

INVESTMENT INCENTIVES, COORDINATION AND CONTRACTS FOR SUPPLY CHAIN SHARED RESOURCES*

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ABSTRACT. Supply chain management challenges in practice the conventional intuition on organization and organizational interfaces between chain members. On the one hand, the requirements on cost efficiency and lead-time performance force supply chains to coordinate more closely through the exchange of information, arbitration of planning decisions or the utilization of joint resources in production, inventory and distribution. On the other hand, shortened product and process life cycles, leading to short and relatively risky production generations, make classical solutions to implement such coordination schemes, e.g. vertical integration or full commitment contracts, less attractive or unfeasible. In practice, such as in the highly leveraged IT or telecommunications sectors, the coordinating OEMs (original equipment manufacturers) frequently delegate to contract manufacturers (CM) to interact with upstream suppliers as to coordinate the manufacturing of modules, packaging, testing standards etc. The arrangement can be justified as efficient if the CM is better informed about certain costs and consequences of an investment at upstream suppliers. However, other streams of literature (Agrell et al. 2005) have found support for distortions in the inventory coordination from delegated control using frequently used contracts under asymmetric information in a three-level setting. In this paper, we investigate a dimension that has received less attention in the supply chain coordination literature, namely the centralization or delegation of investment decisions in shared resources. The particular problem we study is the organizational and contractual choice of a supply chain coordinator (say an OEM) to either control or delegate the investment decision of some shared resource (say dedicated machines, information or product standards etc) to a contract manufacturer (CM) or to an upstream supplier in a three-stage supply chain. The investment is distinguished in terms of its character is substitute and complementary investments, demand is considered deterministic and known by the coordinator in a single-period model.

We present a formal model to investigate three prevalent scenarios; the full integration CM-supplier, a decentralized scenario where the OEM provides an incentive scheme to the CM to invest on behalf of the chain, possibly with subsequent outsourcing of the investment to the supplier from the CM, and a centralized scenario with parallel regulation of both CM and supplier substitute investments. For each scenario, we determine optimal investment policies for the profit-maximizing CM and supplier under control or incentives. The evaluation criterion is the generated supply chain surplus, measured as the proportion of coordination increasing investments that are undertaken. The findings suggest that optimal coordination can be designed as a menu of contracts, which supports anecdotal evidence in the electronics industry that usually has been explained using arguments related to asymmetric information and mitigation of market power. The paper ends with some managerial conclusions for the scenario and suggestions for future research in the area.

KEYWORDS Supply chain, coordination, investments, contracts, organization.

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