Process improvements for sustainable performance in collaborative environments

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Abstract

Many firms have started evaluating their performance on the environmental, social and economic front after acknowledging the importance of triple bottom line framework of sustainability. Firms realize that being environmentally and socially responsible can improve their business values, and therefore will impact the economic performance. In order to attain sustainability on these three fronts, firms engage in process and product related improvements. We address three problems of environmental, social and economic sustainability of firms in three essays by developing stylized analytical models to study collaborations between a firm and external entities such as regulator, competitor, and partner. In the first essay, we explore an interaction between the government and firm(s) on the environmental aspect of sustainability. The environmental pollution caused by the production and usage of products is of great concern in the current global scenario. Environmental regulation is considered to be one of the promising solutions to reduce environmental pollution. We formulate an analytical model where the government decides an environmental tax which maximizes the social surplus and firm(s) react to the tax by changing product and process level greening to improve environmental performance. Firms also decide prices of products. Our analysis indicates that imposition of environmental tax could be counterproductive as it may worsen environmental performance by increasing emission. We analyze environmental performance of the firm(s) in the absence of environmental tax, and we find that the competition could act as a substitute for environmental regulation in improving environmental performance. In the second essay, we develop and solve an analytical model to study buyer-supplier collaborations that can potentially improve safety standards of the supplier's manufacturing facility. Workplace safety has always been considered important from an individual firm's perspective. However, for a buyer, the supplier's workplace safety has come to fore due to several accidents such as Rana Plaza building collapse in Bangladesh. In this essay, we formulate a problem where the buyer and the supplier decide their level of effort on safety improvement at the supplier's facility. We analyze and compare three policies; for the first policy, buyer and supplier jointly collaborate to improve the safety at supplier's manufacturing facility (this policy is named Accord by the proponents). For the second policy, the buyer supports the supplier by providing external funding (this policy is named Alliance in the industry). The third policy is the base policy under which the buyer does not provide any support to the supplier on the safety front. Using an analytical framework, we determine and characterize buyer's and supplier' preferences of one policy over others. We also find that a supplier may not invest in safety at supplier's facility resulting in reduced effectiveness of buyer's support. The third essay deals with improving the economic sustainability of a firm by outsourcing its services. We formulate and analyze collaboration between a service provider and a client for delivery of IT services. The client engages in marketing while the service provider contributes to service quality. Moreover, there is uncertainty about the capability of the service provider. The client determines the retail price and marketing efforts while the service provider makes the decisions concerning quality improvement efforts and process improvement efforts. The total revenue earned, which is shared in a fixed and predefined proportion, depends on the efforts of both players. We analyse the impact of revenue-share proportion and the service provider's capability on firms' decisions. We find that the service provider (client) may not exert any effort on service quality (marketing) which would result in an undesirable outcome for the client (service provider).