Strategic diversity in Japanese university Technology Licensing Offices

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Abstract: The “transfer of university technology” is not only a one-way transfer process of technological outputs matching a scientific discovery with a market need, but also the building of teams of university and business people working towards the common goal of technological knowledge creation. The result of a questionnaire survey of university TLOs in Japan \( (n = 40) \) reveals that ‘individual-type TLOs’ were fewer than expected, while ‘organisational-type TLOs’ were dominant. The members’ employment status and previous occupations, and the time allocation for each TLO activity, differences among TLOs were noticeable.
Keywords: TLO; technology licensing offices; university technology transfer; organisational factors.


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1 Introduction

Between the late 1990s and early 2000s, some universities around the world have tried to establish Technology Licensing Offices (TLOs) to promote the commercialisation of technology they had developed. Since the creation of TLOs is still a new movement, data on their organisational characteristics, the actual conditions of their activity, or improvement factors of their performance is scarce. Furthermore, the issue of university technology transfer has not yet been thoroughly discussed.

Because technology is a part of knowledge, technology transfer is also a part of knowledge transfer. Therefore, because of their very nature, TLOs are well suited to explore knowledge transfer, especially from the university sector to the private sector (Shane, 2004). The issue of strategic management – in formulating, implementing and evaluating several courses of action to achieve its objectives – arises from the diversity of
strategic options available to competing actors in a field. However, because objectively assessing one sector or one field requires to survey all the relevant actors, an exploration of all the possible strategic options is rarely possible. The focus of this paper on Japanese TLOs derives from the accessibility of the data that span the entire population of TLOs in Japan, and consequently can provide a comprehensive picture of their strategic diversity affecting their performance.

The purpose of this paper is to clarify the nature of university technology transfer through the empirical analysis of TLOs in Japan. In particular, the objective of this research is three-fold:

- report the results of a survey on the actual condition of TLOs in Japan
- develop and verify a hypothesis on organisational factors affecting TLO performance
- propose a new perspective on university technology transfer.

In Section 2, we describe the actual condition of TLOs in Japan using data from a questionnaire survey (first objective). In Section 3, we develop a hypothesis on TLO performance based on a case study approach, and we then validate it using the survey data (second objective). In Section 4, we discuss the main findings of the research (third objective). Finally, in Section 5, we present our conclusion and our future research.

2 Survey report on TLOs in Japan

2.1 Population and data collection

The survey named “Survey on the present condition of TLO technology patent transfer and future technology transfer organisation” was carried out from December 2004 to January 2005 with all 40 TLOs in Japan. The response rate was 100%, but since one organisation declined to answer the survey, the final number of respondents was 39. To improve the reliability of the answers, not only the name of each TLO, but also the name and position of each respondent was specified. The questionnaire consisted of 53 questions and about 160 variables were collected from the results, four variables being added later on from other public materials.

2.2 Organisational activity

Using data from the survey, we classified TLOs into two categories, as either ‘individual-type TLOs’ where performance is merely the sum of each member’s individual performance, or ‘organisational-type TLOs’ where performance depends on organisational assets or collaboration within the team (Figure 1). The comparison of these two TLO types reveals that, contrary to what was expected, ‘individual-type TLOs’ were outnumbered by ‘organisational-type TLOs’.

In the survey, we examined the type of networks mostly used in getting a new client (a licensee and licensor), whether it was the network that a License Associate (LA) has as an individual, or the network that the TLO has as an organisation. A higher ratio of individual networks over organisational ones earned the TLO a status of ‘individual type’, while a lower one earned it that of ‘organisational type’.
Figure 1 ‘Individual-type TLO’ vs. ‘organisational-type TLO’ (see online version for colours)

The point diagram in Figure 2 shows that, first, many TLOs are scattered in the lower left corner of the diagram, which means that there are more ‘organisational-type’ TLOs compared with ‘individual-type’ ones. In getting a new licenser (median 20.00%, mean 20.53%) or licensee (median 50.00%, mean 45.24%), the ratio of dependence on individual network is below the ratio of dependence on organisational network. Considering this network dependence, among the four TLOs of the individual type (located in the upper right corner), to the question on “the frequency of information exchange about licensee and licenser among License Associates (LA)” (scored on a 5-point Likert Scale, median 3.50, mean 3.18), one TLO answered 5 (very often), two TLOs answered 4 (often), one TLO answered 3 (occasionally), and none of them chose 2 (almost never) or 1 (never). These answers show that the performance of these four individual-type TLOs is not purely the sum of each member’s individual activity as it was previously asserted. In addition, the ratio on network dependence and that on information exchange were not correlated. Second, Figure 2 illustrates the fact that when comparing licensee and licenser in new licenser development, the ratio of dependence on individual networks is smaller, suggesting that the organisation-type TLO is more dominant in new licenser development activities.

Figure 2 Type of network used in search of new clients (see online version for colours)
2.3 Diversity in TLOs’ organisation

From the earlier analysis, looking at TLOs in Japan, it is clear that more TLOs were of the organisational type than of the individual one. However, even though we could consider all TLOs as one organisation in Japan, the results of the survey imply a wider diversity than expected among Japanese TLOs. Hence, three important aspects regarding the diversity of performance need to be considered to discuss TLO performance.

The first aspect concerns the social role of the TLO and its priority as to whom its work benefits the most. The results are illustrated in Table 1 and are contrary to the assumption before the survey that no general tendency existed in the self-definition of who benefited the most from the TLO.

<table>
<thead>
<tr>
<th>Question: Who does the TLO intend to be benefiting the most?</th>
<th>University</th>
<th>Researcher</th>
<th>TLO itself</th>
<th>Company</th>
<th>Local society</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>7</td>
<td>14</td>
<td>11</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Second</td>
<td>13</td>
<td>15</td>
<td>2</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Third</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Fourth</td>
<td>9</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Fifth</td>
<td>3</td>
<td>0</td>
<td>15</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
</tr>
</tbody>
</table>

The value in cell is the number of TLOs.
Some TLOs put more than one client as most important.

The second aspect deals with the member composition. The following four variables were created:

1. ‘permanent employee ratio’ is calculated as number of permanent employees/(number of permanent employees + number of temporary employees)
2. ‘full-time employee ratio’ is calculated as number of full-time employees/(number of full-time employees + number of part time employees)
3. ‘company-experienced employee ratio’ is a ratio of members who previously worked in a private company, calculated as number of company-experienced employees/number of members; the other previous experiences are ‘university researcher or officer’, ‘student’ (post-doctoral), ‘local government officer’, ‘national government officer’, ‘industry support agent’, ‘patent attorney’ and ‘others’
4. ‘researcher specialty employee ratio’ is a ratio of members who specialised in research, calculated as number of researcher specialty employees/number of members.

The other specialties are planning, legal, sales, marketing, administration, HR and others. Table 2 shows that these ratios have, in general, a high standard deviation and furthermore, a histogram (10% unit) of this variable demonstrated that the TLO
frequency (number of TLOs) was uniformly distributed according to member composition.

**Table 2**  Statistical description of member composition

<table>
<thead>
<tr>
<th></th>
<th>Number of TLOs</th>
<th>Max. value</th>
<th>Min. value</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of employees</td>
<td>39</td>
<td>4</td>
<td>132</td>
<td>15.79</td>
<td>20.336</td>
</tr>
<tr>
<td>Permanent employee ratio</td>
<td>37</td>
<td>0.00</td>
<td>1.00</td>
<td>0.6273</td>
<td>0.32224</td>
</tr>
<tr>
<td>Full-time employee ratio</td>
<td>39</td>
<td>0.05</td>
<td>1.00</td>
<td>0.6900</td>
<td>0.26228</td>
</tr>
<tr>
<td>Company-experienced employee ratio</td>
<td>39</td>
<td>0.00</td>
<td>1.00</td>
<td>0.6285</td>
<td>0.25596</td>
</tr>
<tr>
<td>Specialty ratio</td>
<td>39</td>
<td>0.00</td>
<td>0.78</td>
<td>0.2967</td>
<td>0.25470</td>
</tr>
</tbody>
</table>

The third aspect is related to the diversity in time allocation of activities. Out of a list of 11 generally performed activities (shown in Table 3), respondents were asked to give the share (100% in total) of time allocated to each activity. The above-mentioned activities were categorised based on the ‘Licensing Operation Flow Chart’, which was collected from every TLO at the same time. Table 4 shows the share of four categorised activities (sales, legal, strategic, and others activities) in the TLO’s activity time allocation. As in the case of member composition, a histogram of the activity time allocation variable confirmed that the TLO frequency (number of TLOs) was uniformly distributed. In addition, among 38 TLOs who answered this question, 26 of them allocate most of their time to the sales activity, 6 to the legal activity and 8 to the strategic activity (and 2 TLOs allocate their time equally between two activities), showing that the time allocation of each TLO’s activities is diverse even though its dispersion is smaller than that of the member composition.

**Table 3**  Classification and description of main activities

<table>
<thead>
<tr>
<th>Category</th>
<th>Description (as appeared in survey)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales activity</td>
<td>Searching for technology seeds from university (by visiting, etc.)</td>
</tr>
<tr>
<td></td>
<td>Searching for technology seeds from company</td>
</tr>
<tr>
<td></td>
<td>Promotion activity for joint research, funding or licensing agreement</td>
</tr>
<tr>
<td></td>
<td>After sales activity for joint research, funding or licensing agreement</td>
</tr>
<tr>
<td>Legal activity</td>
<td>Application and registration procedures for patent</td>
</tr>
<tr>
<td></td>
<td>Meeting or arrangement for joint research, funding or licensing agreement</td>
</tr>
<tr>
<td>Strategic activity</td>
<td>Searching for technology seeds from university by using databases</td>
</tr>
<tr>
<td></td>
<td>(electronic journal database, etc.)</td>
</tr>
<tr>
<td></td>
<td>Evaluating current technology seeds or patent</td>
</tr>
<tr>
<td></td>
<td>Searching for technology seeds from company by using databases</td>
</tr>
<tr>
<td></td>
<td>Evaluating financial and strategic condition of potential companies</td>
</tr>
<tr>
<td>Others</td>
<td>Others</td>
</tr>
</tbody>
</table>
Table 4  Statistical description of activity time allocation

<table>
<thead>
<tr>
<th>Number of TLO</th>
<th>Min. value</th>
<th>Max. value</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales activity</td>
<td>38</td>
<td>0.15</td>
<td>0.70</td>
<td>0.4471</td>
</tr>
<tr>
<td>Legal activity</td>
<td>38</td>
<td>0.05</td>
<td>0.45</td>
<td>0.2139</td>
</tr>
<tr>
<td>Strategic activity</td>
<td>38</td>
<td>0.10</td>
<td>0.70</td>
<td>0.2903</td>
</tr>
<tr>
<td>Other activity</td>
<td>38</td>
<td>0.00</td>
<td>0.30</td>
<td>0.0487</td>
</tr>
</tbody>
</table>

Answered numbers were divided by 100.

3  Organisational factors affecting TLO performance

The survey results have so far yielded two main findings on the actual condition of TLOs in Japan: first, TLOs perform their activity organisationally (organisational type); second, TLOs exhibit a great strategic diversity in their social role, member composition, and time allocation of their main activity. On the basis of these outcomes, Section 3 focuses on the analysis of organisational factors affecting TLO performance.

3.1  TLO performance

Six types of data were collected as parameters (Friedman and Silberman, 2003) of TLO performance in FY2001, 2002 and 2003:

1  Number of licences
2  Licensing income
3  Consulting income
4  Project income
5  Other income
6  Number of commercialised cases.

3.2  Object selection for analysis

Because the following analysis uses data from the FY2003 License Income, seven TLOs (out of 39) that were established after 1 April 2003 (the fiscal year in Japan starts in April and ends in March) were excluded from the data set. And since three TLOs did not submit their 2003 license income data, 29 TLOs finally remained for analysis.

3.3  Exclusion of abnormal values

From the remaining 29 TLOs, 2 TLOs were also excluded as their performance was far superior to the others’ and would have had too great influence on the results of the analysis (outliers). The profiles of these two TLOs are as follows. The first one,
as Figure 3 shows, is TLO#35, which has 132 members, a figure far greater than the staff number in other TLOs. Out of these 132, 125 are called ‘Technology-transfer adviser’, working part-time according to its official website. TLO#35 employees mostly draw their expertise in various fields from their experience working at companies. The second one, as Figure 4 shows, is TLO#32, which owns 12,000 patents (the answer in the questionnaire was ‘around 12,000 patents’), while other TLOs never own more than 1000 patents. According to their answer in the survey, they considered their number of patents as their strength.

Figure 3  Number of members in TLOs (see online version for colours)

Figure 4  Number of patents in TLOs (see online version for colours)

The FY2003 license income of the remaining 27 TLOs was analysed and showed: number of TLO = 27; minimum value = 0; maximum value = 2491; mean = 104;
Figure 5 shows that TLO#12, with the maximum income of 2491, may also be considered as an outlier. While other TLOs start their fiscal year in April, TLO#12 starts in January, resulting in a 3-month difference in data. However, since TLO#12’s performance is not attributable to this factor, this difference in fiscal year is ignored. The following case study explores the reasons of TLO#12’s outstanding performance.

Figure 5 ‘Researcher-company priority’ and FY2003 license income

3.4 Case study of a high-performance TLO

TLO#12 emerges as an outstanding performer in license income over FY2003. The subsequent analysis uses data mainly from the questionnaire survey (answered by their PR officer) and from a follow-up interview conducted on 13 September 2005 (answered by their Chairman).

TLO#12’s performance was not only the highest in FY2003, but also the highest among all TLOs in FY2001 and FY2002 (148 million yen in FY2001, 140 million yen in FY2002). Also, TLO#12 has 15 members, a number in line with the average of 14.61 of the other 28 TLOs (excluding TLO#35), it holds 989 patents, the highest number among the other 28 TLOs (average of 138.92, excluding TLO#32) and most of its patents are in Life Science research (generally, most licensed patents are in Life Science research as well).

TLO#12’s strengths are its

- marketing capability
- accurate decisions and agility
- good cooperation with universities.

The development of new clients uses 30% of individual networks and 70% of organisational networks in the case of licensors, and 50-50 in the case of licensees. The “degree of information exchange about licensee and licensor among License
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Associates (LA)” was highest (5, very often) with the bulk of information exchange done during the weekly meeting during which three points are discussed:

- evaluation of potential research in that week
- marketing method
- progress report.

Although every license associate has authority, they share their know-how with one another through the progress report at the weekly meeting. In the interview, the Chairman described the situation as follows:

“The patent proposal is done by the license associate alone. All responsibilities including the choice of the attorney are delegated to him or her. However, the license associates consult one another and me as well. (…) New members feel that meetings are more difficult than presentations to clients or even than interviews with inventors. (…) We hold meetings to share know-how and give progress reports. Problems are discussed by all the members and this is the reason why new members feel some tension. We naturally have a consensus in the discussion as we evaluate the potential of propositions and we retain only 30% of them. The discussion is pretty detailed; for example we say “you should meet with Mr. A” or “you should not meet manager B”. We have a lot of expertise, so we have various points of view.” (TLO#12’s Chairman, September 13, 2005)

From the interview, it can be concluded that TLO#12 is also an ‘organisation-type’ TLO. As for its social role, TLO#12 defines its mission as ‘commercialising technology’. While TLO#12 answered in the survey that its most important client was the researcher, its chairman answered in the interview as follows:

“We adopted ‘researcher’s agents’ as our motto. When stakeholders are divided over some decisions, I will say “your boss is the technology. You have to think about how to commercialize this technology!” In the previous questionnaire, we answered that the researcher is our priority, but precisely, it is ‘technology’. If we cannot motivate the researcher, nothing happens, and there is no knowledge cycle (…). That’s why, I always say “in the organization’s structure, I am the boss, but your real boss is ‘technology’.” (TLO#12’s Chairman, 13 September, 2005)

Regarding the social role of the TLO (client benefiting from the TLO’s work), he said:

“If we focus on the local society, we fear that our activity will become distorted. Our first priority is not the local society, but “how to bring out a technology”. Even within the AUTM (The Association of University Technology Managers) we have a saying that “the inventor is the best marketer”. Most researchers have an incentive to bring out technology.” (TLO#12’s Chairman, 13 September, 2005)

TLO#12’s 15 members consisted of 11 permanent employees, no temporary worker and 4 officers. Out of these 15 members, 14 are full-time employees, and 1 is part-time staff, which also means that the full-time to part-time employee ratio is 93%. Concerning their previous occupation, 10 people worked at a company, 1 in a university office, 2 in a patent office and 2 were students, therefore yielding a ratio of company-experienced employee of 67%. Only 20% of the staff is specialised in research (3 people), while the rest is in Planning (3 people), Finance and Law (3 people), Sales (1), Marketing (1), Administration (1), HR (1) and other (2). Compared with the 39 TLOs’ statistical
description previously shown in Table 2, TLO#12’s permanent and full-time employee ratios are much higher. Also, the company-experienced employee ratio is slightly high, while the research specialty ratio is slightly low. On the topic of time allocation, sales represent 55%, legal 23%, strategic activity 22%, and others 0%. Compared with the average of the 38 TLOs shown earlier in Table 4, TLO#12’s proportion of sales activity is slightly high, while that of strategic activity is slightly low.

The following seven working hypotheses are derived from TLO#12’s case analysis above:

\[ H1: \text{A TLO considering both researcher and company as important clients has a high license income.} \] 
(Social role hypothesis)

\[ H2: \text{A TLO considering researcher more important than local society has a high license income.} \] 
(Social role hypothesis)

\[ H3: \text{A TLO with a high permanent employee ratio has a high license income.} \] 
(Member composition hypothesis)

\[ H4: \text{A TLO with a high full-time employee ratio has a high license income.} \] 
(Member composition hypothesis)

\[ H5: \text{A TLO with a high company-experienced employee ratio has a high license income.} \] 
(Member composition hypothesis)

\[ H6: \text{A TLO with a low specialty ratio has a high license income.} \] 
(Member composition hypothesis)

\[ H7: \text{A TLO allocating its time to sales, legal and strategic activities in the approximate ratio of 55 : 23 : 22 has a high license income.} \] 
(Time allocation hypothesis)

3.5 Working hypotheses validation

This section illustrates the validation of the seven working hypotheses H1–H7. Two TLOs with an abnormal number of patents (TLO#32 and TLO#35) and one TLO with an abnormal license income (TLO#12) were excluded in the validation, therefore, leaving 26 TLOs for the analysis.

To evaluate the importance of both researcher and company in H1, a new variable called ‘researcher-company priority’ is created by adding the values of ‘researcher as priority’ and ‘company as priority’. This variable ranges from 3 to 9 (in integer) and a lower value means that both researcher and company are considered most important.

Next, to study the higher priority of researcher over local society in H2, a new variable called ‘researcher-society priority gap’ is created by subtracting the value of ‘researcher as priority’ from ‘local society as priority’. This variable ranges from −4 to 4 (in integer) and a value lower than (−1) means that researcher is considered as more
important than local society. Figures 5 and 6 show the point diagrams of the two new variables.

**Figure 6**  ‘Researcher-society priority gap’ and FY2003 license income

From Figure 5 of ‘researcher-company priority’, the top 5 TLOs with the highest license incomes scored 5 or less (the fourth and fifth top TLOs overlap). TLO#12’s ‘researcher-company priority’ score, which is not included in Figure 5, is 4. In addition, a score of 2 has appeared because one TLO ranked researcher and company in the same order. Considering that the calculation of the theoretical maximum frequency is 6 on a range from 3 to 9, it can be concluded that H1 is not false.

From Figure 6 of ‘researcher-society priority gap’, the top 5 TLOs with the highest license incomes scored less than (−1). TLO#12’s score is (−4). This result confirms that H2 is possible.

Figures 7–10 are used in the validation of H3, H4, H5, and H6 on member composition.

From Figure 7, TLOs with a high license income generally have a high permanent employee ratio, therefore making H3 possible. From Figure 8, TLOs with a high license income generally have a high full-time employee ratio, so H4 is also possible. Similarly, Figure 9 shows that TLOs with a high license income generally have a high company-experienced employee ratio, making H5 possible. Yet, for H6, a correlation between low researcher specialty ratio and license income could not be found in Figure 10. In conclusion, TLOs with a high license income were found to generally have high ratios of permanent, full-time and company-experienced employees. However, TLOs with a low license income scored inconsistently for these three variables. Concerning H6, no conclusion could be drawn from the relation between specialty ratio and license income.
Last, for H7 (time allocation hypothesis), a new variable called “distance from reference point” was created. Here, \( (\text{distance from reference point})^2 = (\text{sales activity ratio} - 55)^2 + (\text{legal activity ratio} - 23)^2 + (\text{strategic activity ratio} - 22)^2 \), where a lower score means that the time allocation ratio is closer to the reference ratio of 55 : 23 : 22. Figure 11 shows a diagram point of this variable score.

**Figure 7** ‘Permanent employee ratio’ and FY2003 license income

**Figure 8** ‘Full-time employee ratio’ and FY2003 license income
Figure 9  ‘Company-experienced employee ratio’ and FY2003 license income

Figure 10  ‘Researcher specialty ratio’ and FY2003 license income
As can be seen in Figure 11, TLOs with a high license income are close to the reference point. In contrast, as the distance from the reference point increases, the TLOs’ license incomes decrease, therefore making H7 possible.

In summary, working hypotheses H1, H2, H3, H4, H5 and H7 are possible, while nothing can be concluded for hypothesis H6. As there was not any significant correlation between the variables of H1, H2, H3, H4, H5 and H7 and the FY2003 license income, these seven hypotheses could neither be proved nor be disproved. Furthermore, after carefully examining the point diagrams, the following four hypotheses (DH) were derived:

DH 3’: A TLO with a high permanent employee ratio (above median of 71%) has greater potential for high license income than a TLO with a low permanent employee ratio (below median of 71%).

DH 4’: A TLO with a high full-time employee ratio (above median of 63%) has greater potential for high license income than a TLO with a low full-time employee ratio (below median of 63%).

DH 5’: A TLO with a high company-experienced employee ratio (above 50%) has greater potential for high license income than a TLO with a low company-experienced employee ratio (below 50%).

DH 7’: A TLO close to the reference point (below median of 18.38) has greater potential for high license income than a TLO far from the reference point (above median of 18.38).
4 Findings and discussion

From the previous analysis in Section 3.5, four organisational factors improving the TLO performance can be drawn:

1. permanent employee ratio
2. full-time employee ratio
3. company-experience employee ratio

To improve the TLO performance, factors (1)–(3) should be high, and the time allocation ratio for sales : legal : strategic activity should be about $6 : 2 : 2$. New findings regarding these four factors are discussed below drawing from the results of the interviews.

4.1 Interpretation of permanent employee ratio

The permanent employee ratio seems to mainly affect the organisational knowledge succession into the TLO, resulting in greater TLO performance. This assumption is consistent with previous findings (Rogers et al., 2000; Carlsson and Fridh, 2002) stating that the TLO’s age influences the learning curve (organisational knowledge accumulation). The chairman of TLO#16 (80% of permanent employees) corroborated that assumption in the interview:

“Temporary employees leave after 3 years, so their know-how doesn’t accumulate. When they leave, that’s the end. In the past, because our temporary workers were experienced, we didn’t need to train them. But now we have decided to recruit more young people. (...) Temporary employees are good at the beginning, but they end up leaving, we cannot reprimand them, command them, or question their performance. If someone could receive knowledge from external employees, it would be fine, but there is no one. To develop organizational knowledge, documents and manuals are not sufficient, we need young employees, and we want to learn from temporary employees.”

(TLO#16’s Chairman, 5 September, 2005)

4.2 Interpretation of full-time employee ratio

The full-time employee ratio appears to mainly influence the “staff’s motivation in issuing new licenses”, and the “licenser information’s availability associated with the time spent in the university”, resulting in greater TLO performance. Full-time employees spend more time in the university, thereby increasing their opportunity to get familiar with various technology transfer methods (Varga, 1998), and engage with inventors who play an important role in transferring uncertain technology. From the interviews with six of the TLOs (TLO#8, #9, #10, #12, #16, #19) conducted in Autumn 2005, because the whole licensing activity has to be handled by one person each time, full-time employees play a critical role in the TLO (the statement of TLO#12’s Chairman previously corroborated this aspect).
“The 7 marketing staffs here are actually technical staffs. Currently there is another person who works part-time, but the 7 people are all full-time employees. These people issue patent rights and market their activity. The activities from seed searching to contracting are all performed by one person. And yes, they need excellent skills; that is what I am worried about. If we divide the administration and the marketing of patent rights, it won’t go well because the relevant information lies around the inventor. Doing the job early on means sticking to them. (…) This job needs knowledge, individual quality and motivation. People who are proud of their job have a sense of responsibility and devotion for the inventor and society, and usually enjoy a good performance.” (TLO#16’s Chairman, 5 September, 2005)

“When a patent recommendation comes in, the license associate (‘technology transfer manager’) names a person in charge and this one person becomes responsible for all matters, leading to a trusting relationship. We don’t divide the job because nothing is more ineffective than the division of labor [when dealing with licensers and licensees]. If [TLO] members were to interview the researcher on the same things, it would only annoy him.” (TLO#08’s Chairman, 13 September, 2005)

“Basically, coordinators [license associates] search, evaluate and register a license all alone. Sometimes they share some tasks, sometimes they work in pairs.” (TLO#19’s General Secretary, 13 September, 2005)

“Labor division only occurs when dividing the proposals among members. Technology search, evaluation and negotiation are not split. (…) Advisers and full-time employees work as license associates and part-time employees answer phone calls and perform other tasks; so it makes it difficult. (…) We try to work together as one organization: every proposal received is always shared. Everybody can follow what is going on. Everybody can get information about trade shows results and give advice by email. We are trying to create organizational knowledge and every two weeks all members gather. However, in the end, it’s difficult to transfer individual skills. (…) The important thing is to ask university professors for information and advice on how to contact clients.” (TLO#09’s chairman, 6 October, 2005)

“We work all alone on each proposal. The division of labor didn’t work very well. Receiving a license is the first step in transferring technology. So whether we can get a license is the highest priority.” (TLO#10’s Center Chief, 10 October 2005)

4.3 Interpretation of company-experience employee ratio

The company-experience employee ratio mainly affects the “licensee information’s availability from personal networks”, resulting in greater TLO performance.

“The connection with Company A’s HR department was very useful. They know very well to whom we should present the proposal. They helped us in many ways.” (TLO#12’s Chairman, 13 September, 2005)

4.4 Interpretation of distance to reference point

The distance to the reference point influences the “licenser and licensee information’s availability from sales activity” and the “well-balanced team building”. For the recommended ratio in this paper (55:23:22), legal activity is slightly higher, and strategic activity is slightly lower compared with the average ratio of the 39 TLOs. This denotes that spending time in searching for information by directly visiting licensers
and licensees is more important than searching for information only from documents or databases. By directly visiting licensors and licensees, license associates may overcome cultural barrier (Jensen and Thursby, 2001; Siegel et al., 2003) that can inhibit technology transfer. Also, previous research suggests that TLOs able to analyse a licensee’s strategic actions achieve higher performance.

“Everyone calls and meets licensers on his/her own. I guess I have visited every laboratory 3 times. Some license associates target professors, while some others target associate professors. (...) Actually, it is easy to make contacts with licensees. When I was working at a company, the probability of success represented only 3 cases in 200 in one day. Here, I call 300 clients and make appointments with 298 of them. Once I said to the CEO of a big company “I couldn’t explain it over the phone, please just give me 30 minutes to meet”, and I was able to get an appointment with him. A company has nothing to lose by listening to a topic about profit. (...) I also think our failure rate is higher than anyone else; rather than thinking about a strategy, we just go out and learn from our failure. Once we failed 7 times in a row with one client, but the visits helped us learn more about its needs.” (TLO#12’s chairman, 13 September, 2005)

Furthermore, sales are not the only important activity and one TLO chairman explained how he involved the patent attorney to improve its team performance in the legal activity.

“The patent attorney is important. Involving high-level attorneys is the key for success. The way they issue and sell patents is different. We also learnt a lot from discussions with them; they helped us in getting a new point of view, and even in establishing a company. Mostly, they voluntarily work without pay. (...) In rural areas across Japan, the problem is that there are no professional attorneys. A law stationer is not enough. The way they write patent claims makes a big difference in sales.” (TLO#16’s Chairman, 5 September, 2005)

5 Conclusion and future research

In conclusion of the above discussion, the following six points need to be taken into account to improve the TLO performance:

1. continuity in the TLO’s organisational knowledge succession
2. licensing officer’s motivation
3. information accessible to the licenser associated with the time spent in the university
4. information accessible to the licensee from personal networks
5. information accessible to both licenser and licensee from sales activity
6. well-balanced team building.

TLOs were found to exhibit a great diversity in their strategic management reflected in their organisation such as permanent employee ratio, full-time employee ratio, company-experience employee ratio, and time allocation ratio for sales, legal, and strategic activities. As a result, in light of the findings from this research, TLOs decision-makers should focus on these management variables so as to maximise the first three ratios and spend more time on sales activities than on legal or strategic activities.
Drawing from the research findings, two hypotheses were developed:

1. The amount paid by a company buys not only the “complete utilisation of a technical idea and the right to use it” as an output derived from “a team assembled by the TLO”, but also “the team itself”.

2. The most successful team is the one that has the potential to derive more technical knowledge from one scientific discovery by building a long-lasting partnership with the licensor, licensee, and patent lawyer.

The essence of these hypothetical views resides in the nature of the university technology transfer, which is merely a ‘transferring process’, but instead a ‘creation process’.

The limit of the analytical model adopted in this paper is the assumption that all factors affecting performance can be independently examined. In reality, among these factors, some interactions impacting performance also exist. This limitation should be investigated further and future research might focus on a model also considering the interactions between these factors, and explore unambiguous mechanisms improving TLO performance.

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