2017/01/31

オムロン基金プロジェクトによる

研究プロジェクト申請書

申請者
所属　ビジネス研究科
氏名　殷勇

1　研究プロジェクト名	*Seru* Production (セル生産) and its context, mechanism, performance, and design
2　研究メンバー ※研究メンバー全員の履歴書・業績書を添付すること。ビジネス研究科教員以外の者については、研究への参加許諾書を添付すること。	ビジネス研究科： 殷勇 飯塚まり 山下貴子 ビジネス研究科以外の研究者： **Senior members** Kathryn E. Stecke, chair professor, University of Texas at Dallas, USA Morgan Swink chair professor, Texas Christian University, USA Suzanne de Treville former dean, prof of University of Lausanne, Switzerland **Junior members** 野田英雄　准教授　東京理科大学 伊藤浩嘉　客員研究員　東京理科大学 Chenguang Liu, vice dean, prof of Northwestern Polytechnical Univ, China Dongni Li vice dean, asso prof of Beijing Institute of Technology, China Kan Fang visiting scholar, Columbia University, USA Rongxin Zhan Ph.D student, Beijing Institute of Technology, China

3 研究目的	The purpose of this research proposal is to find out the context, mechanism, performance, and design perspectives of Japanese *seru* production systems (セル生産方式). Both industry and academia are continuously showing interests to *seru* production systems. Unfortunately, the current industry and research literature does not illustrate adequately a number of key problems related to the successful implementation of *seru* production systems. To answer the above questions, this research consists of three parts. 1. This research project will list out a large number of study topics related to *seru* production system, emphasize the requirements for their investigation, and recommend useful research approaches for the study purposes. The research project consists of four research aspects for new system adoption – applicability, justification, system design, and implementation. 2. Compare with other production systems: The *seru* production system is a type of cellular manufacturing that is distinguished first by the *serus* being configurable rather than fixed; and second by its use of *serus* for assembly, packaging, and testing rather than fabrication alone. *Seru* is defined by its prioritization of responsiveness over cost reduction in setting the firm's operations strategy. In this research project, we analyze the case histories of Japanese companies, examining the factors leading to the development of *seru* systems and their successful implementations. We make use of several paradigmatic and theoretical lenses to aid understanding of these factors, including lean and agile manufacturing paradigms, cellular manufacturing concepts, and the Theory of Swift, Even Flow (TSEF, Schmenner and Swink, 1998). Our analysis yields a set of testable propositions that describe how and why manufacturing under *seru* can be profitable in a high-cost environment, and it identifies structural factors that may be transferable to other industries and contexts. 3. *Seru* design: How to design the configuration of a *seru* system and how to allocate customer orders to specific *serus* are difficult decision issues. In *genba*, these tasks are usually relied on the experiences of front-line managers. This research develops optimal methodologies to design a *seru* production system. This will benefit Japanese manufacturing factories.

4 研究計画	**Part 1 (Years 2017-2018):** List out a large number of study topics related to *seru* production system. Research methodologies will include literature reviews, mail-telephone-website surveys, and field studies. Applicability: What properties facilitate factories that have adopted *seru* systems, and other questions are keys. Justification: Assessment the cost and benefit relationships, and performance measures. Implementation: Can *seru* systems extend to other industries rather than electronics. System Design: What is the optimal configuration and allocation plan for a *seru* production system? **Part 2 (Years 2017-2019):** Compare with other production systems. This research will investigate describe *seru's* fundamental extensions to, and departures from, lean production (i.e., Toyota Production System), and explain how these companies have applied *seru* to improve productivity, quality, and flexibility in ways that have enabled them to remain competitive. We also offer an elaboration of the theory of swift, even flow, along with interesting implications for future research of trade-offs related to lean and agile manufacturing approaches, and for competitiveness in high-cost locations and technologically dynamic markets. We discuss how the TSEF enhances our understanding of *seru*, how our observations of the *seru* phenomenon help to elaborate the theory, and how *seru* compares to lean and agile production systems. At a higher level, our effort to build and deploy theory around *seru* emphasizes the principles of theory development summarized in TSEF. In addition, our analysis describes a possible path forward for manufacturers and policy makers who seek profitable ways to revive or preserve domestic manufacturing in high cost countries. **Part 3 (Years 2017-2020):** *Seru* systems design. By using the results of parts 1 and 2, we will define a standard *seru* system by using scientific terminologies. The commonly used scientific terminologies will be mathematical formulas. Develop algorithms that split an assembly system with a large number of elements into *serus*. Then, this research will evaluate the performances of algorithms developed; Reform the proposed *seru* production systems. Computer simulation and statistics tools will be used to evaluate the developed algorithms and their revisions by using selected relevant industry factors.

５ 期待される成果	The biggest expected research result is to transfer *seru* production from best practices to rigorous academic theories. These theories can guide business practices in return. This process is like the research history of Toyota Production System (TPS). Toyota created TPS, but researchers transferred TPS into lean theory. By using lean theory, many other companies can easily adopt TPS. In fact, three members of our research team (Stecke, Swink, and De Treville) are famous researchers in the lean theory area. We want to clarify the three research parts as follows. Part I. Find out key factors for a company on *seru* applicability, justification, implementation, and system design. Part II. By comparisons, find out fittest environments for *seru*, but not lean, agile, flexible, and/or other manufacturing systems. Part III. Find efficient, effective, and flexible methodologies for designing a *seru* production system. Also, the highest priority of our research goal is to create our research group (**Doshisha Business School is the core center of this research group**) becoming No.1 research group in the area of *seru* production systems in the world. Here, No.1 means academic performance that is evaluated by academic publications in quantities and qualities. There are three main journal lists (UTD24, FT45, and ABS) that are used to evaluate academic publications. UTD24 includes 24 top academic journals; FT45 includes 45 top academic and practical journals; ABS includes a large number of journals that are considered as good journals. A lot of ranking organizations use these three journal lists to rank the research performance of business schools. The expected publications of our research project are as follows. This can allow us to be No.1 research group in the area of *seru* production systems in the future 3 years (Reasons are given in Category 6: 研究成果の発表方法). Quantities: Generate at least 15 publications including English and Japanese papers and/or books. Qualities: Among 15 publications, at least 10 papers in the ABS list, and at least 2 papers in the UTD24 or FT45 lists.

6　研究成果の発表方法	１．学術誌への発表 Quantities: Generate at least 15 publications including English and Japanese papers and/or books. Qualities: Among 15 publications, at least 10 papers in the ABS list, and at least 2 papers in the UTD24 or FT45 lists. Benchmark: To the best of our knowledge, in the past 5 years, only one paper from Japan published in the UTD24 or FT45 lists in the area of production systems. (i.e., from 一橋大学 on Toyota production system). So if we can publish at least 2 papers in the UTD24 or FT45 lists in the future 3 years, Doshisha Business School definitely will has very strong research competitive advantages in the area of production system (ものづくり) in Japan. The journal published by 一橋大学 is "***Journal of Operations Management***". Our targeted journals from the UTD24 and FT45 are as follows. ***Journal of Operations Management*** ***Production and Operations Management*** ***Manufacturing and Service Operations Management*** ***Management Science*** ***Operations Research*** ２．社会への発信 研究成果の情報発信手段としては、ホームページを作り上げ、企業向けの講演、コンサルティング、企業人向けのセル生産に関する解説書の出版などを考えている。また、同志社ビジネススクールのMBA 学生に対してセル生産に関わる実践的教育を行うことで、本研究の提案法の普及を推進する。