

Appendix 2

THE CONDUCT OF THE QUESTIONNAIRE SURVEY

A2.1 Purpose of questionnaire survey

The questionnaire survey had two direct purposes – first to provide in itself a more general picture of IPR-related facts and perceptions in large corporations, and second to complement other sub-studies in the overall study, particularly the interview studies of best-practice corporations in Japan and Sweden. There was also an intention to develop and test a questionnaire that could be used as an instrument for diagnostic and benchmarking purposes in other settings as well.

A2.2 Method

A2.2.1 Sample design

The first and dominant sampling criterion was to include a major segment of the industrial R&D in Japan and Sweden, and thereby a major share of the IPR resources and activities.¹ The final sample came to consist of large R&D expenditure corporations, altogether covering over 50 per cent of the industrial R&D in Japan and over 90 per cent in Sweden. This first sampling criterion determined the sample size for Sweden and, consequently, the same magnitude was used for Japan. Second, a coverage of primarily chemical, electrical and mechanical engineering industries was desired, with some additional corporations representing civil engineering

¹ R&D concentration to large corporations is high in both countries, and particularly in such a small country as Sweden. The concentration of IPR resources may be even higher than the concentration of R&D.

(construction) and the pulp and paper industry. Third, a certain number of matching competitors (actual or potential with at least one major business area in common) were sought, which led to the addition of a few corporations. Table A2.1 lists the corporations that finally participated in the study. (Note the overlap between the sample for the survey and the sample dealt with in Appendix A. This naturally arises from the similarity in sampling criteria, an overlap which was intended.) The questionnaire was sent out to 32 Japanese corporations and 23 Swedish ones, of which 25 and 20 answered respectively, thus giving a response rate of 78 per cent and 83 per cent respectively. No evidence of bias in the set of non-respondents was detected. Lastly, note that the tables in Chapters 5 – 8 refer only to the corporations in the chemical, electrical and mechanical engineering industries.

Table A2.1 List of Japanese and Swedish corporations participating in the survey study

Japanese corporations ¹⁾	Main sector ²⁾	Swedish corporations ¹⁾	Main sector ²⁾
Asahi Chemical Ind.	C	AGA	C
Canon Inc.	E	Asea Brown Boveri (ABB)	E
Fujitsu Ltd.	E	Astra	C
Hitachi Ltd.	E	Atlas Copco	M
Honda Motor Co., Ltd.	M	Bofors	M
Matsushita Electric Ind.	E	Ericsson	E
Mitsubishi Heavy Ind.	M	Gambro	M
Mitsubishi Kasei Corp.	C	Kabi Pharmacia	C
NEC Corp.	E	Mölnlycke	C
Nippondenso Co., Ltd.	E	Nobel	C
NSK SB	M	SAAB	M
Nippon Steel Corp.	M	Sandvik	M
Nippon Telegraph & Telephone	E	Scania	M
OJI Paper Co., Ltd.	C	Skanska	B
Shimizu Corp.	B	SKF	M
Showa Denko K.K.	C	SSAB	M
Sumitomo Chemical Co., Ltd.	C	STORA	C
SONY Corp.	E	Telia	E
Takeda Chemical Ind.	C	Vattenfall	B
Teijin Ltd.	C	Volvo	M
The Tokyo Electric Power Corp.	E		
Toray Ind.	C		
Toshiba Corp.	E		
Toyota Motor Corp.	M		
Yamanouchi Pharmaceutical	C		

Notes:

1) In total 25 Japanese and 20 Swedish corporations participated. An independent, non-consolidated subsidiary to a keiretsu in Japan and an independent, non-consolidated subsidiary to a corporate conglomerate in Sweden was treated as a separate corporation.

2) Sector classification was made on the basis of the main or largest sector in the corporation, using broad sector categories, corresponding to engineering industry categories. The categories were chemical (C) including pulp, paper and pharmaceuticals, electric/electronic (E), mechanical (M) and construction (B) (buildings, bridges, etc.). Among the respondents there were 9C, 10E, 5M and 1B Japanese corporations and 6C, 3E, 9M and 2B Swedish corporations. Typically the corporations were active in several sectors and the main sector classification is just a first approximation.

A2.2.2 Questionnaire design

The questionnaire was comprehensively designed to cover all major issues related to patenting and its role in corporate commercialization of new technologies. The questionnaire comprised 27 pages with over 400 questions, corresponding to separate variables with factual as well as perceptual questions and including mostly closed questions but also a few open ones for qualitative answers. The complete questionnaire is annexed below. Tendency questions for 1987-1991 were often added to the perceptual questions, which referred to the situation in 1992. Factual questions were asked for the two years, 1987 and 1991, in order to allow a rough time analysis and was designed in the most parsimonious way in order to limit the number of questions. The questionnaire was divided into the following sections or blocks of questions:

- A. General company information
(Factual questions)²
- B. General information about company R&D
(Mainly factual questions)
- C. Technology sourcing (acquisition) and commercialization
- D. Information about the company's IPR and patenting activities
(Factual questions plus perceptual questions on IP-related trends)
- E. Organization and management of IPR and patenting in 1992
(Factual questions)
- F. Role of IPR and patenting in technology commercialization
(Almost all perceptual questions)

A large part of the questions were generated from previous studies of multi-technology corporations and technology strategies (see e.g. Granstrand et al. 1989) and from an earlier study of patenting (Granstrand 1988). Some questions were inspired by Taylor and Silberston (1973). A few questions were selected from the so-called Yale study (reported in Levin 1987), and some

² The distinction between factual and perceptual questions is important, although not always clear. Factual questions refer to facts that are possible to ascertain on higher order measurement scales, apart from straight classifications, with little subjectivity of individual respondents involved. Perceptual questions (for example regarding relative weight of motives or causes behind a decision, policy, behavior or trend) typically extract subjective assessments mostly on ordinal scales and only occasionally on higher metric and quotient scales (e.g. percentage estimates). In the latter case, reliability may be improved by multiple assessments.

questions regarding university research from a successor study designed by S. Ostry in collaboration with Prof. Richard Nelson and others. However, most questions were newly generated in line with issues in the overall study, several of them in connection with the interviews. No specific hypotheses for testing were pre-formulated. The questionnaire was thoroughly discussed and commented upon in a pilot test with IPR representatives from a handful of the Japanese and Swedish companies, who made language suggestions and also suggested new questions. The questionnaire language was English, as suggested by the companies. The primary currency to be used was US dollars. The questions pertained to the corporation as a whole as it was consolidated at the end of 1991. Although everyone was convinced about the principle of keeping the questionnaire short, there were almost no deletions suggested by the practitioners.³ Finally, it should be observed that the resulting questionnaire could also be used as a diagnostic and benchmarking instrument for a corporation in general.

A2.2.3 Survey administration

The questionnaire was sent to the corporate patent or IP manager in the Japanese corporations, all of which had such a person. For the Swedish corporations, the questionnaire was sent to the CEOs, but was filled in by an IP manager or R&D manager corresponding as close as possible to the respondents in the Japanese sample. Ordinary reminders and follow-ups were made, as well as checks of the returned questionnaires.⁴ The overall questionnaire response rate was high (around 80%), and so were most of the various question response rates, particularly for the Japanese corporations, many of which completed the questionnaire in almost every detail. Several Swedish corporations were not able to provide a completed questionnaire, as the information sought was not readily available in consolidated form and was costly for them to

³ The advice on questionnaire design and administration by representatives of patent offices in Japan and Sweden and of Canon, Toshiba, ABB, Ericsson, IVA, and AIPPI-Japan is gratefully acknowledged.

⁴ The assistance of Mr. K. Iwanaga, Mr. P. Keddy and Ms M. Franzén at the Research Policy Institute, University of Lund, and M. Sc. Bo Heiden at Chalmers University of Technology is gratefully acknowledged.

collect.⁵ In a few cases, answers were withheld in both Japan and Sweden for confidentiality reasons. The response rates for the perceptual questions were generally high, however.

A2.2.4 Data analysis and general caveats

The questionnaire responses were coded and univariate analyses performed. Low question response rates were analysed. No evidence of bias among non-responses could be detected.⁶ Several variables were deleted from further multivariate analysis because of lack of data. Various fairly standard multivariate analyses were then performed. A few of the results of these are presented in Chapter 5.⁷

Some general caveats must be pointed out. First, the number of variables by far exceeds the number of corporations. This was by design in order to explore a wide range of issues among corporations with substantial R&D and IP operations, rather than to test pre-formulated hypotheses for a narrow range of variables. The small sample size in relation to the large number of variables naturally limits the possibilities to do multivariate analysis. Also possibilities for generalizing within industries (main sectors) are highly limited, because of the small sample. Second, the subjective nature of perceptual questions necessitates caution in interpretation and generalization, especially over time. Third, the lower response for factual questions also necessitates caution. Fourth, country-comparative survey studies always involve methodological problems with results being possibly influenced by differences in country background differences pertaining to history, language interpretation, perceptions, cultural attitudes, etc. Here, the corroboration of the results by the interview studies was important. Finally, this is an early study of its kind and many of the results must be considered exploratory.⁸

⁵ This is partly a reflection of the generally lower degree of central coordination in Swedish corporations, partly a reflection of their lower levels of IP resources and management attention to IP matters.

⁶ Such evidence is difficult to find, of course.

⁷ The assistance of B. Areskough, Dept. of Mathematics, Chalmers University of Technology, is gratefully acknowledged.

⁸ The results of the survey, especially pertaining to the stark differences between Japanese and Swedish large corporations, are also presented in Granstrand and Sigurdson (1993).

The complete questionnaire is appended (with questionnaire page numbers below book page numbers).