

**Choice of Product Architecture, Product Quality,
and Intra-Firm Coordination:
Theory and Evidence**

by

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Abstract

Coordination within organizations has been recognized as an issue of central importance in the organizational economics literature, where the degree of interdependence between individuals' actions is taken as given. In reality, however, the degree of interdependence is affected by the choice of an organization's strategy, and hence there are inter-relationships among the interdependence of individuals' actions, their ability to coordinate actions, and the choice of the organization's strategy.

We explore these inter-relationships by focusing on coordination between engineers. In our theoretical model, we consider a firm that designs and sells a product which consists of two components, 1 and 2. Engineer i ($i = 1, 2$), who is in charge of the design of component i , attempts to maximize component i 's quality (local quality). The degree to which designs of different components interact with each other is a key determinant of success in product development. In this context, previous research on product design has found that *product architecture* is a useful concept. In our model, a firm can increase the product's global quality by increasing the integrality of the product's architecture. Higher integrality, however, also increases the degree of interaction between the two components' designs, making coordination between engineers more important. We hypothesize that the longer the engineers work together the better they can coordinate their actions.

Our model yields the following testable prediction: "As consumers' valuation of product quality increases, the firm invests more to reduce engineers' turnover rate. A lower turnover rate, in turn, increases the integrality of the product architecture." We investigate this prediction by analysing data we collected through administration of questionnaire surveys to manufacturing and software companies in Japan, Korea, and China. A novelty of our questionnaire survey is that it measures the integrality of product architecture with a continuous variable ranging from 0 to 100, whereas previous studies on product architecture are based on a dichotomy of modular or integral architecture. We test our prediction by the two-stage least squares procedure, and find empirical supports in Japan and China but not in Korea. We discuss possible reasons for the lack of empirical support in Korea.