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Production and Cooperation Strategies in a Remanufacturing System Involving Knowledge Spillover

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Abstract

In this study, we explore how firms determine production and remanufacturing strategies considering knowledge spillover, which is unavoidable in nowadays remanufacturing systems in practice. The remanufacturing system considered in this study consists of an original equipment manufacturer (OEM) and a third-party remanufacturer (TPR). The OEM produces and sells an innovative product for which the innovation-knowledge cannot be directly observed by the TPR. Thanks to the spillover of OEM's general knowledge about product design and production his remanufacturing processes, the TPR not only remanufactures used products but also produces new products under his own brand. He sells remanufactured and new products in the same market as the OEM. In response to the potential market share cannibalization from TPR's products, the OEM collaborates with the TPR by granting the latter a remanufacturing authorization. The spillover of OEM's innovation knowledge takes place under this cooperation. In examining the effect of general and innovation knowledge spillover on two firms' production and cooperation strategies, we consider two scenarios in this study, including i) pure competition and ii) remanufacturing authorization cooperation. We develop and analyze several game theoretical models. Our results highlight the conditions under which the TPR engages in new product production without remanufacturing in pure competition and cooperation scenarios. An interesting finding is that although innovation-knowledge spillover motivates the TPR to engage in new product production and weakens the competitiveness of OEM's products, both firms can be better off when compared to the pure competition scenario. Moreover, both consumer surplus and environment can be improved by remanufacturing authorization cooperation.

Keywords
Remanufacturing authorization, knowledge spillover, co-opetition, production strategy.

Biographies
Linda L. Zhang Dr. Zhang is currently a Professor of Operations Management in Department of Operations Management at IESEG School of Management (LEM-CNRS 9221), Lille-Paris, France. She obtained her BEng and Ph.D. degrees in Industrial Engineering in 1998 and 2007, respectively. In 2012, she received her Habilitation in Management Science from University Paris 13, Villetaneuse, France. Her research interests include sustainable operations and supply chain management, remanufacturing, extended product platforming, product configuration systems, production configuration, etc. In these areas, she has published a number of articles in international refereed journals, such as Decision Support Systems, IIE Transactions, IEEE Transactions on Engineering Management, European Journal of Operations Research, International Journal of Production Economics, International Journal of

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Nannan Wang received her BMgt degree in enterprise management from Anhui University, Hefei, China, in 2018, and the master's degree in enterprise management from Lanzhou University, Lanzhou, China, in 2021. She is currently working toward her Ph.D. degree in management science at the University of Lille, Lille, France. She is currently a Teaching and Research Assistant at IESEG School of Management, Lille-Paris, France. Her research interests include sustainable supply chain management, remanufacturing, supply chain innovation, and cooperation mechanism design.