

Instructors in Technology and Skill Transfer Knowledge:

Expatriate Employees in a Japanese Automobile Corporation

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1 Introduction

Globalization has impelled business activity to be more borderless. In response the Japanese automobile industry has enhanced its operating infrastructure all over the world. Toyota (TMCⁱ), in particular, took a leading role in expanding its overseas activities, operating in 46 overseas production plants in 26 countries, it has increased overseas production volume up to one-third of total in 2002ⁱⁱ. Furthermore, in a long-term management outlook, Toyota set its goal in production: a world market share of roughly 15% early in the 2010sⁱⁱⁱ.

The globalization movement has had a great impact in the automobile industry. As production has expanded it is increasingly necessary to send experienced assembly line workers to offshore 'child companies', to transfer their knowledge and skills by giving instruction to employees in foreign-based factories and to generally model the values of the corporation. For the company to be successful in an overseas context the role of these instructors is crucial. This study sheds light on these instruction workers themselves, rather than on the Toyota Production System (TPS) itself. The rationale is that whatever the technical sophistication of the TPS it requires human experience and skill to transfer knowledge of its workings and continuous improvements. In that sense these instructors are workplace learning facilitators as well as ambassadors for corporate vision and values.

As argued above, these Japanese instruction workers play a vital role in overseas transplants^{iv} and their performance has a decisive impact on productivity. A significant feature of the Toyota Production System lies in "people", which means that every aspect of the system incorporates and values workers' knowledge and experience (Ohno 1978, Monden 1994, Ogawa 1994). In this system, every worker understands the production mechanisms, which embrace the opportunity for continuous improvement (*kaizen*) and problem solving. The system embeds better use of workers' knowledge and skills, to maximize its efficiency and the quality assurance of its products. Without such human resource involvement, the system would be nothing more than a mechanism. Given that Toyota is a global corporation the process by which Japanese instructors go to overseas transplants and provide face-to-face training to local workers contributes to transferring knowledge and values of the Toyota Production System.

Many researchers have paid closer attention to human resource development and training practice at overseas transplants (Yasumuro 1988, Iwauchi 1992, Ueki 2002). Cross-cultural job training has highly dynamic characteristics. Both the trainer's and trainee's various culturally bound psychological and sociological attributes are thrust into contact and influence each other during the training settings (Watanabe 1988). Compared to some other management resources, development of human resources is time-consuming and challenging at the same time (Watanabe 1993, MacDuffie and Pil 1996).

Technology transfer is another significant concept to pay attention in this study. It is the process involved in standardizing production methods by ensuring the workers understand technical knowledge and skills and can effectively apply various technologies and techniques, regardless of location and cultural differences. At the most basic level, it involves a didactic process of instruction and learning by imitation and repetition. The process has drawn distinctions between technology based on 'knowledge', and technology based on 'skill'. Due to their respective attributes, the former can be transferred verbally through manuals and texts but the latter is not transferable by words because it embraces knack and intuition, mostly acquired through long years of experience. Transfer of 'skill' per se can only be achieved by people (Ogawa 1996). Japanese production system owes its competitiveness to skill-based technology. Toyota relies on the part played by people - by workers with expertise and experience in acting as instructors. Human learning is regarded as the vital element for determining the long-term success factor in transferring technology. Hence there is an increasing use of expatriate employees by Toyota, as global operations multiply and become more complex.

As illustrated above, the process sending Japanese workers to overseas transplants to train and instruct local workers will become increasingly important as production intensifies. However, an understanding of these workers, who are central players in technology transfer, have not been given proper attention by academics, despite their importance. These Japanese workers who had been overseas transplants have valuable experience and knowledge in transferring skills in cross-cultural context. This study attempts to uncover some of that experience and knowledge through a survey.

The objective of this paper is twofold: (1) to understand how Japanese technology and skill transfer instructors think and conduct their training work at overseas transplants, and (2) to explore the problems and possible improvement of the training at overseas transplants.

The study was originally conducted with 240 employees who work for TMC. In this paper, special attention is paid to the workers who engage in production activity on the shop floor level. The actual sample comprised 120 instructors who fully completed the survey questionnaire. The focus of this study has been on various aspects of overseas assignment workers, the process and technology transfer instruction. In detail, these include the initial stages of selection and preparation of these workers, to the actual work they undertake, the problems they face, and what they think about their work, including their views on 'room for improvement'.

2 Research method

A survey questionnaire was the main instrument used to collect data from

the 120 instruction workers. The survey was conducted during July to December 1997. The selection criteria for the sample were: 1) employee of TMC, 2) worker who have experience(s) of going overseas transplants for work.

The survey instrument comprised 33 main items. Some of these were designed as multiple-choice questions, or simple five-point scales. Descriptive questions were organized into a number of sections and altogether comprised 16 items. The analytic questions amounted to another 17.

Although the interview method was not considered a critical part of the research design, it was used in a limited number of cases to talk with some selected instruction workers to answer questions about their work. Altogether, 10 such workers were interviewed. The result of these interviews was used to supplement the survey findings.

3 Data findings

For economy and simplicity, only the main findings are highlighted. Although the sample comprised a 120, not all respondents gave answers to every question item, as is typical in survey research.

Employment and demographic characteristics

1. Respondents were mostly long-serving Toyota employees. For example, 86 percent had worked for Toyota for more than 10 years, among them, account for 66 percent of total have more than 20 years in service. They were experienced and knowledgeable workers, typically at a supervisory

level or above.

2. Supporting above, 76 percent of workers were placed in their supervisory positions(*Ko-cho* (factory manager) 17%, *Kumi-cho* (Group leader) 36%, *Han-cho* (Team leader) 23%). The remaining was general worker (21%).
3. Reflecting the employment policies in Toyota, the majority of the sample (86%) were high-school graduates. A smaller number (11%) were recruited right after graduating junior high school especially older workers, who were more likely to have completed their schooling at an earlier age.
4. The greater number fell into the 30-50 year age group (85%). Another 18 percent were over 50 years of age.
5. A hundred percent of respondents were male workers.

Types

1. Their main purpose for going overseas assignment is to coincide with the production on a new model (53%). The kaizen concepts come into more definite when 34 percent of the workers claimed they went for improving the functioning of transplants. A more specific reason was to work for new factory (21%). A smaller number were involved in specific work on existing model (16%).
2. Majority of the respondents have less than a half-year of assignment (92%), particularly a half of them experienced three months (54%)^{vi}. This was often necessary to comply with immigration regulations.
3. More than third quarter of the sample (77%) had worked overseas transplants up to three times.
4. Toyota's overseas transplants cover all major continents. By far the greater number of workers had spent in United States (60%), followed

by Canada (22%) and United Kingdom (19%). As for Asian countries, including Thailand, Taiwan, and Malaysia, 27 percent of the workers had experiences of training. These simply reflect the production level, which is according with the production volume and the number of the transplants in the country.

Selection

The main method of selections for overseas transplants assignment is on the recommendation of superiors (66%). Many of the respondents interpreted that their knowledge and competence in new technology was the key reason for being selected (40%), followed by length of service (39%), which gives enough evidence that the workers are experienced and competent in their work. A smaller number simply volunteered (6%). This method of selection would undoubtedly involve assessing their knowledge, experience and competence. To be assigned as an overseas instructor assures the worker's technical competence as well as teaching skill. Surprisingly the company policy on selection is not likely to be established in the company, but the process is left to superior's discretion^{vii}.

Preparation

The respondents were asked to report on two kinds of preparation before going to an overseas assignment: in-house and self-preparation.

1. Nearly half (48%) claimed they had attended some kind of in-house preparation provided by Toyota, whereas 52 percent said they had not. This might be the fact that the majority of the sample experienced short-term assignments, which is frequently organized at quite short notice, often in response to a problem reported by an overseas transplant.
2. There are three main types of in-house preparation. Language

instruction is most common, with 89 percent citing participation, mainly English. The second most common preparation was the development of specific skills in expatriation work, where 13 percent attended such programs as teaching skills to foreign workers. Lastly, 11 percent claimed to have carried out specific work on some technical aspect of technology transfer.

3. Regarding self-preparation, 75 percent answered they had undertaken some kind of their own motives. As a further question discovered self-preparation included, learning a language (70%), some aspect of the transplant they assigned (46%), obtaining a background briefing from superiors and other experienced expatriate employees (25%), and learning something about the history and culture of the host country (19%).

Language

The effectiveness of instruction and training is to some extent conditioned by language efficiency. A number of questions were posed. It was quite common for instructors to explain ideas and give information in Japanese or limited English (few in the sample spoke good English or other languages), depending upon interpreters or nonverbal communication skills.

1. In response to a question asking workers to self-assess their confidence in using a foreign language (mainly English) in an overseas transplant, 18 percent of the workers claimed they could just about manage to communicate for instructional purposes. A further 54 percent said they could only use another language with difficulty and 31 percent for greeting purposes only. Therefore, at least half of the workers did not have any foreign language ability to instruct. From these results, it can

be assumed that language ability could hardly be an absolute priority in selecting to undertake instructional work at overseas transplants.

2. As a further question discovered more than half of workers thought that basic language skills should be a prerequisite for instructing non-Japanese workers and within that number, there were some who regarded good language skill as a crucial tool for instructing purposes (13%). It is worth noting that about half of them regard language is to some degree important in instructing (45%), another 14 percent regard language is not important in their work. The workers reflected upon their own experiences and claimed that language is not a prerequisite for transferring or instructing.
3. Taking the position that most workers can at best only use another language with great difficulty, they must depend upon other means of communication in an instructional setting to achieve good learning outcomes. One obvious strategy is to use interpreters. Not surprisingly, a half of the respondents used them (51%) and another half did do sometimes (47%). A further question found out that the availability of interpreters, together with the capability of them is comparatively limited especially in using technical jargon.

Given the fact that most of them are struggling to communicate with their rudimentary English, instruction without language facility is not a serious obstacle. This issue will be discussed later. Nevertheless, it is obvious that instruction with limited language ability is a time-consuming process.

Methods of teaching and instruction

Given the special focus on work-based learning facilitation, it is important to know how these workers practically approach their assignments in

overseas transplants.

1. Concerning the extent to which they thought their own approach to instruction was influenced by Toyota practices, 29 percent reported that they were and 28 percent perceived little or no direct influence.
2. As for particular methods, demonstration is the major means of instruction (81%), with emphasis on “look and do”, relying on nonverbal communication and using language interpreters to convey ideas and information when they are available. Likewise, individual practice is frequently employed (68%), usually following an instruction and demonstration session. To a lesser degree, the use of instructional manuals is also employed by 35 percent of the instructors, followed by a method whereby they identified the best learners among teams of local workers and intensively instructed these people so that they in turn could teach the rest of the workers (30%). Rather more unusual is “question and answer” (15%).
3. Like their teacher counterparts, instructors are usually interested in assessing the effectiveness of their methods. The findings show that making their own judgment is considered appropriate (66%), while 34 percent ask the local workers (learners) for feedback. Some workers ask their superiors for their observations of instructing (23%). There were a few other methods, including observation of the work of local workers, assessment of work outcomes against set production targets and quality standards.

Interpersonal communication with overseas transplants workers

The sample of workers were asked to report on interpersonal communication with local workers, that is to say, the efforts made to get close enough to local workers, such that everyone feels reasonably

comfortable communicating with each other at the factory floor level. The main findings are:

1. Most instructors made an effort to get to know local transplant workers (92%). Nearly half found the process of getting to know local workers either easy or at least not difficult (49%) in a cross-cultural environment, which is unfamiliar for ordinary Japanese workers. The rest were less positive but only a modest number claimed they found it a difficult experience (14%). In looking into this aspect more closely, about half the sample their own attitude and behavior was the main problem in getting to know local transplant workers. Few thought that the problem was with local workers. This is partly because Japan is a homogeneous country and workers are not familiar with cross-cultural communication, also due in part to their language abilities make them feel unconfident.
2. A partial explanation for the difficulties some instructors had in reaching out and forming personal relationships with foreign workers might lie in the different approaches to work. Some comments were provided that it was uncomfortable that the local workers leave the work unfinished and go home, even though Japanese instructors still had duties to train local workers until they acquire skills in such a limited time.

General views about instruction work experiences

Altogether, six aspects of work were presented to the workers, in which they were invited to respond on five-point scales: interest level, challenge and creativity, sense of achievement, satisfaction and frustration. Given the strong corporate culture in TMC, it was hardly surprising to find that most workers adopted a positive position. For instance, 71 percent

indicated they found the work interesting, 58 percent regarded the overseas work as creative and 76 percent as challenging, and 74 percent said the work gave a sense of achievement. About the same numbers considered the work satisfying (70%). On the other hand, a third of them admitted they found the work frustrating (31%). Various difficulties that arose from the cross-cultural work environment might be the cause of frustration, which relates to the following data finding.

Room for improvement

The question invited respondents to comment on ways and means of improving their work they did. The main point was made that more attention needs to be paid to creating better awareness of the difficulty of communicating in a cross-cultural setting in an overseas transplant. The biggest problem centered on the use of language, expressing the frustration of being unable to communicate adequately. Other than the language aspect, religious background, the gap in living standard, and different ways of thinking were pointed out. Not infrequently, these cultural differences bewilder Japanese instructors, especially in their first time of overseas assignment.

Part of the cultural sensitivity was to avoid putting across the idea that all things Japanese and from Toyota headquarters were superior. Such a view was seen as a way of encouraging worker motivation in overseas transplants and taking self-directed responsibility for quality assurance.

4 Discussion

In the context of manufacturing industry, two forces are commonly

accepted as driving the achievement of a competitive edge: technological innovation and competent human resources. For successful globalization of the industry, the process of technology transfer has important implications. In this context, the role of technology transfer instructors is clearly vital in the process of transfer, in which human resources and the technology come together in a synergy relationship to bring about the transmission of knowledge and learning to other workers. In this study, the people-focused aspect was a deliberate attempt to move beyond an abstract study of technology and systems, such as the Toyota Production System. More specifically, their work in overseas transplants has been at the heart of this paper. Based upon data findings presented above, two issues were identified for further discussion: the language and the in-house preparation.

Language issue

As the data shown, language is not necessarily being absolute determinant in training. It is interesting that majority of the workers, who were selected as overseas trainers, have only insufficient verbal communication tool, and yet they think language is to some degree important, but not crucial. Three possible aspects which play roles in compensating for language difficulties are explored.

First is the distinctive nature of on-the-job training (OJT), the main method the Japanese instructors at shop floor adopt. It is the process of teaching skills through actual work experience performed under close observation and instruction. OJT is the only method of transferring skill-based technology, which embraces know-how, knack, and intuition. In other words, the essence of OJT lies in “repetition of demonstration and

imitation”, which heavily involves nonverbal communication skills. On the shop floor, these skills include gestures and sign language using machine tools and parts. These nonverbal communications are likely to supplement insufficient verbal communication in cases where OJT is provided. Hence, especially in the cross-cultural context, OJT is rational approach to transferring skills for the instructors with poor language ability.

Secondly, since both Japanese instructors and local workers engage in same field of work, they might already share some tacit knowledge to smooth training unconsciously. As the result shows, many Japanese workers more or less felt the limitation of using interpreters. This may be because as everyone in Toyota is engaged in producing automobiles, they are able to understand meaning behind the words even with halting verbal communication. It can be assumed that tacit knowledge plays a role of common language, and it contributes to facilitate communication in training.

Finally, a sense of belonging to Toyota overcomes the language barriers. In this case study, Japanese instructors and local workers are all Toyota employees. The results showed language inefficiency could be overcome by the instructors’ effort or passion to communicate or transmit ideas to local workers. These Japanese instructors’ attitudes facilitate good interpersonal communication. Watanabe (1988) shows in his study, good human relationships between Japanese trainers and local trainees facilitate smooth implementation of the training. To reinforce the point, Iwauchi’s survey (1992) is useful. He found that Japanese managers at overseas branch tend to emphasize interpersonal relationship skills rather than language ability for successful overseas expatriates.

Nevertheless, the significant role of language cannot be overemphasized. It is time-consuming to communicate without verbal communication. As already mentioned, training human resource is a time consuming process. In addition, in case of this study, Japanese instructors have time constraints in training at overseas transplants. Taken together, training would be more productive by improving Japanese instructors language ability.

What is more, when the subject matter of transfer is tacit knowledge embracing company's philosophy and mind-set, nonverbal communication can hardly be a sufficient tool for training. Improved language fluency is required on the grounds that skills or knowledge are transferred through deeper level of interpersonal communication with local workers.

Although there has been growing interest in knowledge management of the tacit kind, there is limitation of articulation even with computer technology^{viii}. Hence rather in a manual way, human interaction is an essential factor and it is not likely to be replaced by technology. Especially in the case of Toyota, knowledge accumulated in the organization through long years of experience is the company's core competence. For further globalization, all the company employees in the world need to have profound understanding of the company's knowledge up to the philosophical level as core competenceix. In order to familiarize these knowledge, improvements in the level of verbal communication skill of Japanese worker is in pressing need of upgrading.

Preparation issue

Given that OJT is a productive training method in transferring knowledge

or skill to overseas transplants, which is indicated above, people play a key component in those activities. Hence the enhancement of overseas assignments, in a convincing way, is expected as Toyota pursues globalization strategy. Consequently, the number of expatriate employees on the shop floor level will increase in spite of the extremely high cost involved^x. These knowledge-attached workers has a great importance for understanding the hands-on training interaction as well as facilitating skill transfer in overseas transplants. The study showed that shop floor level workers are tend to be sent overseas more for short-term. Nakayama (2003) also reported that Japanese instructors who sent to overseas transplants are mainly comprised of those in short-term assignment. He argues the needs of short-term assignment are higher especially in technical training on factory level.

Taken together, short-term overseas assignment seems to be one of the pillars of overseas assignment practices in TMC^{xi}. Nevertheless, the data in the survey showed that half of the respondents had no chance in receiving in-house training for overseas assignment. It is partly because short-term assignment is often organized urgently and therefore the time for preparation was not available. Since their roles are pivotal to transferring skills in overseas transplants, it is necessary for these workers to provide appropriate in-house training. As already discussed, other than language, Japanese instructors are particularly in need of cross-cultural training.

Limitation of the study

It is recognized that, as a case study of Toyota technology transfer instructors, this research is limited in its capacity to generalize. There is no way of accurately claiming that the case study material might

reflect the situation of comparable workers in other Japanese automobile companies^{xii}. However, there is some informal indication that the findings might be of general interest to those who do this kind of work, and to employers with expatriate management responsibilities.

5 Conclusion

The research is based upon a case study of factory workers employed by Toyota who had worked at overseas transplants. This study contributes to the understanding about how Japanese instructors think and conduct their work at overseas production facilities. Through this understanding, issues of language in the cross-cultural training setting and preparation for workers with short-term assignment were discussed.

Despite its preliminary character, the research reported here would seem to indicate the effectiveness of OJT when the trainer is weak in language proficiency, since it is a method that heavily relies on nonverbal communication skills. It is likely to be effective especially in cross-cultural setting where the language barriers are high, on condition that particular emphasis on establishing interpersonal communication and relationship of mutual trust between Japanese trainers and local workers are given.

In regard to language, there is pressing need for Japanese technology and skill transfer instructors to improve. Foreign language incapability of Japanese has been pointed out by researchers (Hara et al, 1989, Kumara et al, 1991). Increasing company-wide awareness of the importance of language skills has been reflected on the company's strong emphasis on in-house training. On the other hand, however, language acquisition is

time-consuming process and cost consuming as well, and furthermore, it requires considerable efforts by learners, who commit daily production activities. It would be great challenge for them but it must be worthwhile at the same time.

These results put forward a future research question about the implication of verbal communication in transferring “tacit knowledge” in the context of OJT. To put it more precisely, to what extent the language ability conditions the teaching skills or technology with tacit knowledge at overseas transplants. In order to answer this question, more precise and extensive study should be conducted.

Notes

- i TMC stands for Toyota Motor Corporation.
- ii TMC official homepage (<http://www.toyota.co.jp/company/outline/index.html>)
- iii TMC made an official announcement of “2010 Global Vision” which includes a company-wide management outlook that sets the direction for long-term management in April, 2002. See details in TMC official homepage.
- iv The term transplants used in this paper indicates the plant that establish production operation overseas.
- v The pilot study was undertaken with a small group of Japanese automobile company in Australia to finalize the questionnaire design.
- vi The question was asked the longest assignment, in case for the sample who have experiences more than one time. This question is designed for identifying the degree of experience in time of the sample.
- vii This observation was also supported by interview survey.
- viii Dialogue from Hiroshi Okuda, Chairman of TMC. *Gekkan Keizai trend*, (2003, January), *Korekarano Nihon-kigyo to Nihonjin*.
- ix TMC announced “Toyota Way 2001” in 2001. “The business values and unique manufacturing philosophy that have been passed down since Toyota

was established, were clearly set out in the “Toyota Way 2001”. This enabled our core ideas to transcend language barriers and culture and be shared by our employees all over the world” (Toyota home page).

- x Takahashi (1997) reported that there are high costs associated with expatriation, which is three times as costly as managing workers in Japan. (1997, *Nihon jidosha kigyo no global keiei (Global management of Japanese automotive companies)*, Nihon keizai hyoron sha, Tokyo.)
- xi Three months is seemingly common length in short-term assignment on the shop floor, as the data showed.
- xii MacDuffie and Pil (1996) imply that because of the Japanese companies are selective in hiring local workforce, workers in transplants are homogeneous with respect to attitudes towards work and receptiveness to Japanese manufacturing philosophies and human resource practices.

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