Organizations for Global Simultaneous New Model Launching: Toyota’s GPC and Hyundai’s Pilot Center

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Abstract: Simultaneously launching new models globally becomes a problem with an increase in global production. Although Toyota Motor Corporation and Hyundai Motor Company have different production systems, they have almost at the same time created organizations with similar functions to solve the problem of simultaneously launching new models globally. These organizations are Toyota’s Global Production Center (GPC) and Hyundai’s pilot center. Both were new organizations with their own pilot production lines instead of conventional mass production lines. However, Toyota’s GPC, which is a part of the mother factory system, plays a complementary role vis-à-vis the company’s domestic plants, while at Hyundai’s pilot center, which is a part of the model factory system, the pilot center functions independently of the domestic plants. This is how Toyota reduces the burden on its competitive mother factories in Japan, while Hyundai opts to maintain a distance from its domestic factories, which are not
Introduction

Economic globalization encourages companies to have production facilities overseas, not just in their home countries. One problem brought about by increased overseas production is that of launching new models, more precisely, simultaneously launching new models globally.

This paper deals with process engineering as it relates to mass production. Process engineering transforms product design information into information assets required for the manufacturing process, such as tools and dyes, machinery, process management software, workers’ skills, and standard operating manuals (Clark & Fujimoto, 1991). At that time, some prototypes are produced on a pilot basis to confirm the appropriateness of machinery, molds, and tools. If this process meets acceptable levels of performance, then mass production is formally inaugurated.

Many companies start overseas production of new models only after establishing their domestic production methods at the home country. However, doing this is problematic, as it delays the launch of the new models overseas. With increasing global competition, new models are required to be introduced into the overseas markets as quickly as possible and the simultaneous global launch of new models is essential for it. Also, when companies have a string of models being developed specifically for the overseas markets, it is too much of a burden to manage all new model launches from the domestic factories.
Prior research on overseas production has focused on how to best develop and invest in products that meet the needs of overseas markets (Amano & Shintaku, 2010; Kim, 2013) or on how companies can create competencies at their overseas production locations (Oki, 2011, 2012). However, little attention has been paid to the related issue of launching overseas production of new models.

This article is a comparative analysis of Japan’s Toyota Motor Corporation with South Korea’s Hyundai Motor Company to investigate how these two companies handle the simultaneous launch of new models worldwide. Toyota and Hyundai have been noted as having very different production systems (Jo, 2005, 2016; Suh, 2012a, 2016). Although their production systems are different, they both created new organizations with similar functions around the same time in 2003: Toyota Motor Corporation with its Global Production Center (GPC) and Hyundai Motor Company with its pilot center. By launching these organizations in their respective home countries and creating new pilot production lines, they are considered to have solved the problem of simultaneously launching new models globally.

Both organizations have pilot production lines that are separate from the mass production lines, and these pilot lines both create prototypes and engage in process development. However, while at the first glance these organizations appear to be similar, they were born out of different backgrounds. The role played by Toyota’s GPC complements that of the company’s domestic factories, while at Hyundai, which uses a model factory system, the pilot center functions independently of the domestic factories. A detailed comparative analysis of these differences can shed light on the relation between these companies’ production systems and their domestic organizational support for overseas production activities.
The Case of GPC

Suh (2012b) explained the launch of new models overseas through Toyota’s GPC organization. At Toyota Motor Corporation, mother factory’s support is needed for overseas plants to change over from the old production models to the new production model. New models developed in Japan’s development division are first produced on a trial basis by the mother plant’s mass production lines, where production methods and line layouts appropriate to each vehicle are determined. After that, knowledge regarding the new model’s production method, as determined by the mother factory in the home country, is transferred to the overseas factories. In other words, when switching to a new model, the mother factory produces the model before the overseas factories do, and the experiences and knowledge gained by the mother factory are transferred to the overseas factories.

However, when changing models under this system, the overseas factories always change after the home country’s mother factory, which creates the problem of delayed model changes. In addition, sending knowledge about mass production of new models from the mother factory to overseas factories requires a great deal of personnel support for the overseas factories in transferring the knowledge.

With the rapid increase in its overseas production, Toyota set up the GPC in 2003 only to solve this issue. The GPC has many objectives, one of the most important one being to solve the issue of launching new models. The GPC’s facilities are located within the boundaries of Toyota’s Motomachi plant, and its body, paint, and assembly pilot lines assist the pilot production process for mass production during model changes.

When mass producing new models globally, all workers in the plants scheduled to produce that model will group into GPC pilot lines to prepare for mass production. This makes it possible for workers in the overseas factories as well to participate in the process.
of preparing for mass production and directly gain knowledge related to mass production of that vehicle using the new model. Overseas workers who have gained knowledge by participating in pilot line production at the GPC can then launch the new models simultaneously upon returning to their overseas factories.

This reduces the burden of the mother factory and the company can shorten the time it takes to launch new models overseas. However, it must be noted that those in the mother factory are the ones who lead pilot production process and solve production-related problems.

The Case of Pilot Center

Hyundai Motor Company’s Namyang institute (R&D Center) in South Korea has the overall responsibility for development of automotive technologies. The company established a pilot center there in 2003. The pilot center has two major functions. First is the production of prototypes, which entails development of the molds and components needed to make prototypes, digital design validation, and building of prototypes, which are then handed over to the testing team.

The second function is the development for mass production. Line No. 1 was built in the pilot center in 2003, followed by two more lines. Prior to the actual production of a vehicle after the development, the pilot center replicates the mass production process to find out ahead of time whether any problems will arise along the way. When a new model is being developed, the center conducts quality improvement activities and 6M (man, machine, material, method, morale, and measurements) testing. It also offers assembly training for workers in the domestic and overseas plants.

Approximately 300 production workers work at the pilot center. The center initially began with 30–40 people being shifted
from the domestic plants, but today, most of its production workers are hired to work expressly for the pilot center. The production work consists simply of the work involved in producing pilot cars, with no responsibility of problem solving. The engineers are responsible for problem solving and the resultant design changes. These engineers also initially came from the domestic factories, but the ratio of the newly hired engineers at the pilot center has been rising (Jo, 2016).

According to Shioji (2012), the Namyang institute has three pilot lines, so it can work on three prototype models simultaneously. In terms of capacity, in three months the center can reportedly build about 50 units of each development prototype. Building prototypes in the existing factories requires the shutdown of existing lines, which means that existing production lines cannot be freely used for prototypes. Pilot lines can be freely used for prototypes, which improves the efficiency of the test model building process and can reduce the time required for development.

As for quality assurance and pilot production runs, team leaders and group leaders from overseas factories are brought to the pilot center along with people from the domestic manufacturing, production control, production technology, quality, and purchasing divisions, to confirm assembly work and evaluate problems from every possible aspect. This also reduces the time it takes to launch the new models in the overseas factories.

**Discussion**

Toyota Motor Corporation’s GPC and Hyundai Motor Company’s pilot center are both domestic organizations created to deal with the issue of simultaneously launching new models globally. The two organizations constructed pilot lines that are independent of the domestic plants, and the production methods (knowledge) for new models created by gathering workers from across the world to launch
new models can be quickly disseminated to both domestic and overseas production locations. Kim (2013) emphasized the role that overseas engineers participating in the domestic development process play in connecting domestic knowledge about technology with knowledge about overseas markets. In the cases discussed in this article, having overseas production floor (in Japanese, *gemba*) workers participate in the new model launch process is viewed as linking domestic and overseas knowledge.

Clark and Fujimoto (1991) categorized pilot production for launching new models into three patterns: (a) pilot production done in separate pilot plants; (b) pilot production done on separate pilot production lines within a plant; and (c) a parallel production process that combines new and old models using a plant’s regular production lines for pilot production. In the cases of Toyota and Hyundai highlighted in this article, both companies moved from (c) to (a). With (c), the companies were unable to transition smoothly from an old model to a new one without the experience and knowledge of mixed model production, and this harmed their commercial production and competitiveness.

However, different factors and objectives led to the creation of these two organizations. Toyota’s GPC was created not only to help solve the problem of launching new models, but also to make it easier for domestic plants to support overseas plants. The goal was to maintain the influence of the domestic plants while lessening their burden. In contrast, Hyundai’s pilot center was created to solve the problem of how to launch new models and to detach pilot production function from domestic factories. These organizations’ locations are emblematic of these differences. Toyota’s GPC is located within a domestic plant complex (the Motomachi factory), while Hyundai’s pilot center is located in a domestic research center away from domestic factories.

Such differences are likely due to the differences in the relations
between Toyota’s and Hyundai’s domestic and overseas operations. According to Suh (2016), who did a comparative analysis of the relations between domestic and overseas factories at Toyota Motor Corporation and Hyundai Motor Company, Toyota has supported overseas factories using the mother factory system, while Hyundai has used the model factory system. These systems differ as to who takes the lead in knowledge transfer: domestic factories or corporate headquarters. Under the mother factory system, domestic factories play the central role in knowledge transfer, while in the model factory system knowledge transfer is done by the corporate headquarters. This setup is also evidenced in the relations between domestic and overseas sites with respect to the process for launching new models. The GPC plays a complementary role in that function, while domestic factories have the central role. The pilot center functions independently of the domestic factories. The significance of domestic factories in the mother factory system and the importance of corporate headquarters in the model factory system have also been maintained in these companies’ organizations for launching new models.

In fact, both the mother factory system and the model factory system can be seen as having been created due to the differences in the competencies of the domestic production floors (gemba) and production systems and the impact that these differences had on the organizations for launching new models. The Toyota Production System is characteristic of a mixed production system (MPS), and its production floor (gemba) is very flexible with respect to the change (Fujimoto, 1997, 2012; Monden, 2006; Suh, 2015). In contrast, although the Hyundai Motor Company’s production system uses MPS methods, it is not seen as being very responsive to changes on the production floor (gemba) (Jo, 2005, 2016; Suh, 2012a, 2016). In particular, Hyundai Motor Company’s domestic labor structure is rigid. The most important part for production is the adjustment of
man/hour of works. On Hyundai’s production floor, discussion with all labor unions is required for every adjustment, which inhibits flexibility on the production floor (Suh, 2012a). Shioji (2012) asserts that Hyundai set up pilot lines in the Namyang institute so that it would not have to use the existing factories and because it was difficult to make models in the existing domestic factories.

**Conclusion**

This article has dealt with the issue of launching new models when a company’s production sites are spread around the world. Both Toyota Motor Corporation and Hyundai Motor Company formerly produced pilots of new models in their existing domestic factories and then moved mass production to overseas factories, and both companies established new organizations around the same time, with similar functions to deal with the issue of simultaneously launching new models globally. Toyota’s GPC and Hyundai’s pilot center now simultaneously launch new models globally by having overseas workers participate in producing prototypes on pilot lines that are separate from their mass production factories. However, although the two companies had the same responses in changing their patterns of pilot production, they differed in the underlying competitiveness of their production floors (gemba). Toyota’s response was to reduce the burden on its competitive domestic mother factories, while Hyundai’s response was to create distance between its domestic factory and the overseas pilot production organization because its domestic factories were not able to serve sources of competitiveness. Table 1 summarizes the two organizations’ similarities and differences.
**Table 1. GPC and pilot center**

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<thead>
<tr>
<th>Common</th>
<th>Toyota’s GPC</th>
<th>Hyundai’s pilot center</th>
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<tbody>
<tr>
<td>Purpose</td>
<td>Global simultaneous new model launching</td>
<td>Global simultaneous new model launching</td>
</tr>
<tr>
<td>Facility</td>
<td>Independent pilot production line</td>
<td>Independent pilot production line</td>
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<tr>
<td>Location</td>
<td>On the land of domestic factory</td>
<td>On the land of domestic R&amp;D center</td>
</tr>
<tr>
<td>Background</td>
<td>For reducing burden of domestic factory</td>
<td>For separate pilot producing function from domestic factory</td>
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<td>Differences</td>
<td></td>
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<tr>
<td>Human resources</td>
<td>From domestic factory</td>
<td>New recruitment</td>
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<td>Problem solving and kaizen</td>
<td>Engineer &amp; worker</td>
<td>Engineer</td>
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<tr>
<td>Domestic-foreign factory relation</td>
<td>Mother factory system</td>
<td>Model factory system</td>
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<td>Flexibility of production floor</td>
<td>Flexible</td>
<td>Lack of flexibility</td>
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References


