

Infrastructure Sharing Synergies: Optimal Capacity Oversizing and Pricing

Authors : Robin Molinier

Abstract : Industrial symbiosis (I.S) deals with both substitution synergies (exchange of waste materials, fatal energy and utilities as resources for production) and infrastructure/service sharing synergies. The latter is based on the intensification of use of an asset and thus requires to balance capital costs increments with snowball effects (network externalities) for its implementation. Initial investors must specify ex-ante arrangements (cost sharing and pricing schedule) to commit toward investments in capacities and transactions. Our model investigate the decision of 2 actors trying to choose cooperatively a level of infrastructure capacity oversizing to set a plug-and-play offer to a potential entrant whose capacity requirement is randomly distributed while satisficing their own requirements. Capacity cost exhibits sub-additive property so that there is room for profitable overcapacity setting in the first period. The entrant's willingness-to-pay for the access to the infrastructure is dependent upon its standalone cost and the capacity gap that it must complete in case the available capacity is insufficient ex-post (the complement cost). Since initial capacity choices are driven by ex-ante (expected) yield extractible from the entrant we derive the expected complement cost function which helps us defining the investors' objective function. We first show that this curve is decreasing and convex in the capacity increments and that it is shaped by the distribution function of the potential entrant's requirements. We then derive the general form of solutions and solve the model for uniform and triangular distributions. Depending on requirements volumes and cost assumptions different equilibria occurs. We finally analyze the effect of a per-unit subsidy a public actor would apply to foster such sharing synergies.

Keywords : capacity, cooperation, industrial symbiosis, pricing

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