Managing a Responsible Supply Chain under Threat of Public Disclosure

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Over the recent years, there has been numerous reports about environmental or labor violations committed by suppliers of big brands. Every now and then, news about such violations is uncovered by NGOs or whistleblower employees, and finds its way to the media. Revelations such as these has increasingly become a big concern for multinational firms sourcing from these suppliers as it causes serious damage to their reputation and brand image. Apple, Nike, Macy's, Wal-Mart, and Mattel are only a few examples of big corporations publicly blamed for sourcing from irresponsible suppliers (because of their harm to the environment, poor and unsafe working conditions, use of prohibited and hazardous chemicals in their products, etc.), and have consequently suffered from negative media coverage.

Maintaining standards in environmental stewardship and labor practices has introduced a big challenge to established brands because the supplier in these situations is usually located in developing countries where corporate social responsibility regulations are lagging behind and the rule of law is generally weaker. To incentivize the supplier's compliance and mitigate the high risk of public disclosure, the buyer may resort to multiple levers ranging from more stringent monitoring and auditing measures to complex dynamic contracting which is contingent on the supplier's performance. This problem has received a great deal of attention from the OM community in the last few years, and valuable insights are drawn about the effectiveness of different levers in this framework.

In this paper, we analyze a game-theoretic model in which a downstream supply chain member (buyer) is interacting with an upstream member (supplier) over an infinite horizon, and is penalized disproportionately if the supplier's compliance violation is caught by a third party (e.g., an NGO). We assume a dynamic principal-agent setting in which buyer's ability to audit the supplier is limited. Instead, she only receives noisy signals about the supplier's violations in each period, and has to make decisions on relationship continuation/termination based on imperfect information. Specifically, we frame the problem as a repeated bilateral contracting (introduced in the economics literature) in which the two parties review their relationship periodically. While the supplier's actual compliance choice is hidden to the buyer, signals about his abuse of the environment or employees arrive to the buyer according to a Poisson process, the rate of which depends on supplier's action.

At the beginning of each contract renewal cycle, contract terms are determined by the buyer, which consists of wage and firing policy (this is referred to as efficiency-wage contracts in economics). After observing the contract terms, the supplier decides on the amount of effort he is willing to exert in order to enhance his compliance. We further assume that throughout each contract renewal cycle, the buyer has the option of partially subsidizing supplier's compliance enhancement investments. In particular, the more the supplier is subsidized for improving his practices the lower the rate at which violations occur.

Signals about supplier's performance are either learned through auditing by the buyer or elicited by a third party such as an NGO (or former employees, local watchdogs, etc.), and made available to the buyer. The accuracy of signals provided by the NGO depends on the intensity of its information collection process, which is assumed to be known to the buyer. Relationship continuation/termination at the end of the cycle is regulated by the firing policy and is based on buyer's assessment of the observed signals. In the case of relationship termination, the buyer incurs a search cost in order to find a new supplier whereas the supplier gets the continuation payoff of zero.

First, as intuitively plausible, we find that it is always optimal for the buyer to employ a threshold firing policy: if the number of violation signals reported to the buyer exceeds a certain number, then the relationship has to be terminated. While our model is more general, this result is also consistent with employment termination models studied in the economics literature. Similar to these models, we are also able to show that the efficiency of the contract in persuading the supplier to act more responsibly is non-monotone in its review frequency. On the one hand, having a shorter renewal cycle motivates the supplier to exert greater care since his gain from shirking over one cycle is small and the risk of losing business is closer in time. On the other hand, more frequent revisions (and over shorter time intervals), despite enabling the buyer to fine-tune the incentives, decreases the quality of information acquired over the time interval. This, in turn, may actually provide the agent with greater opportunities to evade.

More interestingly, we show that subsidizing the supplier to enhance compliance is not necessarily always productive, and may lead to an adverse effect. Specifically, a supplier that acts responsibly in the absence of such financial incentives from the buyer may find it beneficial to lower his responsibility effort when offered the subsidies. The intuition behind this finding is in parallel to what was described above about the impact of revision frequency, and is due to the stochastic nature of the compliance outcome. In particular, such incremental improvements in supplier's practices also entail reduction in the quality of information that the buyer receives, so that she no longer has sufficiently accurate information to base her firing decisions on. In this situation, the supplier may find it less likely to be caught if he shirks, and hence, is less motivated to comply by the buyer's demands.

Lastly, we investigate the tradeoff that the NGO faces between more stringent monitoring of the supplier's actions versus putting more effort into disclosing and publicizing violations, thereby imposing public punishment on the buyer. We specify how changes in these factors affect the buyer's as well as the supplier's payoff, and characterize conditions on model parameters under which more scrutiny from the NGO may actually backfire and lead to a worse outcome from a social perspective. Hence, we provide normative recommendations on where the NGO should focus its pressure to deter non-compliance depending on the specific characterizations of the corresponding supply chain.