1. INTRODUCTION

Toyota is among the most successful companies in history. Its Toyota production system (TPS) has long been regarded as a source of its outstanding performance. The TPS has been imitated by various companies all over the world and has also inspired thousands of publications in the business press (Takeuchi et al., 2008). Many industries including electronics, metal working, mechanics, and foods supply have attempted to implement the TPS. Even in service industries such as consumption (Womack & Jones, 2005), software, postal services, hospitals, airports, and government, TPS is widely applied (Fujimoto, 2007). However, these latter
industries have their own characteristics that are different from the auto industry. Not every part of the TPS – *kanban*, *andon*, and *heijunka*, for instance – can be easily transplanted without modifications. A fashion show dress might look glamorous on models, but it may not be appropriate for everyone. Similarly, Toyota’s TPS might not perfectly fit other industries. Most companies, however, try to imitate TPS without modification, achieving only limited benefits. Innovative companies, on the other hand, constantly change these lean tools to fit their systems (Moody, 2001). Some modifications become so successful that they produce huge impacts on industries.

One such innovation is *seru*. *Seru* has acquired a reputation as the *next generation of lean* in Japan for several years, but it is still largely unknown outside Japan (Shinobu, 2003). With combined strengths from Toyota’s lean philosophy and Sony’s one-person production organization, *seru* is a more productive, efficient, and flexible system than TPS. It has successfully been applied to electronics and auto components industries. Many leading Japanese companies such as Sony, Canon, Panasonic, NEC, Fujitsu, Sharp, and Sanyo have dismantled their assembly conveyor lines and adopted *seru* (Gotou, 2005). In fact, by applying *seru*, the average productivity of Canon is now higher than that of Toyota (Weekly-Toyo-Keizai, 2003). *Seru* has many benefits. It can reduce lead time, setup time, WIP inventories, finished-product inventories, cost, required workforce, and shop floor space. *Seru* also influences profits, product quality, and workforce motivation in a positive way (Takeuchi, 2006).

As a human-centered production system, *seru* is regarded as the ideal of lean organizations. *Yatai*, one type of *seru*, is considered by many Japanese managers to be a most perfect organization of people/work. *Seru*’s principles provide an implementation framework for achieving the ideal lean. *Seru* was conceived at Sony, and is used mainly in the Japanese electronics industry. Compared to the auto industry, the electronics industry is in a rapidly changing business environment because of its shorter product life cycles, uncertain product types, and fluctuated production volumes (sometimes mass, sometimes batch, and sometimes very small volumes). In Japan, a special business term, *hensuhenryou*, was used to describe this environment. Except for a few high-volume, low-variety electronics products, application attempts of TPS to mixed product lines collapsed because it could not address problems in this volatile business environment.

Significant extensions of TPS were developed that are more appropriate to the volatile environment of electronics manufacturers. Fortunately, assembling an electronics product is much simpler than car assembly. An electronics product is often put together with hundreds of components, while a car has thousands of parts. Also, the size of electronics products is much smaller. These characteristics of electronics products provide an opportunity for manufacturers to implement very short, compact lines with fewer workers and simpler tools. These compact lines are evolving into super-talent *serus* that allow a company to develop the right *serus* with appropriate capabilities to match customers’ requirements. A *seru* system is an extension of a just-in-time (JIT) system from the material level to the organization level. We begin by looking at *seru*’s history.

2. THE HISTORY OF SERU

Sony (2005, 2009) began to adopt assembly conveyor lines in 1955 to accommodate rapidly increasing market requirements. Until 1992, conveyor lines were widely used in Sony’s manufacturing factories and had contributed greatly to Sony’s production. In between 1955 and 1992, Sony also tested other manufacturing approaches such as *one-person production organization* (OPO) and TPS.

Sony experimented with OPO in 1963. By 1967, it became the second most important manufacturing tool for Sony after assembly conveyor lines. In 1983, a *TPS Studying Club* was created. Later, a project named “production-
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