

### **Dr. Xiaowen Huang**

Xiaowen Huang is an assistant professor of supply chain management at Miami University. She teaches in the areas of operations management, supply chain management, and operations strategy. Dr. Huang recently graduated from Operations and Management Science Department, University of Minnesota. Her research interest revolves primarily around the question of “how can companies achieve competitive advantage through effective technology management, especially in the supply chain context?” Her current research includes empirical investigation of adoption of Internet reverse auction in the manufacturing setting and adoption of retail technologies in the retail supply chain operations.

#### *Complementarities between In-Store and Supply Chain Technologies: An Empirical Analysis of Food Retailing Operations*

Managers of retail firms are being confronted with a diverse array of technologies that promise to improve store performance. While the extant literature is replete with studies investigating the performance impact of technologies one-at-a-time, organizations are adopting technologies in bundles. In this paper, we empirically examine the impact of bundling technologies on financial performance of stores. Conceptually, the study draws on the literature on complementarity. We develop hypotheses positing: (H1) Stores will adopt in-store and supply chain technologies as a bundle; (H2) In-store and supply chain technologies adopted by stores as a bundle will be complementary; (H3) Stores will realize the effect of learning when they adopt complementary in-store and supply chain technologies as a bundle. The empirical analysis is based on data collected during the year 2002 from a large-scale survey of supermarket food stores in the lower 48 states of U.S.A. In particular, the study is based on data on the adoption of ten in-store and supply chain technology applications, and financial performance of stores measured as weekly sales per square foot of selling area. The store formats represented in the study sample are: conventional supermarket, food/drug combo, warehouse, superstore, super-center/hypermarket, and super warehouse. All in all, results of the empirical analysis provide support for the three hypotheses. First, we find that stores adopt in-store and supply chain technology applications as a bundle. Specifically, the in-store technology applications are those that enable shelf-space allocation plan-o-gram, product movement analysis, and category management. The supply chain technology applications are those that enable electronic transmission of movement data to headquarters or key suppliers, and Internet/Intranet link to corporate headquarters and suppliers. Second, we find that conventional supermarket stores that adopt a bundle of complementary in-store and supply chain technology applications for more than two years financially outperform stores that either adopt a few of the complementary technology applications for a comparable period of time, or adopt the complementary technology applications over time (i.e., over a couple of years) to eventually form a bundle. Third, we find that there is a positive effect of learning on financial performance of stores at the level of technology bundle – i.e., the stores realize the effect of learning when they adopt complementary in-store and supply chain technology applications as a bundle. In particular, conventional

supermarket stores that adopt the bundle of complementary in-store and supply chain technology applications for more than two years financially outperform stores that adopt the same bundle, but where one or more of the individual technology applications were adopted for a period of two years or less. From the standpoint of practice, the study identifies specific in-store and supply chain technology applications with the potential to improve financial performance of stores. The study also sheds light on the strategy for technology adoption as it shows that stores adopting in-store and supply chain technology applications as a bundle outperform stores adopting the technology applications on a piecemeal basis.