

Effective Channels for Knowledge Transfer to an Upstream Supply Chain

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Abstract

This paper proposes nine effective backward channels for knowledge transfer from downstream manufacturers to upstream suppliers, based on the analysis of a number of company cases for how the technology actually spilled over to upstream companies. Different companies may take different routes to enhance their suppliers' technology level, some succeeding, some failing. One of the most important elements is thought to be the transfer carrier, in other words, the channel of technology transfer. Therefore, nine effective channels are proposed here, summarized from the successful cases, to provide some suggestions for companies which are planning to implement knowledge transfer to an upstream supply chain. The effectiveness of the proposed nine channels is also tentatively testified to by showing a matrix of the cases and the channels.

Key Words: technology transfer, supply chain, effective channel

1. Background and Definitions

At the time of the latest global financial crisis, many manufacturers had to face to the reality that suppliers disappeared in front of them. These suppliers are those who had competed together in the market with each other, and the manufactures realized the importance of sharing their valuable experience along with the level of knowledge they gained, in order to improve their suppliers' competitive capability. One of the most apparent reasons for motivating such activities is to maintain supply stability from the upstream. Moreover, drastic global technology competitiveness has lead to more complex innovative activities, so that enterprises tend to set up product innovation processes under the circumstance of supply chains, looking for knowledge, technology and resource supports through the cooperation of downstream and upstream supply chain (Li Chuan-hui, Sun Li-hui, Li Mei-yan. 2009). Thomas *et al.* concluded that the rapid change of technologies and customer requirements has become increasingly more important for companies across industries, and developing capabilities and relations with suppliers may be the key factor to meeting the challenge of flexibility (Thomas V. Scannell, Shawnee K. Vickery and Cornelia L. Droge, 2000).

One of the most important tasks to enhance the upstream/downstream relations of a supply chain is to develop suppliers' overall capability. This requires a long term cooperative

effort between the buyers and suppliers to upgrade the supplier's technology, quality, delivery and cost capabilities in order to foster ongoing improvements (C. Hahn, C. Watts, and C. Kim. 1990). Thomas *et al.* suggested that first-tier suppliers allocate their training and technical resources to develop both their own internal process capabilities, and their suppliers' facilities for long term process improvements (Thomas V. Scannell, Shawnee K. Vickery and Cornelia L. Droge, 2000).

Argote & Ingram defined knowledge transfer as the process through which one unit (e.g., group, department, or division) is affected by the experience of another (Argote, L.; Ingram, P. 2000). Knowledge transfer is also understood as the acquisition of collective production know-how defined as the implementation of a broader set of capabilities involving far-reaching organizational and technological adaptations inherent in advanced production systems as opposed to the implementation of one or another specific technique (Luiz F. Mesquita, Jaideep Anand and Thomash. Brush. 2008).

Beside the nature of the downstream firms' knowledge, the absorbing capabilities of suppliers and the degree of cooperative relationship, the carrier, herein called the "Effective Channel" [N.B.] is also important for technology transfer, and it is clear that an unobstructed, solid and appropriate bridge is the key to ensure the effectiveness of technology transfer.

[N.B.] The definition of "Effective Channel" herein given by the authors of this study is to show the bridge which connects the upstream and downstream companies for the backward knowledge transfer.

2. Purpose of This Study

The purpose of this study is to propose effective channels of backward knowledge transfer from downstream manufacturers to upstream suppliers. Different companies may engage in different activities to enhance their suppliers' technology level, some succeeding, some failing, but one of the most important elements should be the transfer carrier, in other words, the channel for technology transfer.

This study proposes clarified channels by analyzing the cases of a number of companies and how well the technology actually spilled over to the upstream companies. The effectiveness of the proposed nine channels is also tentatively testified to as an outcome of the analysis.

3. Nine Effective Channels (EC)

The nine effective channels are proposed as follows. The case sources which were used to summarize the nine effective channels are shown in Appendix 1. Case Sources.

EC 1: Set up a platform for suppliers to share knowledge and information

TOYOTA: Organized Supplier Associations to provide a platform to share information and practice: BAMA (Bluegrass Automotive Manufacturing Association) and Kyohokai.

SANY: Held various meetings to share information and knowledge: Supplier meetings, technical communication meetings, supplier hearings and concentrated training meetings.

NISSAN: Held three meetings for 25 core suppliers and other small group meetings to share information about evaluation data and for creating consensus about future directions.

EC 2: Organize a Specialist Team to transfer knowledge and give onsite instruction

TOYOTA: Two Specialist teams: OMCD (Operations Management Consulting Division) and TSSC (Toyota's Supplier Support Center).

SANY: Specialist teams consist of finance, technology, quality and management specialists to provide capital support, technology instruction and factory construction support to suppliers.

HITACHI: Specialist team gives monthly onsite instruction.

NIDEC COPAL: Organized a specialist team to teach suppliers how to enhance quality control immediately if there is some qualitative problem in the upstream supplier.

EC 3: Train various suppliers

Futon: Suppliers trained by a professional international company.

GE: Provided EHS (Environment, Health and Safety) and CSR (Environment, Health and Safety) training to suppliers.

WAL-MART: Packaging training and evaluation to suppliers.

EC 4: Implement evaluation and diagnoses to improve supplier's performance

Nissan: Nissan's Capability Enhancement Activity places great emphasis on evaluation and diagnosis.

Hitachi: Annual thorough evaluation of suppliers.

DAHANG: Standard operation procedure diagnosis and if necessary, repeat diagnosis until there is complete satisfaction.

EC 5: Promote synchronous improvement and development with suppliers

Nissan: Nissan incorporates factory-wide assistance for synchronized production as a supply development activity.

Honda: Implements SBP (Soft Best Position), synchronized with suppliers.

Futon: The SDU (Synchronous Development Union), established with suppliers, has become the key element to improve the innovative capability of Futon.

EC 6: Using their own 'brand advantage' to help suppliers

SANY: Uses their own brand advantage to help suppliers in new plant relocation, mortgage by receivables plan, and favorable raw materials procurement.

EC 7: Set up and spread a positive cooperative culture

TOYOTA: 'Co-existence, Co-flourish' (Kyosonkyoei) philosophy.

Hitachi: Meticulous working attitude.

Komatsu: Mutual assistance culture.

EC 8: Encourage and drive suppliers' voluntary learning

TOYOTA: Factory Jishuken (Kojo Jishuken), an autonomous study group, funded to culminate education and training by Toyota, which also set up similar Jishuken activities with American suppliers called PDA (Plant Development Activities).

Honda: As Honda develop suppliers, the shop floor Kaizen activity on a chosen model line was followed by autonomous activities initiated by suppliers themselves.

EC 9: Help suppliers to tide over difficulties and obtain rapid enhancement

Komatsu: Take measures to help supplier pass through financial difficulties.

Hitachi: Help suppliers get into the enlarged European and American market.

Sumitomo: Provide timely support and help suppliers get rapid development.

4. Summary of Conclusions

The nine effective channels which have been summarized from the successful cases are analyzing through a matrix showing the channels and the companies. The effective channels are classified and analyzed below Table 1.

From Table 1 we can find the following conclusions.

- (1) Japanese automobile manufactures mostly focus on knowledge transfer when they develop their supply chains. Today when people talk about supplier development and partnering relationships between enterprises and their suppliers, the Japanese automobile manufacturers as a whole industry always mention how knowledge transfer should be realized. The need to improve its supplier’s capabilities has been taken for granted in the Japanese automotive industry for several decades.
- (2) Sharing information, giving various kinds of training, holding evaluations, diagnosing and promoting synchronous development are broadly implemented channels for knowledge transfer.
- (3) Effective channels with the following characteristics are clarified as important.
 - a) Extensive participation
The associations, training and meetings are organized by various levels and different departments.
 - b) Multifaceted

Table 1 Matrix of effective channels and company case studies
EC: Effective Channel, Total: Number of companies/channels checked by ●.

Company \ Channel	EC 1	EC 2	EC 3	EC 4	EC 5	EC 6	EC 7	EC 8	EC 9	Total
TOYOTA	●	●					●	●		4
SANY	●	●				●				3
NISSAN	●			●	●					3
HONDA					●			●		2
HITACHI		●		●			●		●	4
FUTON					●					1
GE			●							1
WAL-MART			●							1
SUMITOMO									●	1
DAHANG				●						1
KOMATSU							●			2
NIDEC COPAL		●								1
Total	3	4	2	3	3	1	3	2	3	

Measurements taken are information sharing, training, site instruction, various supports, with the content consisting of cost, quality, production, delivery and new product innovation.

- c) Harmonious
The kaizen system and self-learning system are set up and accompanied by corresponding evaluation and diagnosis to guarantee synchronization.
- d) Continuous
When effective channels are established, the activities of knowledge transfer usually continue for many years and even several decades ensuring the long-term developing of suppliers.

Although the ways taken might be affected by the difference in the degree of relationship, target, time limitation or other elements, the purpose of effective channels is to improve the suppliers' technology level and then create more profit, better quality and more stability in the supply chain. There are various ways to implement knowledge transfer, but there is no best or almighty way for any supply chain. Therefore, the summary of the nine effective channels provides a reference for downstream companies planning to implement knowledge transfer to upstream suppliers.

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Appendix 1
Case Source

Company	Industry	Source
TOYOTA	Automobile	1) Zhang Yurong, Zhang Xumei, Analysis on Knowledge Sharing of Core Enterprises and Suppliers in Supply Chain-A case study of Toyota), SCIENTIFIC MANAGEMENT RESEARCH, 2006, Vol. 24, No. 2, pp. 117-120 (P 118, 120) 2) Jeffrey K Liker, David Meier, Chapter 12 Develop Suppliers and Partners as Extensions of the Enterprise, The Toyota Way Field-book. McGraw-Hill E-book, 2006, pp. 273-293
SANY	Construction Machinery	news.lmjx.net 2011-08-10 09:15:52 http://news.lmjx.net/2011/201108/20110810091552.shtml 2011-08-10 09:16:21 http://news.lmjx.net/2011/201108/20110810091621.shtml
NISSAN	Automobile	Mari Sako, Supplier development at Honda, Nissan and Toyota: comparative case studies of organizational capability enhancement, Industrial and Corporate Change, 2004, Vol. 13, No. 2, pp. 281-308
HONDA	Automobile	
HITACHI	Metal	Ji Hongrong, An S-F Two-Echelon SC-Oriented VMI Supplier Cultivation Strategy: A Case Study), Supply Chain Management, 2011, Vol. 30, No. 6, pp. 158-160
FUTON	Automobile	Li Suicheng, Jiang Yin hao), Case Study on the Correlation Mechanism between Supplier Involvement in NPD and the Enterprise' Self-determined Innovation Capability, Management of Science and Technology, 2010, No. 02, pp. 53-58 (P 57)
GE	Electrical	www.guanlixuejia.com
WAL-MART	Retailing	2011-5-27 17:48:20 http://www.guanlixuejia.com/ArticleInfo.asp?id=154
SUMITOMO	Purchasing Agent	Direct interview: Sumitomo Corporation, heard at Dalian Office of JETRO (Japan External Trade Organization) 2011-09-07
DAHANG	Logistics	Direct interview: Dalian Office of DAHANG International Transportation Co., Ltd, 2011-09-07
KOMATSU	Construction Machinery	Nikkei English News (E.NIKKEI.com) 2011/10/21 18:31 Komatsu Broadens Ties With Suppliers, Looking To Future
NIDEC COPAL	Precision Component	Direct interview: NIDEC COPAL CORPORATION, 2012-02-27