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"Impact of information on operations management in emerging businesses"

Thursday, February 19, 2015
1:00 pm
388 Posner Hall

My research is dedicated to understand the role of information in managing emerging operations problem, particularly in the domains of socially responsible management and service operations.

In the first chapter I study how to combat child labor in global supply chains, specifically investigating how supply chain transparency influences the fight against child labor. There are nearly 200 million children engaged in child labor in the world, many in developing countries that are part of the supply base of global manufacturing networks. I model such a situation: A multinational firm in a developed nation selling the product made by a supplier in a developing country. I analyze the firm's strategies to control its supplier's use of child labor, and examine factors that affect the firm's incentives to use these strategies. I then investigate the potential effects of new legislation -- the California Transparency in Supply Chain Act (the Act) -- that requires disclosure of corporate efforts to combat child labor. I find that supply chain transparency may backfire and inadvertently induce additional child labor: The Act, by serving as a commitment device, may enable the firm to credibly commit to conducting no internal inspections and hence encourage the supplier to use child labor. I also study several measures which can potentially mitigate such adverse effect (e.g., consumer boycotts, third-party organizations' support for firms' inspections) or eliminate it completely (e.g., a zero-tolerance policy).

The other two chapters focus on the operations of service management companies. In the second chapter, I propose a static service differentiation policy for a single-server queueing model of a service system. The policy randomly assigns homogeneous customers different service rates -- independent of system state -- while keeping the mean service time unchanged. Although conventional wisdom held that such differentiation would increase service time variability and thus increase waiting time, I show the contrary: Such differentiation may reduce total waiting time because it creates information that enables the implementation of service-rate-based scheduling, which mitigates the increased variance. I provide conditions under which the static service differentiation reduces waiting, and further derive closed-form expressions for the optimal differentiation policy. I also illustrate the policy in the context of quality-based service domains, in which customers value service time but dislike waiting. Numerically I find that providing differentiated service can improve system performance by 5% without the investment in any additional capacity.

The third chapter relates to a client who outsources service requests to multiple service vendors (servers). I uniquely consider the scenario in which during the service process multiple service vendors can share their system state information, and strategically share their capacity for their own interests. This collaboration increases capacity utilization but dampens capacity competition, and therefore its impact on system waiting time is ambiguous. I explore how this strategic collaboration affects the client's contract design when the client needs to meet some certain service level on waiting time. Preliminary numerical analysis shows that even though strategic collaboration discourages capacity investment, the loss in capacity can be compensated

for, to some extent, by increased utilization. In particular, in the presence of strategic collaboration, the client can pay less for outsourcing and rely on collaboration to reduce waiting when the required service level is not extremely high. I propose to provide an analytic proof of this fact, and more insights for the client on how to utilize such strategic collaboration more cost-effectively.