Understanding Path Dependence Management in Indonesian Automotive Industry: Narrative from Toyota Case

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ABSTRACT
Learning path dependence of managerial and manufacturing technology from a parent company is significant in understanding the technological and managerial trajectory of its automotive subsidiaries elsewhere. This paper discusses the path dependence management of Toyota Indonesia by focussing on the knowledge transfer process. Using a qualitative case study approach by highlighting TPS (Toyota Production System) for lean production management, this paper contributes to managerial production in the automotive industry.

Keywords: Path dependency, knowledge transfer, automotive industry, Toyota Way, Toyota production system, lean production

INTRODUCTION
Toyota’s success story has caught the attention of the world in the 1980s, when it became clear that there was something special about the quality and efficiency of the Japanese production system. Furthermore, in 1990s, it became noticeable that there was something more special about Toyota compared to the other automakers in Japan (Liker & Meier, 2006; Fujimoto, 1999; Womack, Jones & Roos, 1991; Ohno, 1988).

The secret of Toyota’s success is the consistency of Toyota’s performance as a direct result of operational excellence. In fact, Toyota has turned operational excellence into its strategic weapon. Nevertheless, tools and techniques are not a secret weapon for transforming business (Liker, 2004), as Toyota achieves continued success at implementing these tools stems from a deeper business philosophy based on understanding of people and human motivation. Thus, its success is ultimately based on its ability to cultivate leadership, teams, and culture, to devise strategy, to build supplier relationships, and to maintain a learning organization (Liker & Meier, 2006; Liker, 2004, Irawati, 2010).

Toyota Motor Manufacturing Indonesia (TMMIN) has experienced a long way journey through managerial and technological trajectories which implemented in knowledge transfer process. Accordingly, the underpinned research questions for this paper are as follows:

1. How is the process of knowledge transfer in Toyota’s Indonesian production network?
2. To what extend the path dependency process is regarded as a successful lean production management?

This paper proceeds as follows. The following section gives an overview of path dependence for Toyota. The third section discusses the Toyota’s trajectories in technology and management in Japan. The fourth section is
methodology. The fifth section is the discussion and findings of path dependency in Toyota’s Indonesian production network in the case of the Kijang project. Finally, the paper ends with the conclusion.

LITERATURE REVIEW: PATH DEPENDENCY IN LEAN PRODUCTION MANAGEMENT

The concept path dependence originates with the desire of evolutionary economists to account for the factors, which determine the selection mechanisms that exist within the process of technological choice and the natural trajectories that emerge from those patterns (i.e. management). Brian Arthur (1994) and Paul David (1997) used path dependence to explain how and why certain technologies emerged and prevailed over competing technologies in periods of rapid innovation when a number of alternative technological designs characterized the market place.

Paul David (1997) defines a path dependence sequence of economic changes as one in which important influences upon the eventual outcome can be exerted by temporally remote events, including those dominated by chance elements rather than systematic forces. He further suggests that in a dynamic process, positive feedbacks are generated by strong technical complementarities on the supply side of markets, or the independence of customer preferences operating on the demand side.

The lean production system through knowledge transfer has become a path dependence study in the automotive industry. In the automotive industry case, these may arise as well from learning effects and habituation associated with the sunk cost effects of new technologies-such as those involved in learning how to use a new programme (Irawati, 2010).

In conjunction with the nature of the global business network of Japan in the automotive sector, the principal channels of international technology transfer are licensing, franchising, foreign direct investment, joint ventures, subcontracting, cooperative research arrangements, and co-production agreements.

In view of that, to make research manageable, this research applies a narrower definition of formal channels which defines technology transfer in the automotive industry as a process by which expertise or knowledge related to some aspect of technology is passed from one user to another for the purpose of economic gain.

The case studies in the automotive industry make clear that the Japanese MNEs have extended important influences upon the global automotive industry and indirectly upon knowledge transfer process in subsidiaries. It is when Japanese industrial organization models are transferred abroad that they influence the modes of technology transfer and systems for local skill formation in particular place (i.e. automotive cluster). At the same time, however, Japanese industrial organization models show a strong ability to adapt themselves to local conditions (Irawati, 2010).

METHODOLOGY

This research uses the explanatory case study method to answer the proposed research questions. The explanatory case study is chosen as it allows the researcher to concentrate on a specific instance, that is, the Indonesian automotive industry, in an attempt to identify detailed interactive processes. An explanatory case study is a sensible method to use in international business and management studies, where cross-cultural understandings (such as the Japanese business characteristics in the automotive keiretsu) are a necessary element to be taken into account.

The primary data from research in Indonesia has been collected from the archive evidence, ongoing email correspondence, phone interviews with employees of Toyota in Indonesian and other relevant represent throughout the data analysis process. A qualitative approach has been used to analyse the data. In each case, the management representatives included the Head
Office and other senior (Marketing and Project Development) managers who are regularly involved in the development of car assembling-operational and trading. On the employee side, in each case employee representatives (i.e. engineers) who are members of the select committee have been interviewed.

KNOWLEDGE TRANSFER IS A MANAGERIAL AND TECHNOLOGICAL TRAJECTORY: PATH DEPENDENCE IN INDONESIAN CASE

In Indonesia, applying the Toyota Production System (TPS) in the shop floor has been done gradually over the last three decades (Irawati, 2010; Irawati & Charles, 2010). Toyota Indonesia has developed long path dependence, both in technology and management since 1971, where the establishment of PT Toyota-Astra Motor (TAM) as importer and distributor of Toyota vehicles has had been approved by the Indonesian Government. Additionally, Indonesia has become not only a springboard for Toyota's products to Western European and North American markets, but is itself one of the fastest growing markets for Japanese products. Toyota’s technology transfer to Indonesia has been designed to strengthen and develop its ties with this country.

Specifically, technological and managerial trajectories in terms of the automotive sector in Toyota Indonesia can be classified into two broad categories: capital-embodied and labour-embodied. Capital-embodied technology is intrinsic to various production processes such as casting, forging, metal-cutting, welding, pressing, etc. On the other hand, labour-embodied technology includes: (1) skills and know-how in the operation of specific processes, (2) the ability to understand capital-embodied technology (which is the ability to maintain and repair machines and equipment, and this applies to elementary level employees) and (on a more advanced level) the ability to devise alternative processes and equipment in response to various economic and engineering needs, (3) the capacity to design or re-design products, processes and plants, and (4) the ability to innovate and to develop new production techniques.

In the automotive industry, transfer of technology commonly happens between the parent company and the host company. The process itself does take time as it is not simply technology per se but also involves human interaction, which in turn involves absorptive capacity. The nature of the technology that Toyota transfers to advanced industrialized countries is fundamentally different from that of the technology transferred to Indonesia as a developing country (Irawati, 2010). Technology transferred to the advanced industrialized countries largely consists of patented high-level technology; while that transferred to the developing countries is mainly modernization experience and skills closely related to standardized production methods.

The scope of a typical technology transfer contract usually covers production, management, and marketing. The various production activities that Toyota Motor Corporation has transferred to Toyota Indonesia include: material selection, selection and installation of equipment, plant layout, assembly methods, machine operation, training of personnel, maintenance techniques, provision of technical data, quality and cost controls, and inventory management (Irawati, 2010).

Moreover, technology recipients (e.g. Toyota Indonesia) tend to require foreign investors to be involved in the initial stages of production. Many developing countries do not usually recognize the economic value of industrial expertise and tend to regard this as a free service that should accompany the purchase of machinery and equipment. Therefore, Japanese car producers found it necessary to obtain sufficient compensation for their technology through capital ownership and direct management of their foreign investment.

As most technology transferred by Japanese car producers to Indonesia is related to labour-intensive industries, labour training occupies a prominent position in the Japanese strategy of technology transfer. For this reason, on-the-job
training (OJT) has been considered by some as Japan’s ‘inner mechanism of technology transfer’.

OJT not only provides technical and administrative knowledge to employees, but also coaches them on how to have higher motivation and better discipline so that the process of never-ending quality improvement (kaizen) can be fulfilled. Unlike European and American companies, which utilize written manuals and detailed job descriptions, Japanese car producers support their production management methods and their technical training all through OJT.

Moreover, Toyota has different approaches towards technology transfer (Liker & Meier, 2005; Toyota, 2007). Most Europeans and American companies will pull back their technical advisers when the factory runs smoothly, and the local employees will only need to follow manuals carefully (Ozawa, 2005). In contrast, in Japanese automotive affiliated companies, technical advisers tend to stay even after good operations have been achieved. They will continue to train the employees step-by-step in productivity and quality control, maintenance and repair, utilisation of new production methods and new technology, as well as other production-related skills (Chen, 1996; Ozawa, 2005; Fujimoto, 2007).

Accordingly, in the automotive industry, Japanese car producers, notably Toyota, are currently the main sources of mature technology transfer to Indonesia. Industrial expertise and know-how have been the primary transfer while foreign direct investment constitutes the most widely used transfer channel. Meanwhile, traditional Japanese OJT management has commonly been used to ensure the success of the transfer process.

As a result, the process of transfer is beneficial for Toyota and its host country, since Toyota needs to shed some of its traditional industries in order to promote high-technology and service-based industries. On the other hand, the continued flow of technology and investment from Japan to Indonesia will not only contribute to growth of industrialization but also help boost the Indonesian economy in the booming Pacific Rim.

**KIJANG PROJECT: A SUCCESSFUL PATH DEPENDENCY PROJECT IN INDONESIA**

It is increasingly apparent that car producers in newly-industrializing countries cannot just rely on traditional, labour-intensive manufacturing operations, particularly if they want to enhance their bargaining power by being prominent in automotive export markets.

According to Jones & Womack (1985, p. 405), if newly-industrializing countries are intent on developing an export-oriented motor vehicle industry, the objective should be to maximise the amount of wealth produced per worker using state-of-the-art social organization and production technology and to create jobs by expanding volume.

If this does not take place, Jonas & Womack (1985) argue that newly-industrializing countries would fall further behind in technological development and have even less chance of ever catching up. As a result, the implication of such analysis must be that Indonesia, regarded as a newly-industrializing country, has to forge stronger links with Japanese vehicle multinationals, particularly in terms of technology transfer and new organizational methods.

Toyota Indonesia wants to take up this challenge not only through assembly line plants, but also by active involvement in producing engines, parts and components for export-oriented production, specifically in Asia Pacific, the Middle-East, Africa, and Latin America. Consequently, the local engineer in Indonesia is closely involved with Kijang project. One of the preferred types of passenger car for exports is Kijang. In Toyota, the process of path dependency is executed through knowledge transfer, started from technical capability, involving transferring knowledge through people by on-the-job training (OJT). The following paragraphs will explain the path dependency in Kijang Project, the local contribution from Indonesian subsidiary to Toyota.

*Kijang* or deer (in English translation) is one of Toyota Indonesia’s accomplishments through an extended path dependency in managerial
and technology. A Kijang prototype idea was designed by Toyota Indonesia’s engineers based on push factors, namely, the Indonesian market, local context, and the urge from the government to use 80% local components. However, as Toyota Indonesia was not the final decision maker to proceed with this project, the initial design was sent to TMC Japan for further feasibility study and improvement. This process involved Indonesian engineers in the Kijang team project to come up with more details for production and technology improvement, alongside Japanese engineers in Japan. After a long on-going improvement process and a rapid strategic marketing to target the 4x2 segment, this Indonesian family car is a phenomenon in the history of the Indonesian automotive industry. In particular, Kijang’s reputation has soared from its debut up to now, with a place in the heart of every Indonesian family. Furthermore, Kijang production reached the million marks by the end of 2003; hence, Kijang was recorded in MURI (Museum of Indonesian Record) which strengthens Kijang’s reputation as the best Indonesian family car.

The first generation of Kijang began in the period 1977-1980. Kijang’s debut on 9th June 1977 was extraordinarily well received. The second generation of Kijang was launched in 1981-1986. Since then, Kijang has received an even more favourable response. In fact, the growth of the coachwork business soon afterward was a key element in the transformation of the Kijang from a commercial vehicle to a family car.

The third generation of Kijang continued to be sold in 1986-1996. Furthermore, Kijang’s popularity increased when Super Kijang was introduced in 1986 and Kijang Grand in 1996, with the Toyota Original Body technology. As a result, Kijang started to be caulk free and has the same body structure quality as the sedan. It has made Kijang overtake the sedan as a popular family car. Therefore, in 1995, the production of Kijang reached 500,000 units and the introduction of 1800 cc engine was also finalised.

In the fourth generation, the new look of Kijang was introduced as Kijang Kapsul, with 60% local content. This new generation of Kijang was very different in its design from the previous one. It also offered a number of variants, including the choice of gasoline or diesel engine, as well as the luxury Krista and the option of automatic transmission.

Early in 2000, Kijang Electronic Fuel Injection was introduced, followed by a more powerful 2000 cc EFI Engine. In the fifth generation, Toyota Indonesia proudly introduced Kijang Innova, a revolutionary design that continues the ultimate performance of Kijang. With its stylish revolutionary look and new improvements in all features, Kijang Innova offers a significant driving experience.

Accordingly, in response to global expansion, Toyota Indonesia has been exporting Kijang since its first launch. However, the most significant export for Kijang began in 1998 up to the present, particularly for ASEAN and Middle East markets which could stimulate the fast-growing markets of Asia and Latin America against Europe and Northern America.

CONCLUSION

Learning path dependence in automotive industry is a motivating research object as automotive manufacturing is big investment type of business and has developed long trajectories in both technology and management to survive in long-term achievement.

Toyota Indonesia has taught the path dependency management to implement Toyota Production Systems through knowledge transfer. The path dependency in Indonesia has been made to transform Toyota Indonesia into a true lean learning organization that continuously improves and meets the needs of its customers, and positions itself for long-term success; a challenge from parent company, Toyota Motor Corporation in Japan. One the example of this path dependency is the local project called Kijang which involved managerial and technological path dependency.

Through the Kijang project, Toyota Indonesia has proved its credential to follow the success of the Parents Company. Implementing TPS (Toyota Production System) has taken
Toyota Indonesia to make path dependency in its management and production to be more productive and efficient. This encouraged top-down knowledge transfer since the Japanese companies would in the end enjoy the benefits themselves. Second, the hierarchical structure proliferates a shared sense of identity and shared purpose, and a shared set of norms, values and conventions throughout on technical path dependency via job training. These soft factors are important for management path dependency, in particular, with regard to its tacit dimension. An effective transfer of tacit knowledge requires a shared frame of reference, a shared social context to interpret and give meaning to knowledge.

For future recommendations and further research, the challenge for the Indonesian automotive industry now lies in finding a sustainable business development model to propel itself on a trajectory that will enable it to take an independent place in the global automotive industry. This industry can function as an engine, transforming a low wage, labour intensive and developing economy into a higher wage, technology-intensive and developed economy. On the downside, however, the Indonesian automotive industry has become overly dependent on their Japanese patrons.

REFERENCES


