

*The Hong Kong Polytechnic University
Department of Logistics and Maritime Studies
Research Seminar*

**3D Printing vs. Traditional Flexible Technology:
Implications for Manufacturing Strategy**

by

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Venue: V303, Jockey Club Innovation Tower
The Hong Kong Polytechnic University**

(Conducted in English)

Abstract:

We study a firm's manufacturing strategies under two types of flexible production technologies: the traditional flexible technology and 3D printing. Under the traditional flexible technology, capacity becomes more expensive as it handles more product variants; under 3D printing, however, capacity cost is independent of the number of product variants processed. The firm adopts a dedicated technology and one type of flexible technology, either the traditional one or 3D printing. It needs to choose an assortment from a potential set of variants, assigns each chosen variant to a production technology, and finally invests in capacities. We first establish that the optimal assortment must contain a number of the most popular variants from the potential set. Based on the variants' popularity rankings, we find that the optimal technology assignment can follow an unexpected reversed structure under the traditional flexible technology, while the optimal assignment always follows an ordered structure under 3D printing. Surprisingly, we find that adopting the traditional flexible technology in addition to the dedicated one may reduce product variety chosen by the firm. 3D printing, by contrast, always enhances product variety. Furthermore, 3D printing allows the firm to choose a much larger assortment than optimal without significant profit loss. These results demonstrate that the rising 3D printing has significantly different implications for firms' assortment and production strategy than the traditional flexible technology.

Key words : 3D printing; technology management; assortment planning; manufacturing flexibility; product variety; multinomial logit model

Bio:

Fuqiang Zhang is currently a professor and area co-chair of Operations and Manufacturing Management at Olin Business School, Washington University in St. Louis. He obtained his Ph.D. in Managerial Science and Applied Economics from the Wharton School, University of Pennsylvania. His main research interests are in supply chain management, consumer analytics in operations management, and sustainable operations. His research has appeared in *Management Science*, *M&SOM*, *Operations Research*, *Marketing Science*, and *Production and Operations Management*. He received the Wickham Skinner Early-Career Research Accomplishments Award from the Production and Operations Management (POM) society (2009), the Meritorious Service Award from *M&SOM* (2006, 2009, and 2011), and the Distinguished Service Award from *Management Science* (2009, 2010). He has served as the Secretary/Treasurer/VP Meetings of the Manufacturing and Service Operations Management (MSOM) society and Associate Editor for *Management Science*, *M&SOM*, and *Omega*.

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All are welcome!