technical workings of every product. You would be hard-pressed to find an executive with a better sense of the interaction between the social and the technical. When we think of lean, our mind first goes to the workings of the Toyota factory. However, the principles of eliminating waste and achieving interruption free flow may be found at an even more profound level in the design of Apple's breakthrough products and the intuition of Steve Jobs. Only 9 percent of Americans today work in manufacturing, and we might do well to turn our attention to the application of lean principles to less obvious endeavours such as product design and the use of technology. From the design of the first Mac to the design of the iPad, Steve obsessed on their design. He understood what we wanted before we wanted it and that was his genius. We didn't know we wanted GUIs, an iPod, or iPad and even less did we think we would be attracted to a product by the elegance and simplicity of its packaging. He imagined the customer experience before we had experienced it. This is intuition, a Zen appreciation for the movement of the hand and eye and the imperative to eliminate distractions to allow the mind of the user to flow from the first thought to the engagement in the utility of the device. As usual Jobs pushed for the purest simplicity. That required determining what was the core essence of the device. The answer: the display screen. So the guiding principle was that everything they did had to defer to the screen. "How do we get out of the way so there aren't a ton of features and buttons that distract from the display?" With the story of the development of each product, it is easy to see why Jobs nearly drove those around him crazy. It was normal for him to walk around and look at the work of designers and engineers and immediately pronounce their work to be crap! And, a week later he would be gushing about the very same thing he labelled "crap" a week earlier. It was also normal that the work on the new product would be almost finalized, or finalized in the mind of others, and he would wake up in the middle of the night and realize why he was not comfortable with its design. The radius of the corners was wrong! Or, the ionized aluminium casing wasn't exactly right. He would stop everything and have the entire team working on the product go back and fix things based on his simple feel for the design. Inevitably he would be proven right. And in every case, it was a matter of the flow, the movement of the eye and mind from one interaction with the product to the next. It was about "lean" although he would not have felt the need to label it as such. It wasn't the lean of the factory, but the lean of the customer experience. It is doubtable that any CEO in the history of business has been as intimately involved in the design of breakthrough products. His contribution was not that of a traditional executive at all. It was total intimacy with the customer experience that was his contribution. The way lean is implemented in many companies today it is viewed as primarily a cost reduction tool. Eliminating work in process, reducing the need for space, and increasing output per employee are all the natural results of

lean, and all result in positive impact to the bottom line. Rarely was reducing costs the primary motivation behind Steve Jobs' decisions. The decision to open retail stores provides a telling example. Jobs obsessively wanted to control the entire flow of work from the design of chips to software to the design of the case, the screen, and the packing. This was the motivation for his decision to open Apple Stores. He and Ron Johnson spent many months designing the stores, developing prototypes, and obsessing on every detail. From a traditional retailing perspective, it made no sense. They didn't have enough different products to fill a store. Most analysts thought it would be impossible to push enough products through the stores to justify the cost of the space. Gateway was failing miserably in their retail stores, and Dell was selling direct to customers. But that is not how Jobs was thinking at all. He was thinking about the brand, the customer experience, and the joy that the stores would create. Larry Ellison, the CEO of Oracle, was a close friend, and Steve repeatedly invited him over to walk through his prototype store. On each visit Jobs prodded Ellison to figure out ways to streamline the process by eliminating some unnecessary step, such as handing over the credit card or printing a receipt. "If you look at the stores and the products, you will see Steve's obsession with beauty and simplicity – this Bauhaus aesthetic and wonderful minimalism, which goes all the way to the checkout process in the stores", said Ellison. "It means absolute minimum number of steps. Steve gave us the exact explicit recipe for how he wanted the checkout to work. That is lean thinking at its best".

Most experts predicted failure. "Maybe it's time Steve Jobs stopped thinking quite so differently". *Businessweek* wrote in a story headlines "Sorry Steve, Here's Why Apple Stores Won't Work". The retail consultant David Goldstein declared, "I give them two years before they're turning out the lights on a very painful and expensive mistake". Gateway's stores were averaging 250 visitors per week. On May 19, 2001, the first Apple Store opened in Tysons Corner Mall, one of the most expensive retail properties in the country. By 2004 Apple stores were averaging 5400 visitors per week! That year they had $1.2 billion in revenue, setting a record in the retail industry. In July 2011, a decade after the first store was opened, there were 326 Apple stores. The average annual revenue was $34 million, and the net sales in 2010 were $9.8 billion. They were not only profitable, but they boosted the brand and reinforced everything else that Apple did. The development of Apple stores and Apple products demonstrated an aspect of lean thinking that is not understood by most lean practitioners. It is not simply about cutting costs. It is about creating value in the customer experience by optimizing flow. Many lean writers and practitioners have not been willing to step up to the plate and address the issues of organizational structure and systems. But, if you don't you are not likely to be lean. The story of Sony's lost opportunity and the development of the iPod proves the point. Sony had a music division and contracts with a large number of the most popular bands and artists. They were a dominant force in the music business. They had another division that had created the Walkman, a personal device to carry and play music. They had a computer division producing personal computers. They even had software to sell music online. And, at the time, they realized that Napster and other free music download websites were destroying the profitability of their

business. It was out of control. Within the Sony brand, they had every piece required to solve the problem. However, the three big and powerful divisions fought among themselves and could not collaborate to develop a solution. At Apple Computer there was a leader who understood disruptive technology. It wouldn't be unfair to call Steve Jobs the Crown Prince of disruptive technologies. At that time Apple was merely a personal computer company (Edson 2012). They produced no personal or portable devices. But, Jobs loved music. He understood that the personal computer could be the music hub. He personally led the charge to develop the iPod, and there were no warring divisions within Apple. Jobs personally met with music royalty including Bob Dylan, Bono, the head of Universal, Sony, and other music studios. He went to Japan and found the disc drive at Toshiba that could hold a thousand tunes. He developed an end-to-end solution that met the needs of the artists, the music studios, his own company, and, most importantly, the customers who loved music! He practically lived with Jony Ive, the chief designer, whose aesthetic sense of elegant simplicity for not only the device but even the packaging created a unique brand image and advantage. The combination of iTunes software for your computer, the iTunes store, and the iPod, met the needs of all key stakeholders. It was a victory of seamless integration. It eliminated waste in every component of the music delivery process. It could only have been achieved by an organization devoid of silos and a leader who understood the advantage of a seamless experience by the end user. In every instance of product development and marketing, Steve Jobs understood and demonstrated how eliminating waste from the flow of work and the flow of the customer experience results in the creation of value. Perhaps more than any other executive in our lifetime, he understood the interdependence of the human and technical factors in product development and in their use. This is the lean that needs more of our attention (Miller 2014).

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