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# Recruitment and retention of ICT skills among MNCs in Taiwan


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## Abstract

**Purpose** – The existing research on multinational companies (MNCs) tends to emphasise the diffusion of knowledge and skills in information, communication and technology (ICT) from the more advanced industrialised nations to less-developed or latecomer countries. Few studies have examined the ICT work force supply and development of local ICT skills among MNCs' overseas subsidiaries. This paper aims to fill the gap by evaluating the issues relating to the host country's ICT work force planning and supply and the recruitment and retention of ICT skills among MNCs at their local subsidiary.

**Design/methodology/approach –** A survey of 100 MNCs in Taiwan, Republic of China was used for analysis. The self-administered questionnaire was designed to examine the extent of difficulty experienced by MNCs in recruiting high, medium and low levels of ICT skills in the manufacturing and service sector. Attrition rate of the ICT skilled workers in Taiwan was also examined.

**Findings** – The results suggest some degree of ICT skill deficiency at the firm level, despite many efforts attempted by the Taiwanese government to develop and supply ICT skills at the national level. A gap between national advancement in technology and firm level of skills deficiency exists. These findings lead to consideration of a better alignment in providing local government support programs to meet MNCs specific skill requirements.

**Originality/value** – The study provides some insights especially for the emerging economy of China, which tends to heavily impose government intervention in developing strategic industries.


## Introduction

Over the past decade, there has been a growing interest in exploring the reasons behind the economic success of Asian “latecomer” countries (Hobday, 1995; Mathews, 2002). Latecomer countries are defined as a group of nations entering into a particular economic developmental stage, whereby they have developed certain competitive industries, largely not by choice but by historical necessity. These countries tend to be initially resource-poor

in terms of technology and market access. They focus primarily on the "catch-up" strategy (Hu and Mathews, 2005). Taiwan, Singapore, South Korea and lately China are regarded as latecomer countries as they often have initial competitive advantage on low labour and production costs (Hobday, 1995; Mathews, 2002). However, these nations have gradually built up their innovative capacities through foreign direction investment (FDI), external technology acquisition, well-educated work force, consistent research and development (R&D) expenditure and strong government support (Hu and Mathews, 2005). This export-led technology innovation strategy has enabled the latecomer countries to achieve economic miracles for the past two decades (Hobday, 1994, 1995; Hobday *et al.*, 2004).

The utilisation of FDI and acquisition of external technology are regarded as essential for the technological progress in the latecomer countries. However, human capital is the driving force behind the technological progress (Chang and Chen, 2002; Mathews, 2002; Amsden and Chu, 2003). The latecomer countries have gradually acknowledged the importance of relying on the quality of knowledge-intensive work force to sustain their economic performance and continued growth. Hence, most latecomer countries have heavily invested, for the past decades, in human capital, developing science and technology (S&T) skills at national level. Countries like China, South Korea and Taiwan have all established new institutions for graduate education in S&T. These countries have expanded their S&T graduate programs in the existing national universities so that education and advanced training of S&T students have become less dependent on the USA or other overseas countries. In 1999, for the first time, Taiwanese earned more S&T doctoral degrees at local universities than from universities in the USA (ITRI, 2004).

It seems that a new way of learning and innovation has been found in Asia through advancing technology capabilities, constructing and building the higher education systems (Cohen and Levinthal, 1990). Consequently, skills are generated to facilitate the adoption of advanced technology, innovative use of new information sharing and communication channels in order to produce better quality of products with low costs. The "catch-up" strategy used by the latecomer countries, such as Taiwan, follows this pattern. With technology advancement and capacity building, Taiwan has turned itself into an important part of the global systems of supplying high-tech labour. For example, Taiwan is now the world's fourth largest semiconductor producer, next to the USA, Japan and South Korea; and the leading producer of many IT products including laptop, LCD panels, ABS, WLAN and IC foundry (Chen, 2002; Amsden and Chu, 2003; ITRI, 2004; MOEA, 2005-2006).

Building the high-tech hub in Taiwan is also attributable to substantial investment by many multinational companies (MNCs). One would wonder why Taiwan and other latecomer countries have become the preferred designation for MNC investment. The conventional FDI theory would argue that a MNC chooses a preferred location whereby it can best utilise its internal capabilities, exploit firm specific assets in foreign markets, and capitalise foreign investment from the economics of scale operation (Caves, 1971; Dunning, 1981; Kohn, 1997). Hence, many MNCs have set up their subsidiaries in the late-industrialised or latecomer countries based on this rationale, suggesting that MNCs achieve their competitiveness through taking advantages of low costs of labour and other local subsidiary resources (Dunning, 1995, 1997; Chen and Chen, 1998). However, in recent years, it has been found that MNCs have not only relied on cheap labour or economics of scale for their

foreign investment and market expansion, but also sought after the innovation and technology capabilities possessed by host nations (OECD, 1999; Buckley and Casson, 2003). Kumar (2001) argues that MNCs have started taking a strategic approach in determining where to undertake their R&D activities. Mostly, the availability of advanced technology infrastructure, resources and government policy framework in the overseas subsidiary are the key determinants for MNCs' investment (Kumar, 2001). With advancement in S&T at national level, Taiwan, as well as many emerging economies such as China and India has become the favourable destination for foreign investment, attracting many MNCs.

In the era of developing "knowledge economy" it is believed that human resources (HRs) with knowledge and competencies in the areas such as information, communication and technology (ICT) are considered as key assets in assisting firms and/or countries to sustain their competitive advantage (Prahalad and Hamel, 1990). The OECD (2000) reports that the ICT work force is the crucial competing factor for both the manufacturing and service industries, even though the nature of industry may require different ICT work force to create value-added and generate diverse innovation capability and performance (Wang and Chien, 2006). The prior studies tend to describe the extent of ICT industry development at the national level in Taiwan (Chen, 2002; Lee and Tunzelmann, 2005) without addressing the implication to the firm level of ICT supply and demand. The studies on FDI by MNCs in the ICT industry also largely focused on market access, technological capabilities, contracting networks or linkages, and diffusing knowledge from home to host nations (Chen and Chen, 1998; Chen, 2002; Chang and Chen, 2002; Chang and Tsai, 2002; Amsden and Chu, 2003). The studies addressing the issue of recruitment and retention of ICT work force at firm level are limited (DeMers, 2002), even lesser in the context of the latecomer countries.

Therefore, this paper intends to fill up the gaps by looking at the trend of recruitment and retention of ICT-related employees of MNCs, with examination of the differences between manufacturing and service industries in Taiwan. The paper commences the discussion with a brief overview of the development of the ICT industry with strong government support in Taiwan. Research questions are then developed. The survey instrument and the data collection process are reported. The analyses of the survey results are discussed with emphasis on the main implications and application of the study to other latecomer countries. The conclusions and limitations of the study are marked.

## Government support of national technology advancement

With the industrial development moving toward a knowledge-based economy, Taiwan's government has formulated various policies and initiatives to build an industrial innovation system. These include the technology development programs, research organisations with collaboration among industry, universities and research institutes, R&D parks, tax exemptions, venture capital systems, and industry clusters (Chang and Tsai, 2002; Lee and Tunzelmann, 2005). This has become the main driving force behind local industrial development and, in turn, has attracted much multinational R&D investment in Taiwan.

With a strong government support, a "high-tech cluster" was built, which has made Taiwan a giant manufacturing house and a "one-stop shop" for all high-tech goods and services. The cluster is also called "an international procurement centre". Additionally, the Ministry of

Economic Affairs (MOEA) had signed 72 strategic alliance agreements between 1993 and 2001 with numerous world-class companies, with an aim of encouraging MNCs to invest in Taiwan. These MNCs include IBM, Lucent, Philips, Nortel, TI, Motorola, Siemens, SBC, Rockwell, GE, Compaq, Digital, GM, Ericsson, Dupont, HP, Alcatel, and Oracle (MOEA, 2005-2006). These are the leading companies present in Taiwan to develop ICT R&D capacity and to expand the ICT industry from Taiwan to the Asia Pacific markets.

However, the strategic alliance between the government and industry appears having little positive impact on the firm level of recruitment and retention of ICT skills. MNCs have continued facing the shortage of high-skilled work force. This is supported by many anecdotal evidence, which illustrated how MNCs in Taiwan used HR recruitment agents (such as recruiters) to attract most capable candidates with provision of the highest standard benefits package (*DigiTimes*, 2004). To compete, local Taiwanese IT (or high-tech) firms also used special reward systems that attract potential professionals. Many companies in Taiwan have adopted the similar or even more profit sharing incentives to retain their high-tech talents. A Watson Wyatt Survey (2005) indicates that, except for the better salary package, approximately half of the MNCs in Taiwan have given away prestigious club memberships to high level managerial and professional staff.

In order to attract foreign investment, Taiwanese government has provided a range of assistance and HR support programs to assist MNCs in addressing the issue of recruiting and retaining ICT managerial and professional employees. For example, the MOEA assists MNCs' R&D centres in recruiting staff from the Reserve Duty System for Technology and Science. Work force provided from the Reserve Duty System for Technology and Science is constituted by graduates who have passed the examinations for reserve officer or reserve non-commissioned officer and who hold at least master degree. They have ability to conduct advanced R&D activities. Private businesses could benefit from the use of such work force in advanced R&D activities by realising long-term plan with lower employee turnover (MOEA, 2005-2006). The MOEA also provides assistance to MNCs' approved R&D centres by introducing overseas talents (including those from Mainland China). MNCs that received letters of permission from the MOEA are allowed to employ foreign skilled personnel without labour law restriction and political consideration (e.g. those personnel coming from Mainland China) (MOEA, 2005-2006).

Given such an unusually strong government support provided for MNCs to recruit their ICT skills, it is expected that MNCs in Taiwan should have experienced relatively fewer problems in recruiting their ICT employees. However, many media reported otherwise (*Asian HR Newsletter*, 2005; International Herald Tribune, 2005; *AsiaNews.IT*, 2006; *Asia Times*, 2006), pointing to the severe shortage of ICT professionals across Asia, including Taiwan. MNCs have tried different measures (e.g. use of different recruitment methods, increase amount of compensation as discussed earlier) to attract ICT professionals. The purpose of this paper is to establish the extent to which MNCs have experienced recruitment difficulty and what companies or government can do to combat further the problem of retaining ICT competencies in the process of developing the knowledge economy.

## Development of research questions

The ICT industry has been primarily developed with the demands from the globalised companies seeking for innovation in information dissemination and knowledge transfer (Chen, 2002; Lee and Tunzelmann, 2005). Many technology and telecommunication tools have been increasingly used to improve effectiveness and efficiency in processing organisational and HRs information in all sectors of economy and the society as a whole. Chen (2002) stated that since the 1980s, the ICT industry has become the paramount engine of economic growth in Taiwan. Whilst many countries have experienced rapid development of their ICT sectors over the past two decades, the growth of Taiwan's ICT industry has outpaced the majority of its international counterparts, making Taiwan one of the world third largest producers of ICT products (Chen, 2002). The National Science Council reports that in 2005, Taiwan had 94 S&T researchers per 10,000 labours in 2005, a ratio similar to that in the USA (NSC, 2006). Apart from building national technological capability, industrial networks and strong government supports for the development of the ICT industry, there must be a sufficient supply of HRs with ICT skills to support the rapid growth of the industry in Taiwan. A number of governmental supported institutes such as Industrial Technology Research Institute, Institute for Information Industry, Computer and Communication Laboratory, etc. have trained ICT skills (ITRI, 2004). Assumingly, there should be sufficient supply of ICT skills in the Taiwanese labour market. Based on these arguments, it seems that MNCs operating in Taiwan should have less difficulty in recruiting their ICT employees. However:

*RQ1.* Why then in the labour market, have companies consistently been reported to have difficulty in recruiting ICT talents?

Kuo (2006) argued that along with rapid development of ICT industry in Taiwan, there would be an increasing dependence on ICT for companies and increasingly complicated information applications, and the demand for the proportion of ICT skills and services would be higher. ICT services cover software, turnkey system, system integration, intellectual property management, and technology development. These require a range of ICT skills to assist firms' operation and further development. Therefore, a related research question would be:

*RQ2.* Have MNCs in Taiwan demanded more ICT skills in order to assist their firms operation and continuous growth?

Most of sectors, but especially the manufacturing industry in Taiwan has been much influenced by global competition, technological capability, resource streams, HR diversification and information flow (Wang and Chien, 2006, p. 635). Companies need to exploit the best methods to attract and retain their ICT skills in order to compete in the changing environment and in the increasingly competitive business world. ICT-related employees have been regarded as assets for innovation that helps enhance organisational performance (Chang and Chen, 2002; Haesli and Boxall, 2005). Developing products or processes from scientific breakthroughs and bringing these products to the market is an innovation, which is the key factor to corporation performance (Wang and Chien, 2006, p. 636). MNCs operating in Taiwan would have also been continuously confronting global competition, and facing problems of decreased profitability, on-going organisational restructuring, and increase of labour costs. To maintain competitive, companies would need

to find motivated employees with innovative ideas, who are able to help improve product quality, reduce production costs and increase market share. Wang and Chien (2006) use a forecasting model to predict that innovative performance is a key factor for sustaining the competitive capability of Taiwanese manufacturing industries. Therefore, it can be expected that the manufacturing companies would require more specific ICT skills for innovative performance. The question is:

*RQ3.* Would the requirement for innovation in the manufacturing sector impose more difficulty in recruiting specific ICT skills than in the service sector?

It has been the evidence that the demand for ICT work force and the retention of these professionals is one of the main HR issues for many MNCs operating in Asia, including Taiwan. Lack of qualified work force in ICT areas often forces companies to poach talent from other corporations with attractive offers (Racz, 2000; Tulgan, 2001; Perry, 2001, 2002; Loane, 2004) and the high turnover of professional employees has been a daily issue in Asia (Khatri *et al.*, 2001):

*RQ4.* Would MNCs operating in Taiwan also experience a high employee turnover rate, especially for ICT-related employees?

Research methods and measurement used in this study will be discussed next. Subsequent discussion on the results from the survey will attempt to answer the research questions raised above.

## Research methods

The paper intends to identify whether MNCs operating in one of the global ICT powerhouse, Taiwan, have experienced a certain level of difficulty in recruiting ICT employees, and whether the difficulty varies across different industries. To assess the level of recruitment difficulty of ICT employees, a survey of 100 MNCs in Taiwan was conducted in May 2001. A local researcher based at the Taiwan Institute of Economic Research was commissioned to collect data from the identified 100 MNCs, which spread across two sectors: manufacturing (45 companies) and service (55 companies). A profile of the surveyed companies is provided in Table I.

To measure the level of recruitment difficulty, a “vacancy index” suggested by Iredale and Mitchell (1995) was adopted to evaluate the length of vacancies and amount of time required in recruiting ICT employees. Employers' (MNCs *per se*) demand for ICT skills was measured by the respondents' perceptual indication of needs to recruit a range of ICT job categories (Shah and Burke, 2005). Nine common ICT job categories were included in the survey questionnaire (Table II for the list). ICT skills were categorised into high, medium and low. In doing so, we take it that project managers, programmers and systems consultants will require a more complex combination of management, networking, interpersonal skills, and perhaps a higher level of ICT skills to effectively function in their roles. On the other hand, engineers and system maintenance workers and technician do not require such a complex combination of skills but, rather, specific ICT skills to do their jobs.

An attrition rate was used to reflect the staff turnover rate; it evaluates the likelihood for highly trained and skilled labour to leave the current jobs because of the shortage of supply of certain skills in the labour market (Haskel and Martin, 1993; Shah and Burke, 2005).

The survey questionnaire was filled out by company senior executives, including senior executives, financial controllers and HR managers who were believed to be more competent in providing better assessment of the extent to which the company has experienced difficulty in recruiting ICT-employees.

The data collected to assess the level of difficulty experienced by MNCs are generally dichotomous and the variables coded are largely categorical, except the attrition rate which is continuous variable measured by the number of employees who left in the past 12 months against the total employees in a firm (Price, 1977). Gravetter and Wallnau (2000) suggest using cross-tabulation with the $\chi^2$-test for independence to determine whether two categorical variables are related. This will generate a correlation coefficient (Pearson *r* value) to indicate the strength of the relationship. The results are presented next.

## Data analysis

Three observations can be made from Table I. First, manufacturing companies surveyed are predominately Japanese companies, whilst more American companies in the service sector. This indicates a strong connection of Taiwanese manufacturing sector with Japanese MNCs, which comparatively probably have less R&D investment than the US companies in Taiwan. As a result, more manufacturing companies in the survey would experience difficulty in obtaining and retaining competent ICT skills because of lack of R&D and company investment in further staff training and development. Secondly, most manufacturing companies are long established and old with relatively large size while service companies tend to be smaller with shorter length of operation in Taiwan. The emerging knowledge-intensive ICT industry would probably be more likely dwelled in or supporting the service sector, which has more complimentary factors in development, rather than manufacturing with unique skill and developmental requirements. Finally, the majority of manufacturing companies engaged more in export activities (68 per cent) than services companies (46 per cent) which may have serviced more of domestic needs of developing emerging industries, such as ICT. The profile, to some extent, reflects the evolution of Taiwan's industrial development, indicating a shift from export-oriented manufacturing to building more knowledge-based services sector.

The shift on the developmental focus is likely to induce more demand and/or short supply of certain skills in different industry. Would this shift affect on MNCs requirement of ICT skills? (*RQ2*).

The answer to this question can be found in Table II. The table indicates the varying demand for ICT skills in manufacturing and service MNCs in Taiwan. The manufacturing MNCs tend to demand more on lower ICT skills (53 response frequency) whilst service MNCs tend to require slightly more in the higher level of IT skills (51 response frequency against 44 from manufacturing companies) ($\chi^2$=15.249, $p$<0.05). There is no significant difference in the demand for medium skill levels between manufacturing and service MNCs ($\chi^2$=8.804,

*p*>0.1). These results seem only partly answering the *RQ2*. Overall, MNCs demand more ICT skills. However, MNCs in different sector depend on different types of ICT skills in their operation and expansion. This also implies that technology advancement in Taiwan's manufacturing sector may be more innovative at the lower production level, but technology application in the service sector presents a stronger intention to move toward developing a high skill, knowledge-based economy, similar to the results concluded by Hu and Mathews (2005).

The requirement for innovation both in the manufacturing and service sectors may impose difficulty for MNCs in recruiting their industry specific ICT skills. Many sectors in Asia were reported to have a certain level of ICT skill shortage (*AsiaNews.IT*, 2006). Would MNCs in Taiwan have also MNCs experienced difficulty in recruiting ICT skills (*RQ1*)? We answer this question in Table III. Most companies would take about 2-3 months to recruit various skill levels of ICT professionals, suggesting a level of ICT skill shortage, which has caused companies to take a longer period of time to recruit.

There appear some differences in the level of ICT skill requirements for manufacturing and service companies. Table III illustrates that whilst the service companies were relatively easier to recruit the lower ICT work force with more firms able to recruit this category of workforce within three weeks ($\chi^2$=16.282, $p$<0.05), the manufacturing companies seem having a difficulty in recruiting all levels of ICT professionals. This result answers the *RQ3*, which suggests that manufacturing MNCs would experience more recruitment difficulty of ICT employees than the services MNCs. In fact, to some extent, all MNCs surveyed found some difficulty in recruiting ICT employees with dominant time period to obtain certain skills ranging from 4-7 weeks to 12-15 weeks, and some even went over 16 weeks to get suitable staff. Relatively, service companies found it easier to recruit ICT skills. This might be due to its complimentary factors, which allow skills transferability across different industries. In another words, service companies are more able to accommodate work experiences and skills gained in previous firms to a new environment. In contrast, manufacturing companies tend to have more specific skill requirements that cannot be easily transferred.

To answer our last *RQ4* – would MNCs also experience a high employee turnover rate, especially for ICT employees? We measure different attrition rates between high and medium-low ICT skilled workers. Table IV shows that most of the companies surveyed, manufacturing and service alike, were better able to retain their higher level of managerial IT skills, with over 50 per cent of companies surveyed having attrition rates of less than 1 per cent. This might be due to the effect of prestigious club membership and profit sharing scheme together with the better salary package offered to a high level of managerial staff by multinational firms.

However, the attrition rate for medium and low level of professional ICT skills is relatively high, 49 per cent of manufacturing companies and 67 per cent of service companies surveyed indicate an attrition rate of between 11 and 15 per cent and over 15 per cent for this category of ICT employees. These results suggest that, in a tight labour market, MNCs operating in Taiwan have experienced a high level of ICT staff turnover. A high level of employee turnover implies that there is an overall shortage of ICT skills in Taiwan's labour

market, contradictory to the conclusion made from some recent studies (Chen, 2002; Lee and Tunzelmann, 2005; NSC, 2006) that claim a sufficient supply of ICT skills in Taiwan.

## Discussion

From the above data analyses, it is evident that MNCs operating in Taiwan may have faced quite a distinctive dilemma in terms of their global deployment of HR, in particular ICT resources. On one hand, MNCs were attracted to Taiwan because of the Taiwanese government's numerous publicly active strategies in education, foreign direct investment, and strong support in the ICT industry development. MNCs were probably anticipating in reaping the results from many publicly funded ICT recruitment support programs, external technology acquisition and ICT work force planning by the Taiwanese government at the national level. Yet on the other hand, at the firm level, MNCs have experienced, to some extent, the difficulty in recruiting and retaining sufficient ICT skills to further their development and expansion.

The survey results indicate an overall shortage of ICT skills in Taiwan's labour market. In particular, there was a high attrition rate for medium and lower ICT professional employees in both manufacturing and service sectors. Other recruitment difficulties were also felt both by manufacturing and service companies, despite HR support provided by the Taiwanese government to MNCs. There appear to be two reasons underlying this dilemma. One is to do with asymmetric or imperfect labour market information, and the other is to do alignment between government general support program and company specific skill requirement. Not all ICT skilled workers have full labour market information about where and when the demand and supply of ICT labour might be. In addition, foreign language (mostly English and Japanese) ability is required to work in MNCs, particularly in the service companies. Local Taiwanese may not all be able to meet this language requirement. It is highly likely, in the context of Taiwan's labour market, that labour react more actively towards certain information that would tilt the bargaining scale in better determining their employment conditions. With many media reporting government support programs and strategic alliance agreements signed by government and large MNCs, this could only send a strong signal of ICT supply deficiency in the labour market. Therefore, many medium and low level ICT skilled professionals with the language ability would see this as a great opportunity to hop around jobs to gain better working conditions, in relation particularly to pay. This has led to a higher attrition rate among the service MNCs, whereby lower level skills can be easily transferred to new working environment.

The ICT labour shortage experienced by MNCs in Taiwan could be further intensified when there is a greater misalignment between national level of support programs and firm level of skill requirements. From our earlier discussion, it is evident that the governmental ICT recruitment support programs tend to focus on recruiting high level R&D research and managerial capabilities, with little attention given to basic ICT skills. This study confirms that there are more serious problems in recruiting and retaining medium and low level of ICT employees, rather than high level of S&T skills. Therefore, there is a need to understand better what is required by MNCs at firm level and address the issue of better alignment between support programs provided at the national level and company ICT skill requirements. The recent initiative of strategic alliance agreements signed by the

government with various large corporations discussed above might be one way to demonstrate a need to direct toward achieving such a close alignment.

## Conclusions

It is noted that the Taiwanese government has put a great deal of efforts on assisting work force recruitment for MNCs. However, at firm level, companies continue experiencing recruitment difficulty and retention issues, especially for the medium-lower ICT skills. By large, it is suggested that there might not be a strong and/or positive link between the national level of promoting ICT development and advancement and firm level of easy access to a readily deployable pool of ICT HRs. There is quite likely that the government has pushed too much on developing a high level of ICT skills in the "catch-up" process and neglected the development of low and medium skills, which are necessary for any firms' development. To better facilitate the firm level of development, the government, in their work force planning, might need to shift from solely emphasizing the quantity of skills supply to specifically clarifying the levels ICT skills required by companies in the different sectors.

Industrial transformation in Taiwan, as well as in other emerging Asian latecomer countries, requires the changing focus on HR development. With a strong intension of building a knowledge economy, many latecomer countries need to provide governmental support to facilitating the technology development and ICT capability building, especially for the service sector as it gradually evolves to be dominant in the national economy. This may imply a less focus on the remaining fraction of the manufacturing sector, as large parts of manufacturing and production may be shifted to sites in less developed region. However, it seems that the strategic ICT industry led by the government, as in Taiwan's case, has largely concentrated on manufacturing of personnel PC, notebook PC, semiconductor and opt-electronics (ITRI, 2004). Contrarily, high skill emphasis at the national level does not match the needs of low-medium skills required by the sector. One implication for emerging economies, such as China and other less developed Asian countries, would be that when they implement a "catch-up" strategy, and initiate support for developing strategic industries, they need to be cognizant of developing a balanced range of skills required by the industry, rather than focusing only on the development of high skills.

In the past decades, technology has developed in a fast pace, so has the HR management and developmental trends. Our study presents a picture of the extent to which MNCs face recruitment and retention issues regarding their ICT skilled employees, and suggests some misalignment between the national level of technology advancement and firm level ICT skill requirement. It is perceivable that the state intervention in the strategic development of certain industries will continue across many emerging economies. MNCs should be more proactive in working with host nations' governments in developing necessary human capital, not only for the benefits of company's further expansion and development, but also for providing a critical and close linkage between latecomer countries' industrial evolution and the global knowledge economy.

The limitation of our current study is that it did not explore the causal relationship between the national push in innovation development and firm level of specific ICT skills. Instead, we questioned the effectiveness of the governmental support programs in developing strategic

industry to address the industry and firms specific needs. Use of the survey results, some misalignment between governmental support programs and different industry skill requirements were identified. It is acknowledged that various recruitment and retention strategies adopted by MNCs should be further evaluated to determine the extent of the difficulty in recruiting ICT skills. In addition, specific set of ICT skills required by firms in different industries should also be considered in future studies. Nonetheless, the current study provides some insights into explaining the reasons behind the recruitment and retention dilemma experienced by MNCs in Taiwan, and the ways in which the government could intervene more effectively in the balanced development of necessary skills to support strategic industries. As such, the findings could be useful for those latecomer countries such as China, India, Indonesia and Vietnam in their process of the continuous industrial transformation and restructuring.

**Table I.**
Survey profile – MNCs surveyed in Taiwan

| Industry | Manufacturing | Service |
|---|---|---|
| No. of MNCs responded | 45 (per cent) | 55 (per cent) |
| *Parent countries (no. of MNCs included: 100)* | | |
| Australasia | 4 (9) | 15 (27) |
| Europe | 10 (22) | 10 (18) |
| Japan | 18 (40) | 11 (20) |
| Taiwan | 5 (11) | 5 (9) |
| USA | 8 (18) | 14 (25) |
| *Length in operation (no. of MNCs included: 100)* | | |
| Newly established ($Y < 5$) | 3 (7) | 9 (16) |
| Growing MNCs ($5 < Y < 10$) | 5 (11) | 15 (27) |
| Reasonably established ($10 < Y < 30$) | 13 (29) | 19 (35) |
| Old in operation ($Y > 30$) | 24 (53) | 12 (22) |
| *Firm size (no. of MNCs included: 100)* | | |
| Small ($N < 50$) | 9 (20) | 31 (56) |
| Small and Medium ($50 < N < 100$) | 11 (24) | 7 (13) |
| Medium ($100 < N < 500$) | 12 (27) | 10 (18) |
| Large ($N > 500$) | 13 (29) | 7 (13) |
| Number of companies included: 100 | | |
| *Export activity (no. of MNCs included: 96)* | 44 | 52 |
| No export | 14 (32) | 28 (54) |
| Export between 1 and 20 per cent of products | 8 (18) | 7 (13) |
| Export between 21 and 80 per cent of products | 9 (21) | 9 (17) |
| Export over 80 per cent of products | 13 (29) | 8 (16) |
| Missing cases: 4 | | |

**Note:** Figures which are given in parentheses are percentage

***Table I****Survey profile – MNCs surveyed in Taiwan*

**Table II.**
IT job categories and applicability to MNCs

| Job categories | Skill level<br>No. of manufacturing MNCs responded, service MNCs responded | Manufacturing<br>45 (per cent) | Service<br>55 (per cent) |
|---|---|---|---|
| IT project manager | | 17 (38) | 22 (40) |
| IT programmer | Higher (44, 51) | 18 (40) | 19 (35) |
| IT system consultant | | 9 (20) | 10 (18) |
| IT system analyst | | 15 (33) | 16 (29) |
| ICT[a] officer | Medium (36, 36) | 12 (27) | 11 (20) |
| Network consultant | | 9 (20) | 9 (16) |
| IT engineer | | 17 (38) | 7 (13) |
| IT maintenance | Lower (53, 32) | 20 (44) | 11 (20) |
| IT technician | | 16 (36) | 14 (25) |

**Notes:** [a] ICT = information, communication and technology; figures which are given in parentheses are percentages

***Table II****IT job categories and applicability to MNCs*

| Recruitment period<br>IT jobs/industry | Skill level | Within 3 weeks (per cent) | Between 4 and 7 weeks (per cent) | Between 8 and 11 weeks (per cent) | Between 12 and 15 weeks (per cent) | Over 16 weeks (per cent) |
|---|---|---|---|---|---|---|
| *Project manager* | Higher | | | | | |
| Manufacturing (17) | | 12 | 29 | *35* | 6 | 18 |
| Service (22) | | 18 | 14 | *41* | 14 | 14 |
| *IT programmer* | | | | | | |
| Manufacturing (18) | | 17 | 17 | *33* | 28 | 6 |
| Service (19) | | 21 | 32 | *42* | 5 | – |
| *IT system consultant* | | | | | | |
| Manufacturing (9) | | 22 | 22 | *33* | – | 22 |
| Service (10) | | 10 | *50* | 20 | 10 | 10 |
| *IT system analyst* | Medium | | | | | |
| Manufacturing (15) | | 13 | 7 | *47* | 27 | 7 |
| Service (16) | | 25 | *31* | 25 | 19 | – |
| *ICT officer* | | | | | | |
| Manufacturing (12) | | 17 | 17 | *33* | 25 | 8 |
| Service (11) | | 9 | 27 | *45* | 9 | 10 |
| *Network consultant* | | | | | | |
| Manufacturing (9) | | 22 | 11 | *33* | 12 | 22 |
| Service (9) | | 22 | 44 | *44* | – | – |
| *IT engineer* | Lower | | | | | |
| Manufacturing (17) | | 23 | 18 | 6 | *29* | 24 |
| Service (7) | | *43* | 28 | 29 | – | – |
| *IT maintenance* | | | | | | |
| Manufacturing (20) | | 25 | 15 | *30* | 15 | – |
| Service (11) | | *36* | 27 | 28 | – | 9 |
| *IT technician* | | | | | | |
| Manufacturing (16) | | 25 | 19 | *38* | 18 | – |
| Service (14) | | *43* | 28 | 22 | 7 | – |

**Table III.**
Degree of recruitment difficulty for IT employees – percentage of MNCs responded

***Table III****Degree of recruitment difficulty for IT employees – percentage of MNCs responded*

| Industry | Manufacturing | Service |
|---|---|---|
| No. of MNCs responded | 42 (per cent) | 54 (per cent) |
| *Higher level of skills* | | |
| Under 1 per cent | *25* (*60*) | *26* (*48*) |
| Under 5 per cent | 4 (10) | – |
| Between 6 and 10 per cent | 2 (5) | 3 (6) |
| Between 11 and 15 per cent | *6* (*14*) | *6* (*11*) |
| Over 15 per cent | *5* (*12*) | *19* (*35*) |
| Missing cases: 4 | | |
| No of companies included: 96 | | |
| No. of MNCs responded | 37 | 37 |
| *Medium-lower level of skills* | | |
| Under 1 per cent | *9* (*24*) | *10* (*27*) |
| Under 5 per cent | 1 (3) | – |
| Between 6 and 10 per cent | 9 (24) | 2 (5) |
| Between 11 and 15 per cent | *5* (*14*) | *5* (*13*) |
| Over 15 per cent | *13* (*35*) | *20* (*54*) |
| Missing cases: 26 | | |
| No of companies included: 74 | | |

**Note:** Figures which are given in parentheses are percentages

**Table IV.**
Managerial and professional staff attrition rate

***Table IV****Managerial and professional staff attrition rate*

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