

DISSERTATION DEFENSE

Managing Technology and Operations in Emerging Markets

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Firms increasingly face both opportunities and risks: on the positive side, they can exploit fast-burgeoning markets in emerging economies and leverage low factor costs in these countries; on the negative side, they face mounting cost pressures due to intensified competition and eroding price premium due to fast commoditization. The new competitive landscape of the business world is therefore more and more shaped by *globalization* and *technology*. Motivated by strategic issues faced by executives in different industries, this dissertation tends to answer fundamental issues and choices when firms enter emerging markets: new economies or new technologies.

Chapter one studies the implications for global sourcing and technology transfer in the presence of technological imitators. Technology transfer offers global firms an opportunity to reduce costs of serving emerging markets as well as source from the low-cost country for their home markets. However, it also poses risks of potential technology imitation by local competitors who may enter the emerging market and invade subsequently the global firms' home markets as well. We study the competition between a global firm and a local imitator in both markets and examine how the competition affects the global firm's technology transfer and sourcing decisions, and the local competitor's imitation and exporting choices. We examine the impact of various factors, such as market characteristics, cost structures, intellectual property protection policies, firm-specific advantages and disadvantages in production and distribution. Our model broadens the traditional view of firms balancing between avoiding technology leakage and exploiting factor-cost difference by incorporating sourcing opportunities for their home markets. We find three possible optimal strategies: "Local Content", "Export Platform", and "Global Platform", and characterize the above factors that drive which of these strategy will result in equilibrium. Some interesting results arise. For instance, in some cases, larger size of the emerging market could induce the global firm to transfer less technology, and higher imitation cost does not necessarily lead to more technology transfer. The model is also interpreted in conjunction with field data obtained from a critical equipment producer in U.S.A. This company faces similar choices in levels of technology transfer to its Chinese affiliate. Our model provides insights in the fundamental drivers of imitative competition that emerge in this industry.

Chapter two studies the green vehicle introduction strategy subject to scarce green fuel supplies. Concerns of environmental impacts coupled with high oil prices spur a trend of green vehicles powered by biofuels. The scarce biofuel supply however remains a major obstacle to the development of the green vehicle market. The scarcity of the complementary product causes the consumers utility to be endogenously determined by the consumers' vehicle choice: the conventional or green vehicle. We study vehicle manufacturers' product and pricing strategies: when to offer a single vehicle or both vehicles, and at what prices. We examine the impact of various factors, such as green segment sizes, biofuel price sensitivities, vehicles performance, and fluctuating petroleum fuel prices. Our results confirm that the factors exhibit interactions that must be well balanced. Some interesting results arise. For example, as the number of green

consumers increases, it is less likely that the firm will adopt the green vehicle only strategy, but the two-vehicle strategy. The green vehicle's fuel flexibility has its value only in the presence of uncertain petroleum fuel prices. Surprisingly, under uncertain petroleum fuel prices, the green vehicle only strategy emerges as an optimal strategy when the petroleum fuel price is both low and high, due to the value generated from its fuel flexibility.

Chapter three studies the coordination of a two-firm supply chain through repeated interaction. In each period, the upstream firm, the manufacturer, determines the wholesale price and the downstream firm, the retailer, subsequently sets the order quantity before the market demand is realized. The environment is characterized by uncertain market demand and discounting of the future profits. No inventory is carried over between periods. In a single-period interaction, the wholesale price contract cannot achieve supply chain efficiency (or coordination). With repeated interactions, we show that supply chain efficiency can be achieved with the wholesale price contract if the supply chain members have a sufficiently high discount factor. At the minimum possible discount factor, we show that the manufacturer decreases the wholesale price, in return for a larger order quantity from the retailer. We show that information about the demand distribution available to both players in the beginning of each period may decrease the retailer's expected profit in a coordinated supply chain, or constrain supply chain coordination.