

## **Understanding Supplier Quality in Decentralized Supply Chains**

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There has been considerable concern recently regarding the lax oversight over the supplier's supply chain and the consequent poor quality. This is reflected in considerable media interest in understanding the reasons behind poor supplier quality. For example, the Mattel toy recall, blamed on a Chinese subcontractor for paint contaminated with lead, has received considerable media attention. Poor customer service in call centers is another oft-cited example of sub-standard quality, in the services context.

Understanding supplier quality is even more pertinent as supply chains decentralize and globalize. Several factors affect the quality choice of the supplier – the technology available to the supplier, the contract between the supplier and the buyer(s), the regulatory environment and the ability or inability to verify quality. In many cases, quality standards may be explicitly contacted upon but parties may not meet their obligations due to the challenge that supply chain constituents face from managing the costs that arise from the above mentioned factors.

To understand these issues, we model a supply chain where the seller and buyer(s) decide upon a mutually agreed quality standard. The supplier controls the quality level, perhaps only partially, which is discovered by the buyer only after purchase. The buyer can enforce the quality standard by taking a costly action. This action could include legal redress and arbitration, packaging and returning defective items, contracting a third party to document a breach, etc. The model incorporates penalties which require the seller to refund the purchase price of the units that are found to be below the quality standard. The analysis helps us understand the effect of purchase price and enforcement costs on the quality of the suppliers units. The model differentiates between two kinds of enforcement: individual enforcement and joint enforcement (“class action”). In individual enforcement, each buyer enforces the quality independently, while in joint enforcement, if the unit supplied to even one of the buyers is found to be below the quality standard, all the buyers benefit. The results obtained from the analysis provide interesting strategic insights.

First, the buyer may have an incentive to provide a higher purchase price in order to induce the supplier to provide higher quality. If the prevailing market conditions result in high purchase prices, a “normal market” scenario might result, with goods of high quality. In this case, the buyer is better-off by providing marginally lower purchase price, while the seller is better-off by obtaining marginally higher purchase price. On the other hand, if the prevailing market conditions result in low purchase prices, a “black market” scenario might result, with cheap goods of poor quality. In this case, the buyer is better-off by providing marginally higher purchase price. Alternately, the seller is better-off by obtaining marginally lower price. In either market, higher enforcement costs lead to poor quality highlighting the importance of efficient mechanisms for redress.

Second, when there are several buyers, who each interact independently with the seller though individual enforcement, sellers target the quality expectations of the “average customer”, leaving some buyers with poorer quality than would be the case if other buyers were absent, while other buyers are able to free-ride and obtain higher quality. Further, a buyer with dominant market share is able to drive the supplier to provide higher quality, while if the market is split, with buyers of small market shares, the seller is able to provide poor quality. Thus, large buyers are able to drive the supplier towards providing high quality through economies of scale in the cost of enforcement.

Finally, in markets where buyers have the ability to enforce a “class action” on the supplier through a joint enforcement, quality is high and is driven by the buyer with the least enforcement cost. This result underscores the importance of government regulatory bodies, non-government organizations and consumer advocacy groups in quality improvements. As bodies with considerable knowledge and capital to pursue quality failures, they are instrumental in raising public awareness and lowering the costs of enforcing a contract. Concurrently, suppliers in such markets should be vigilant against quality lapses.

Managing the cost – quality tradeoffs inherent in decentralized supply chains presents unique challenges to managers. Instead of a myopic cost-driven focus, firms can

maximize their profits by considering the cost of poor quality while designing contracts, especially in situations where a class action is possible.