

Product Architecture, Organizational Design, and HRM Practices:

Comparing Japanese, Korean, and Chinese Firm



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Why Do East Asia and Product Development Matter?

East Asia is now the center for the research and development (R&D) and manufacturing of high-tech products. East Asia's economic emergence during the 20th century rested on its role as a cheap base for manufacturing. However, since the beginning of this century, East Asia has started to become increasingly important also as a base for research and product development.

Why Do East Asia and Product Development Matter?

However, there are relatively few international comparative studies that examine product development activities by East Asian firms. In addition, there are hardly any international comparative studies that compare the management of human resources in charge of knowledge creation and knowledge transfer taking place in the development process.

What We Know

For example, it is well known that in the Japanese auto industry (especially Toyota), product development practices involve long-term employment and the adoption of project-based organization with a project manager who has considerable authority and is in charge of coordinating the development process.

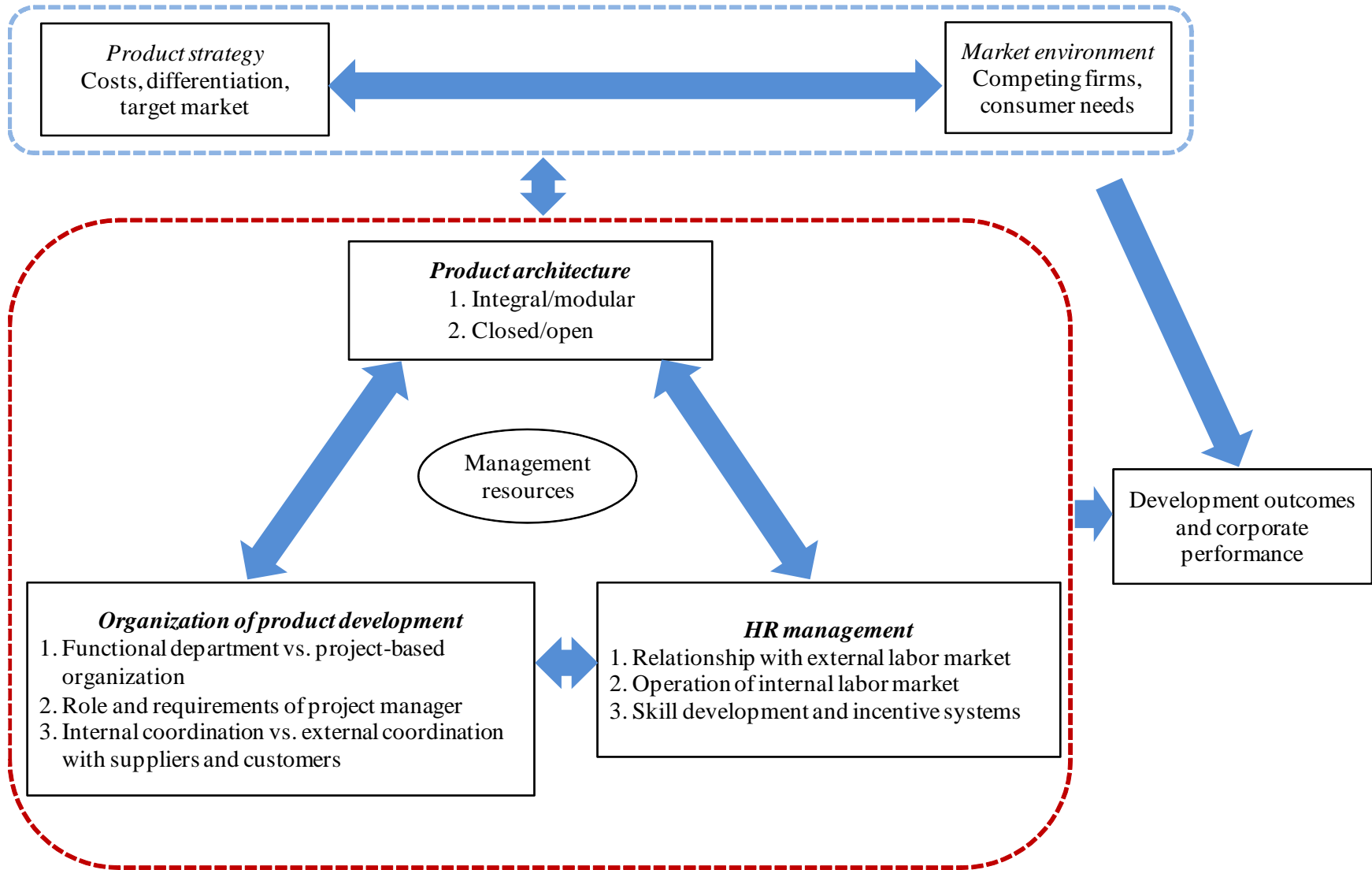
What We Don't Know

However, how do firms in Korea and China organize such activities? Moreover, is there something that Japan could learn from practices in Korea and China? Does Japan's experience hold any lessons for the other two countries? To date, there are few answers to these important questions for the global economy in the 21st century. This lecture is an attempt to provide a few clues.

Three Hypotheses

- *Hypothesis 1*: Firms strategically choose their product architecture, taking into account factors such as internal management resources and external product market conditions.
- *Hypothesis 2*: Firms strategically choose their organizational design for product development activity reflecting their choice of product architecture.
- *Hypothesis 3*: There is a complimentary relationship between the chosen product architecture and the organization of product development on the one hand and HR management practices on the other.

Figure 1. Causal Loop Diagram: Product Development and HR Management



Definitions of Key Words

Modular/ Integral Product architectures can be distinguished in terms of whether they are “modular,” where there is more or less a one-to-one relationship between a particular function and a particular part, or “integral,” where the relationship between particular functions and parts is more complicated.

Open/ Closed With regard to interface design rules, one can distinguish between “open” design rules, which are standardized beyond a particular firm, and “closed” design rules, where the design rule is limited to a particular firm.

Methodology

- **Case Studies** To make comparisons of the three countries, it is essential to focus on the same product. Otherwise, it is not clear whether similarities and differences between the three countries are the result of differences between the countries or of differences between the products. Thus, we focus on a representative major corporation from each of the three countries manufacturing cellular phones, liquid crystal televisions (TVs), and business information systems.

Methodology (cont.)

- **Questionnaire Survey** Case studies provide important anecdotal evidence to better understand patterns in Japan, Korea, and China. Additionally, we also conducted a firm-level questionnaire survey in order to allow us to examine these issues from a quantitative perspective. The survey questionnaire was identical for all three countries, and the actual survey was conducted after a pretest. **See Table 4.**

Hypothesis 1

Firms strategically choose their product architecture, taking into account factors such as internal management resources and external product market conditions.

Hypothesis 1 \Rightarrow Result 1

1. **Case Studies See Tables 1-3.** For all three product categories that we focused on – cellular phones, liquid crystal TVs, and information systems – the case studies provided support for the hypothesis that firms strategically choose their product architecture. Each firm deliberately chooses whether it employs an integral or a modular architecture depending on the level of accumulated technological capabilities and skills as well as the product market situation (e.g., whether the firm targets the high-end or the low-end market).

Hypothesis 1 \Rightarrow Result 1 (cont.)

2. **Questionnaire Survey** See Table 5; Tables 6-8. The survey results showed that although in China there is a strong tendency toward the use of modular architectures, in all three countries – Japan, Korea, and China – there is considerable variation in the use of modular and integral architectures and no particular product architecture dominates even in the same industry and among firms of a similar size. In other words, the hypothesis was supported that product architecture is not something that is exogenously determined by, for example, industry characteristics, but instead is strategically chosen by firms depending on a number of factors at a particular time.

Hypothesis 2

Firms strategically choose their organizational design for product development activity reflecting their choice of product architecture.

Hypothesis 2 \Rightarrow Result 2

1. **Case Study See Tables 1-3.** The case studies showed that in the case of information systems, where product architectures have a strong modular flavor, product development tends to be organized within functional departments. On the other hand, in the case of cellular phones and liquid crystal TVs, which tend to have a strong element of integral product architectures, product development tends to be organized within cross-functional projects. Moreover, the case studies also showed that the higher the degree of integrality, the stronger is the authority of the project manager (i.e., there is a heavyweight project manager).

Hypothesis 2 \Rightarrow Result 2 (cont.)

2. **Questionnaire Survey** See Tables 9-11. The questionnaire survey found that for Japan and China, there appears to be a complementary relationship between integral product architectures and cross-functional project-based product development on the one hand and modular product architectures and product development within functional departments on the other. However, for Korea we did not find such a relationship.

Hypothesis 3

There is a complimentary relationship between the chosen product architecture and the organization of product development on the one hand and HR management practices on the other.

Hypothesis 3 ⇒ Result 3

1. **Case Study See Tables 1-3.** With regard to product architecture and HR management practices, the case studies showed the following complementary relationships: (a) integral architecture is associated with an emphasis of internal training, skill development from a long-term perspective, and the provision of incentives, and (b) modular architecture is associated with an emphasis of mid-career recruitment and provision of incentives from a short-term perspective. However, we were not able to clearly detect a complementary relationship between the organization of product development and HR management practices.

Hypothesis 3 \Rightarrow Result 3 (cont.)

2. **Questionnaire Survey** See Tables 12-14. The questionnaire survey showed that at Japanese firms, there tends to be a correspondence between long-term employment and integral architectures, while at Chinese firm, there tends to be a correspondence between short-term employment and modular architectures. On the other hand, for Korean firms, such corresponding relationships seem to be much rarer.

Implications for Japan

The integral product architecture employed by Japanese firms is closely linked with HR management practices focused on the long-term. While this itself is evidence of complementarity, it is possible that in recent years, with the long-term orientation of HR practices at Japanese firms taken as an “unshakeable premise,” this has given rise to a reverse causality, where it is such practices that are the reason for choosing integral product architectures. That is, it may reflect a situation where firms adopt an integral product architecture because they have a high level of technology accumulation and have a lot of employees with great technical know-how as a result of their long-term employment practices.

Implications for Japan (cont.)

While this may have been a viable strategy when the domestic economy was growing strongly and there was little competition from abroad, this is no longer the case. Japanese firms are confronted with changing product market conditions and the emergence of rivals from Korea and China. It appears to be time for a strategic adjustment of product architectures and HR management practices. In addition to choosing their product architecture more flexibly – using an integral or a modular architecture as the situation requires – Japanese firms can learn from Korean global players with regard to combining mid-career recruitment and hiring of new graduates as well as short-term and long-term employment.

Implications for China

With regard to Chinese firms, we would like to suggest that in order to increase the sophistication of their products and adopt integral architectures, skill development from a long-term perspective, higher employee retention, and the provision of incentives will be important. In other words, the institutionalization of an internal labor market will be important. In fact, with labor laws and regulations in the process of being revised, the overall direction for employment in China is a transition from fixed-term contracts to indefinite employment as found in Japan. This means that Chinese firms anyway will need to adopt HR management practices that take a long-term perspective.

Implications for Korea

Korean global players in recent years have been in extremely good shape. However, they nevertheless also face a number of challenges.

First, in the development of products with an integral architecture, greater coordination between product development and manufacturing as well as the identification and solving of problems during earlier phases of product development (front-loading) will be necessary. However, the interviews we conducted suggest that there were problems in the coordination between development and production departments. The likely reason is that incentives reward the achievements of individual departments, thus promoting opportunistic behavior by departments. This will eventually have to be corrected.

Implications for Korea (cont.)

Second, project managers (PMs) in Korea generally tend to have substantial authority, but to some extent this reflects the fact that PMs have to take on duties beyond their normal responsibilities. Put simply, in order to compensate for the lack of personnel, the PM often has to shoulder the work of others. In consequence, the workload of PMs is often excessive and a situation is developing where there are not enough people willing to be PMs. Thus, Korean firms need to strengthen their HR development with a view to nurturing future project managers.