Study details how competitors should invest in capacity of supplier

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Firms considering investing in suppliers that also supply their competitors need to think strategically about how their competitors or other firms may respond to their action, according to a new study from The University of Texas at Dallas.

Firms must examine the direct and indirect consequences of their investment through the lens of a multiplayer game, rather than myopically focusing on increased access to capacity, said lead author Dr. Anyan Qi, assistant professor of operations management in the Naveen Jindal School of Management.

The study, published online in *Production and Operations Management* in March, uses game theory to analyze how competing firms should invest in a shared supplier's capacity.

"Supply chains today are highly decentralized and consist of complex networks with many buying firms and suppliers," Qi said. "Therefore, understanding how firms and suppliers interact in supply networks becomes increasingly important."

The researchers considered a supply network in which two firms compete in the market while sharing a supplier. They examined how the different contractual forms affect the firms' investment in a shared supplier's capacity and the resulting profits for the two firms and the supplier, and therefore how the firms and supplier should choose these contractual forms.

"In order to build a tight supplier-buyer relationship, typically buyer firms may invest in the supplier, for example, to expand the supplier's capacity," Qi said. "Of course, there is no free lunch with this type of investment. Typically, strings are attached. The strings in this type of investment are the contractual forms that limit how the invested capacity should be used."

The study looked at exclusive and first-priority contracts. In an exclusive contract, a firm exclusively uses the invested capacity, and disallows any other use, even if there is leftover. In a first-priority contract, the investing firm demands to fulfill its own order first, but the supplier is free to use any leftover.

Qi said because the supplier has more flexibility in a first-priority contract, a common misconception is that downstream competition will become more intense.

According to the study, however, first-priority capacity may not necessarily increase the downstream competition. When firms invest in a shared supplier, they should anticipate that their competitors may have access to the leftover capacity. The firm should invest less aggressively, therefore curbing the competition.

Another misconception is that a firm should always demand exclusivity, Qi said. The study found that in some scenarios, it may actually be better for a firm to grant its competitor access to its invested capacity. If both firms invest in the supplier, the downstream competition becomes more intense.

One example that illustrates the framing of Qi's model is Foxconn's investment in Sharp. In 2012, Foxconn invested $1.6 billion in one of Sharp's factories and claimed exclusive use of the 50 percent capacity, while Sharp was free to use the remaining 50 percent for others and its

own tablet and TV products.

Shortly afterward, Samsung also invested to prevent competitors from gaining too much control over Sharp, and secure a steady supply of LCD panels.

"You don't want to demand too much from your shared supplier," Qi said. "Otherwise, it might backfire and lead your competitor to jump into an investment relationship. Then, both of you might be worse off because the downstream competition becomes more intense."

Research findings

- Buyer firms should not always demand the exclusive use of their capacity. It might be better for a firm to grant its competitor access to its invested capacity. If the firm demands exclusivity, it may force the other firm to invest, too.
- First-priority capacity does not always lead to intensified downstream competition. When a firm makes an investment, it should anticipate that its competitors may have access to the leftover capacity. This will cause the firm to invest less aggressively, curbing the competition.

More information: "Investing in a Shared Supplier in a Competitive Market: Stochastic Capacity Case." *Production and Operations Management* (2015), DOI: 10.1111/poms.12348

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