

Chapter 8

IP ORGANIZATION AND MANAGEMENT

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8.1 Chapter outline

This chapter will describe developments in the organization and management of IP resources and activities in large Japanese corporations. Special attention will be paid to what can be called a patent culture in those corporations. Such corporate patent cultures have developed during a long period of time as described in Chapter 5 but have been strengthened considerably from the 1980s onwards through developments in IP organization and management, spurred by the outbreak of "patent wars", notably with large US corporations.

Accordingly, IP resources have increased substantially, and the IP organization has become upgraded, more centralized, more comprehensive, and has received more attention by top management, technology management and business management. It appears as if Japan, partly as a result of the pro-patent era, has developed still another area of management in which Western companies have much to learn. The chapter also addresses the possible future role of IP management and the further evolution of corporate management and organization. With the increasing role of intellectual capital and the further emergence of what we can call intellectual capitalism (see Chapter 10), it is conceivable that intellectual capital management will develop, engulfing IP management. Which countries and companies will take the lead in this development is an open question.

8.2 IP resources

The level of IP resources in Japanese corporations is considerably higher than in most Western corporations, as is the output in terms of patent applications (see Chapter 5). As mentioned, the IP resource levels have also increased during the 1980s, as have the numbers of patent applications. Table 8.1 gives some examples of top IP spenders among Japanese large corporations in different sectors.

As seen from Table 8.1, the electrical corporations top the list regarding the total number of patent employees. The electrical industry was also the first and hardest hit by the patent wars and therefore reacted early by building up in-house resources. In terms of the ratio of patent employees to total employees, Canon is leading. However, it must be kept in mind that the degree of outsourcing and centralization of IP resources and R&D varies among the corporations. The degree of consolidation also varies. The figures for the total number of employees, total sales and total R&D are self-reported in the questionnaires complemented with officially reported figures.

Table 8.1 Japanese corporations with most patent employees (in 1991)

Corporation	Patent employees ¹⁾	Total employees ³⁾	Pat.empl./ Tot. empl. (%) ⁴⁾	Total R&D (MUSD) ²⁾	Total sales (MUSD) ²⁾	R&D/ sales (%)
Electrical:						
Toshiba Corp.	370	162 000	0.23	2 390	35 507	6.7
Canon Group	350	62 700	0.56	830	14 053	5.9
Matsushita Electric Co. Ltd	340	210 848	0.16	2887	49 619	5.8
Hitachi Ltd.	330	324 292	0.10	3 690	58 173	6.3
Fujitsu Ltd.	210	155 779	0.13	2 947	25 880	11.4
Sony Corp.	200	110 000	0.18	1 504	27 068	5.6
Mechanical:						
Honda Motor Co., Ltd.	150	85 500	0.18	1 459	32 342	4.5
Toyota Motor Corp.	130	102 423	0.13	3 233	74 099	4.4
Chemical:						
Asahi Chemical Ind.	70	27 018	0.26	300	9 785	3.4
Mitsubishi Kasei Corp.	70	17 000	0.41	379	9 479	4.0

Notes:

- 1) Number of persons working more than half time with patenting activities according to questionnaire. See note 4.
- 2) Consolidated data, including majority owned subsidiaries worldwide. Conversion rate used is 1USD = 133JPY.
- 3) Consolidated employee data.
- 4) Hitachi, Honda, Toyota, and Asahi reported non-consolidated data. It is therefore possible that the number of patent employees may be greater than shown due to additional staff in majority owned subsidiaries not reported. This would produce higher patent employee ratios for these companies.

Source: Questionnaire survey by the author and colleagues. Corporate annual reports.

Table 8.2 then shows the general picture of patent and R&D resources in the sample. A few observations in relation to Table 8.2 are noteworthy. First, total patenting costs have grown considerably between 1987 and 1991, more than sales and R&D. However, the growth of in-house patenting staff is much less, except for the electrical industry which has been a forerunner in building up IP resources in the 1980s. The lower overall growth of in-house patent employees compared to the growth of patenting expenditures is probably primarily due to growth in foreign applications, but it could also be due to a growth lag that reflects both a temporary peak in work load and bottlenecks in more long-term build-up of IP resources that lead in turn to the growth in outsourcing. It could also be due to circumstances specific to the mechanical corporations, which show the largest difference in growth ratios for patent engineers and in-house patent costs.

Patent employees in Japanese large corporations are predominantly engineers, few are economists and lawyers. The main strategy in building up in-house competence has been to "convert" engineers to patent specialists, as is also indicated by the growth in percentage of engineers in patenting. There are, moreover, significant differences across industries in the degree of centralization of patent employees.

The chemical corporations were found to be most centralized and the electrical corporations least centralized, although with a strong trend towards centralization among the latter. On average, patenting is also more centralized than R&D and engineering.¹ For example, about 20 per cent of IP personnel are located at corporate headquarters in Toshiba, while the other 80 per cent work in various operations departments in the corporation. For engineers in general at Toshiba, about 19 000 have at least a Bachelor's degree or the equivalent, and of these only 10 per cent work in corporate laboratories, while 10 per cent work in development laboratories and the remaining 80 per cent in various other operations departments.

¹ A similar result was found in Etemad and Dulude (1987) as well for a sample of large European, Japanese and US MNCs.

A final observation is that on average "patent intensity" in terms of the ratio of patent costs to R&D costs is still fairly low, i.e. around 2.3 per cent, which by the way is less than half the average R&D intensity, i.e. the ratio of R&D costs to sales. However, some companies like Toshiba have a patent/R&D cost ratio around 10 per cent.²

² A study by the author of 10 US large corporations (GE, ITT, Xerox, Pfizer, Motorola, 3M, Honeywell, Control Data, RCA, and Zenith) in 1985 showed a patent-to-R&D cost ratio in the range 1–3%. However, the ratio of number of patent applications per R&D dollar has been over ten times higher in Japan relative to the USA in leading chemical, electrical, and mechanical corporations.

Table 8.2 Patent and R&D resources in Japanese large corporations

(Code) Question	Chemical (n=9)	Electrical (n=10)	Mechanical (n=5)	Total (n=24)
(A1a) Total sales globally in 1991 (MUSD)	6 341	33 096	30 791	22 582
Growth ratio 1991/1987	1.31	1.43	1.45	1.42
(A2a) Total number of employees in 1991 ¹⁾	13 906	153 056	60 771	81 649
Growth ratio 1991/1987 ²⁾	1.23	1.15	1.03	1.14
(B1) Total R&D expenditures worldwide in 1991 (MUSD)	255	1 984	1 285	1 190
Growth ratio 1991/1987	1.38	1.56	1.50	1.53
(E7) Cost of in-house patenting department activities and purchased services in 1991 (MUSD)	8.0	51.5	22.4	27.0
Growth ratio 1991/1987	1.63	1.35	1.17	1.43
(E6a) Number of persons working more than half-time with patenting activities in the company in 1991	40.8	217.2	94.8	121.6
Growth ratio 1991/1987	1.04	1.35	1.01	1.23
thereof:				
(E6b) Percentage engineers 1991	83.8	62.6	76.8	74.0
Growth ratio 1991/1987	1.01	0.96	1.05	1.00
(E6c) Percentage lawyers 1991	4.9	6.3	2.2	4.9
Growth ratio 1991/1987	0.86	1.58	0.73	1.11
(E6d) Percentage working in central/corporate headquarters 1991	75.0	37.6	46.2	54.1
Growth ratio 1991/1987	1.00	1.10	0.95	1.02
Key resource ratios:				
(E6a/A2a) Percentage patent workers in the company 1991 ²⁾	0.32	0.17	0.22	0.18
(E7/B1) Patent cost/R&D cost 1991 (%)	3.1	2.6	1.7	2.3
(B1/A1a) R&D/sales 1991 (%)	4.0	6.0	4.2	5.3

1) The figures for the chemical and mechanical sectors are underestimated due to the inclusion of non-consolidated company employee data.

2) Ratios are based solely on reported employee data from company questionnaires.

8.3 IP organization

8.3.1 Organizational options for IP in general

There are various options concerning the organization of IP activities. They could be combined in different ways, e.g. in a 3-tier organization with IP activities at corporate, business area, and business unit levels plus parallel IP activities in an independent foreign subsidiary or newly acquired company, all supplemented with outside patent firms, and law firms. Thus, IP activities could be:

- 1) Centralized at corporate headquarters (mostly as a staff function)
- 2) Decentralized to business areas, business units and subsidiaries, domestic and foreign
- 3) Decentralized to one business division as a "lead-house" with corporate-wide IP responsibility
- 4) Organized as an independent IP business unit in the corporation
- 5) Externalized to a supplier organization, with one, two or more patent bureaus, agents, attorneys and law firms (more than one is definitely advisable for a large company), or to collective IP resources shared with others.

At the functional level IP may be organized:

- 1) As organizationally separate functions for various IPRs (patents, trademarks, copyrights etc.)
- 2) As a comprehensive IP department, integrating various IP activities
- 3) Integrated with R&D, a special innovation company, a legal department, a licensing department, a department for intelligence, information and documentation, or with marketing.

Rarely is an IP department organized as a profit centre or business unit. Often it is a cost centre with a cost-sharing arrangement, possibly with some services sold internally as well. As a typical staff service function, the IP organization works in a matrix arrangement with the line organization. Coordination is also achieved through committees, liaison people and the

like.

Traditionally in Western companies, IP matters have not attracted a great deal of resources and attention concerning their organization. Usually, IP activities have been split into patenting and other activities and attached in a subsidiary manner as staff or service functions to other functions in the corporation. A traditional large Western corporation has typically had some kind of patent department attached to R&D or a legal department at corporate level with some liaison engineers decentralized. Trademark-related activities have mostly been attached to marketing. Sometimes, there has also been a separate licensing department. While there has naturally been a certain amount of writings about the work operations of IP-related departments and their staff, especially patent departments, there have been few, systematic studies across companies, industries and countries. A classic study is Taylor and Silberston (1973), which contains a sub-study of patent and licensing departments in approximately 30 UK companies in the chemical and engineering industries. Some of the findings in the Taylor- Silberston study may well represent the traditional situation in many other Western companies and will therefore be described here.³

Taylor and Silberston distinguish between four types of patent organizations.⁴ The types (1–4) differ primarily in terms of size (from small to large), degree of internationalization of specialist operations (from low to high), and degree of formal organization and management (from low to high). The four types refer only to patenting, and thus do not differ in terms of an expanding set of functional responsibilities outside the patenting area. The first type of patent organization has no specific arrangements other than having a chief engineer or a technical manager assuming responsibility for patenting. There is no special staff and

³ Another of the rare studies of size and organization of patent departments is Bertin and Wyatt (1988), who made a questionnaire survey 1983-84 of 118 large firms (corresponding to a response rate of 22%) in 15 countries and 6 sectors. The average number of full time employees involved in patenting services in 9 responding Japanese firms was 118.

⁴ The authors call them successive stages of patent organization, but present no historical evidence that the types constitute stages in some sort of evolution of the patent organization. Nevertheless, given that patent resources grow overall, the types are likely to follow roughly upon each other, possibly with some leaps.

therefore he must rely fully on outside patent agents. The second type of patent organization has an in-house patent specialist with a very small staff but still relies greatly on outside patent agents. The third type, considered a typical industrial patent department in the study, has a central patent department at corporate headquarters, headed by a specialist middle manager as patent manager, that is qualified as both a patent agent and an engineer. This department has a central staff, supplemented by liaison individuals or small units of patent specialists in the R&D and production units, as well as some outside patent agents, especially for work on foreign applications. The fourth and final type is termed the 'super patent department' in the study. The total staff of this type of patent organization ranged from around 35 to 50 patent employees, including secretarial and clerical staff, performing all professional patent work except that which needed foreign agents. The largest of such patent departments, of which there were only a few in British industry at the time (late 1960s), were able to handle several hundred UK priority applications. There were perhaps five or more foreign applications for each of these. Licensing was likely to be a separate department. The traditional functions of the patent department as identified in the study included: obtaining and maintaining patents (including identifying patentable inventions in the organization and deciding whether to patent or not); opposing patent applications of others; handling infringements; linking up with licensing and litigation when needed; dealing with foreign patent work; and performing as a clearing-house for technical information in the firm, including the monitoring of patenting by others.

8.3.2 Patent and IP organization and management in large Japanese corporations

The patent organizations in large Japanese corporations in the 1990s have a number of common features that clearly distinguish them from the traditional patent organization in large Western corporations.

IP resources

The resources devoted to IP activities are not just slightly larger, they are often larger by a

magnitude.

Centralized IP department

Responsibilities for patenting and other IP matters have been integrated and centralized into a comprehensive IP department at corporate level. In fact, all 24 corporations in the sample had a centralized patent department with corporate-wide responsibilities for patent coordination, headed by one central corporate patent manager. Usually, this department had similar responsibilities for other IP matters as well; there was an organizational trend showing evolution from a patent department to an IP department and from a patent manager to an IP manager.

Status of the IP department

The status and power of the patent and IP department has risen. Questions about patents and related matters were regularly discussed at company board meetings in most of the corporations, and often the IP manager reported directly to the CEO. The career paths to top management positions often have resided substantially in R&D with involvement in IP matters, and several Japanese CEOs were strongly IP-oriented. The IP department was thus of strategic concern under pro-active management, not just a reactive service department. Consequently, there was a need for sustainable in-house competence on a substantial level and scale. Still, much patent work was outsourced.

Clearing-house

Substantial emphasis and resources were devoted to having the patent department serve as an active clearing-house for technical information, with activities for technology scanning internally and externally, patent mapping, patent clearance, dissemination etc. Sometimes, technology intelligence was conducted in special subsidiaries as well. Such information-

related activities are clearly important but in Western companies they have been difficult to maintain, coordinate and link to decision-making. Often the Western patent department has scanned and disseminated patent information without adding much value for the user, and without much follow-up and feedback (cf. Chapter 9). Japanese firms also experience difficulties like these, but they tackle them in more determined and systematic ways.

Integration of IP and R&D

Good working relations between the patent department and R&D were emphasized. This is a natural concern in Western firms as well, however the Japanese patent department was usually more powerful than a reactive service department purely under the aegis of R&D. Patenting people were regularly involved in the early stages of R&D, not casually called in at too late a stage as has often been the case in Western companies. Patent management operated pro-actively rather than reactively responding to requests from business and R&D operations and was expected to take sufficient initiative in order to secure viable patent positions in various business and technology areas. Needless to say, that is not an easy task as business divisions become increasingly independent. In general, corporate patent management in Japan had more power than their Western counterparts.

To illustrate, in one corporation a review of patent positions was regularly undertaken at an early stage of entering a business and/or technology area. If the review showed an unfavourable "jungle" of patents, the IP manager had the clout to hold up the project until some kind of patent clearance (through e.g. licensing) had been undertaken. However, more common than vetoing, an IP manager had the possibility to bring such a situation to the attention of higher management.

Patent (IP) culture

The Japanese patent organization was immersed in what can be called a patent culture in the corporation. This is an important feature that will be dealt with in the next section.

8.4 Patent management and patent culture

Chapters 5 and 6 have described how Japanese industry, and large corporations in particular, have developed a general orientation concerning patenting. This orientation could best be described as a patent culture residing within and between companies.⁵ The patent culture did not develop as a result of a grand design but was instead part and parcel of a catch-up process that started after World War II and was further strengthened after the emergence of the pro-patent era in the 1980s. That is not to say that managerial action cannot influence the formation of a culture in business, such as a patent culture. The early efforts of Mr. Takahashi, at the national level, are one example of such action (see Chapter 5). The efforts of Mr. Saba, former CEO and Chairman of Toshiba, and Mr. Yamaji, former CEO and vice Chairman of Canon provide other examples.

The question is to what extent can a patent culture be fostered by managerial action in a corporation. A more general question is how a corporate culture in general could be formed. Japanese corporations are renowned for having built strong corporate cultures by various means. Needless to say, a well-functioning culture of some sort could be an effective vehicle for coordinated, purposeful action, and as such, could work as an efficiency-enhancing control mechanism. At the same time a culture could become a barrier to change. Moreover, in society as well as in large corporations, there is a fair amount of cultural diversity with several subcultures that may clash with one another.⁶

Thus there is a need for management to consider how to influence cultural formation and change. General managerial instruments that are mentioned in the management literature as useful in bringing about cultural formation and change are: strategy and policy formation, recruitment, promotion, restructuring of communications through organization and location,

⁵ The concept of culture has come into popular use – and misuse – in management in the last few decades. Despite a certain vagueness and tendency to use culture as a catch-all concept, it will be used here since it captures some important, if yet evasive, features in organizations. A standard textbook in social psychology has the following definition: "Culture includes all institutionalized ways and the implicit cultural beliefs, norms, values and premises which underline and govern conduct" (Krech et al. 1962, p. 380).

⁶ A subculture is simply "a culture within a culture".

and campaigns of various sorts. There are also less tangible managerial actions representing elements at a fundamental level within a culture, such as actions that influence language and values, create symbols and rituals, integrate company life with social life and leisure activities, take on social responsibilities, strengthen ideologies, nurture common myths, and create implicit incentive and penalty structures. The importance of company leaders as role models who live as they preach is also extremely important.

These are all general elements in fostering a culture in a corporation, and it is in the nature of things that an exhaustive listing of elements cannot be made and that many elements are intangible, requiring much managerial sophistication. When it comes to building a corporate patent culture that was found in the large Japanese corporations studied, the elements become more specific. Some of these elements, as observed, are dealt with below, in no particular order.

Top management involvement in patenting and IP

Top management involvement is indeed a necessary but insufficient condition. It is typical for most Japanese corporations to have top management involved in technology and R&D. Many corporations, too, have had a preference for technologists as CEOs, although there are corporations such as Hitachi and Toshiba that prefer a succession of technologists and commercialists as CEOs. In either case they are almost always members of top management with an appreciation of patenting matters, often having direct personal experience. Some top managers make it a habit to ask questions about the patent situation during business presentations, and some also make it a habit to visit labs and discuss, among other things, patenting in more casual ways. It is important to show concern and at the same time refrain from letting obsolete or otherwise insufficient technical knowledge or one's own pet ideas misguide R&D.

Patenting and IP as a common concern for all engineers

Although specialists are always needed for patent work, it is considered important not to consider patenting primarily a specialist function but to make patenting a common concern for all engineers. Training courses, job rotation and career paths with at least an early stint in a patent department are valuable, together with the other measures described below.

Patent policies and strategies integrated in business plans

Without a requirement that makes patenting and IP a regular and specified item on the agenda of business plans, business managers will easily neglect the IP situation or let IP strategies become too generalized and watered down. Integration of business and IP aspects is not only a matter of thinking hard and coming up with cunning ideas but is also a matter of two-way communication with some integration of business language and IP language. "What is our unique competence in this business?" is a common question in business analysis. The equally important, but less commonly used IP-related question is "How can we protect our unique competence in this business?"

Clear patent objectives

Clear, quantified objectives for patenting were common among the Japanese corporations in the study. An example is given by Hitachi, which had the objective of increasing the number of strategic patents by 25 per year, as described in Chapter 7. There are many arguments against quantifying objectives, and often patenting people produces such arguments. One argument is that quantified objectives are said to stimulate quantity rather than quality of patents and foster unfruitful competition. On the other hand, quantification focuses attention and provides clear yardsticks for rewards and penalties, as well as for improvements. The arguments for quantifying objectives appear to be stronger when building a patent culture. Such objectives then function as symbols and provide a basis for habitual behaviour, even rituals, such as "Kamikaze research", which describes the patenting frenzy in Japanese companies at the end of the budget year in order to meet quotas. Such behaviour could be

seen as going too far, but nevertheless is part of the patent culture.

Clear patenting incentives for R&D personnel and organizational units

The issue of how to reward inventive work by individuals, teams and units is a very important and fundamental question in both Japanese and Western firms. This is a complex issue that could be elaborated at great length. Without doing so here, one can just point to the clear and fairly strong reward schemes employed by Japanese firms, often developed without the adversarial relationship between the firm and the inventor that easily develops in Western firms. The following citation is in contrast with the top management view, not uncommon in Western firms, that R&D people basically are salaried for doing inventive work.

We try to encourage the view that the company's value to society lies in developing new technology. We also try to provide a corporate environment where thought and originality are rewarded.

We give annual cash awards to the employee who has applied for the most patents that year and to those who have developed patents or software of an outstanding nature.

Keizo Yamaji

Former CEO, Canon Group

Fostering of behavioural attitudes and norms

Fostering of behavioural attitudes, norms, habits and standards conducive both to technology protection by patents and secrecy and to technology intelligence can be done in various ways. For example, certain reading and writing habits of engineers can be encouraged, as in Canon. A citation by Dr. Yamaji may again illustrate:

I encourage our researchers to read patent specifications rather than academic theses and to write patent applications rather than technical reports. I also tell them to make virtual experiments ("Gedanken" experiments) in order to have them apply for more and more patents, so that we can be prepared for the era to come when only some companies, strong in patents, will cooperate with each other and survive.

Keizo Yamaji

Former CEO, Canon Group

Canon, as well as other companies, also tries to encourage writing habits by aligning the reporting on R&D work to the norms and standards used in patent documents. In this way, patent application work is facilitated while thinking in patent terms is encouraged.

Speaking, listening and observation habits of engineers, salesmen, managers etc. could also be influenced for protection and intelligence purposes, although extreme behaviour in this regard may be counter-productive in other respects.

Visible organizational means

Tangible and intangible means for building a patent culture have to complement each other. Examples of visible organizational means besides the ordinary patent organization are patent promotion centres, patent liaison officers distributed in the organization, corporate-wide patent campaigns, patenting prizes, and patent strategy seminars.

Language, methodology and philosophy

A common language is central to any culture. One way to foster a professional language for a patent culture is to develop concepts and tools and employ them in a methodology for analysis and in communication, which could be further turned into a philosophy. The patent-mapping methodology described in Chapter 9 was developed in Japan by JPO initially and then improved over time by large corporations. It has been a useful methodology for several purposes in itself, but at the same time it has contributed to building a patent culture through its influences on language, analytical perspective, conceptualization and communication.

Finally, it must be emphasized that corporate patent cultures are embedded in and reinforced by an overarching industrial and national culture, conducive to patenting, inventions, intelligence, and so on. There is a wide range of institutional arrangements for this with government agencies and initiatives, legislation, associations, institutes etc. The

historical dimension is important and Chapter 5 gives some features of it for Japan. The large Japanese corporations as a whole play an increasingly important role. The corporate IP managers know each other well and are part of various "old boy networks" (to use a Western term). The Japan Patent Association (JPA) is a good example of an organization primarily catering to the interests of large corporations since long ago.⁷

8.5 IP organization at Toshiba and Hitachi

Toshiba is one of the leading Japanese corporations in the IP field, with top rankings in terms of e.g. number of patent applications and patent employees. Thus, it is natural to look at the history, organization and management of IP in Toshiba in greater detail.

Table 8.3 indicates that the organizational history of Toshiba and its R&D and IP resembles, at a very general level, the organizational development in a large Western corporation. The corporation grew, diversified, refocused and internationalized. At the same time, R&D established early as a separate lab, grew, diversified, differentiated into product and process development and research and organized into a mix of centralized/decentralized labs under a technology management structure. At a later stage, R&D became internationalized, a process that began fairly late in Toshiba. The IP organization became established as a patent department at an early stage, also by Western standards (comparable to stage 2 in Taylor and Silberston's study described above). The IP organization has historically been oriented around patenting, which grew and was upgraded in the organization, adopted a centralized/decentralized mix, internationalized, and finally consolidated into one large department with various IP activities that grew up in a diversified way over the years. Thus developments in the corporate organization shaped, often with some time lag, the developments of the R&D organization, which further shaped the IP organization.

⁷ JPA was formed in 1938 by patent attorneys employed in some large corporations including Toshiba and Hitachi. It was originally named Chrysanthemum Feast Club (Chōyō Kai) and was renamed Japan Patent Association (Nihon Tokkyo Kyōkai) in 1959 (Rahn 1983, p. 473).

Table 8.3 Key historic events in Toshiba's corporate, technology and IP organization

Some key events in corporate organization	Some key events in R&D organization	Some key events in IP organization
1870 Shibaura Electric established		
1890 Tokyo Electric established (first producing light bulbs)	1906 R&D lab established in Shibaura Electric	1912 Patent Section est'd
	1918 Matsuda R&D lab established in Tokyo Electric	
	1931 Tsurumi R&D lab established in Shibaura Electric	
1939 Toshiba established as merger of Tokyo Electric and Shibaura Electric		1944 Patent Division est'd
1960s Cooperation with NEC and GE in computers	1961 Corporate research lab established	
	1968 Heavy industry research lab established	1968 A decentralized system adopted
	1970 Production engineering lab established	
		1972 Start of trainee education for foreign countries
1976 Adopts GE type of organization (with business portfolio analysis, business units etc.) Decides to focus on electronics and information technology.		
1978 Exit from mainframe computers	1978 Labs in business units established in a 3-level organization under business sector labs and corporate labs	
		1979 Washington Intellectual Property Office ("WIPO") established.
1980s Promotion of globalization, and E&E strategy (energy & electronics). Later extended to 3E – energy, electronics and environment.	1980s Various new labs established, e.g. a VLSI lab in 1984. The 'Tokken' system for R&D management established together with the 3-level R&D organization.	
1989 ICTs account for over 50% of sales		1989 Intellectual Property Division established

Source: Material from Mr. Saba, Mr. Takayanaga, Mr. Norichika, Miyazaki (1995), and interviews.

Figure 8.1 shows the overall Toshiba corporate IP organization in the mid-1990s. One can note that each business group has an integrated IP department or section under the business group management but also a functional administrative management arrangement with the corporate IP division. The latter in turn is at the same staff level as R&D and the design centres.

Figure 8.2 further shows the inner organization of the IP division, with departments for each major type of IPR, except trade secrets, plus departments for licensing and patent information. Toshiba Techno Center also performs patent analysis but for various reasons is organized separately. Finally, there is a relatively large department for planning and coordination of IP departments in business groups. Thus, the IP division is by and large comprehensive, and represents another stage beyond the "super patent department" in the study by Taylor and Silberston (1993).

Education in IP, both for IP personnel and engineers corporate-wide, is important in Toshiba, as in any company seriously responding to the pro-patent movement. Table 8.4 shows Toshiba's patent education system.

Similar, although not identical, IP organizations can be found in other large Japanese corporations, as illustrated in Figures 8.3 and 8.4 in the case of Hitachi and in Figures 8.5 and 8.6 in the case of a representative chemical corporation (as a contrast to the focus so far on electrical corporations). Figure 8.7 also gives a bird's-eye view of how R&D and patent departments cooperate in the Hitachi case.

Table 8.4 Toshiba's patent education system (as of 1995)

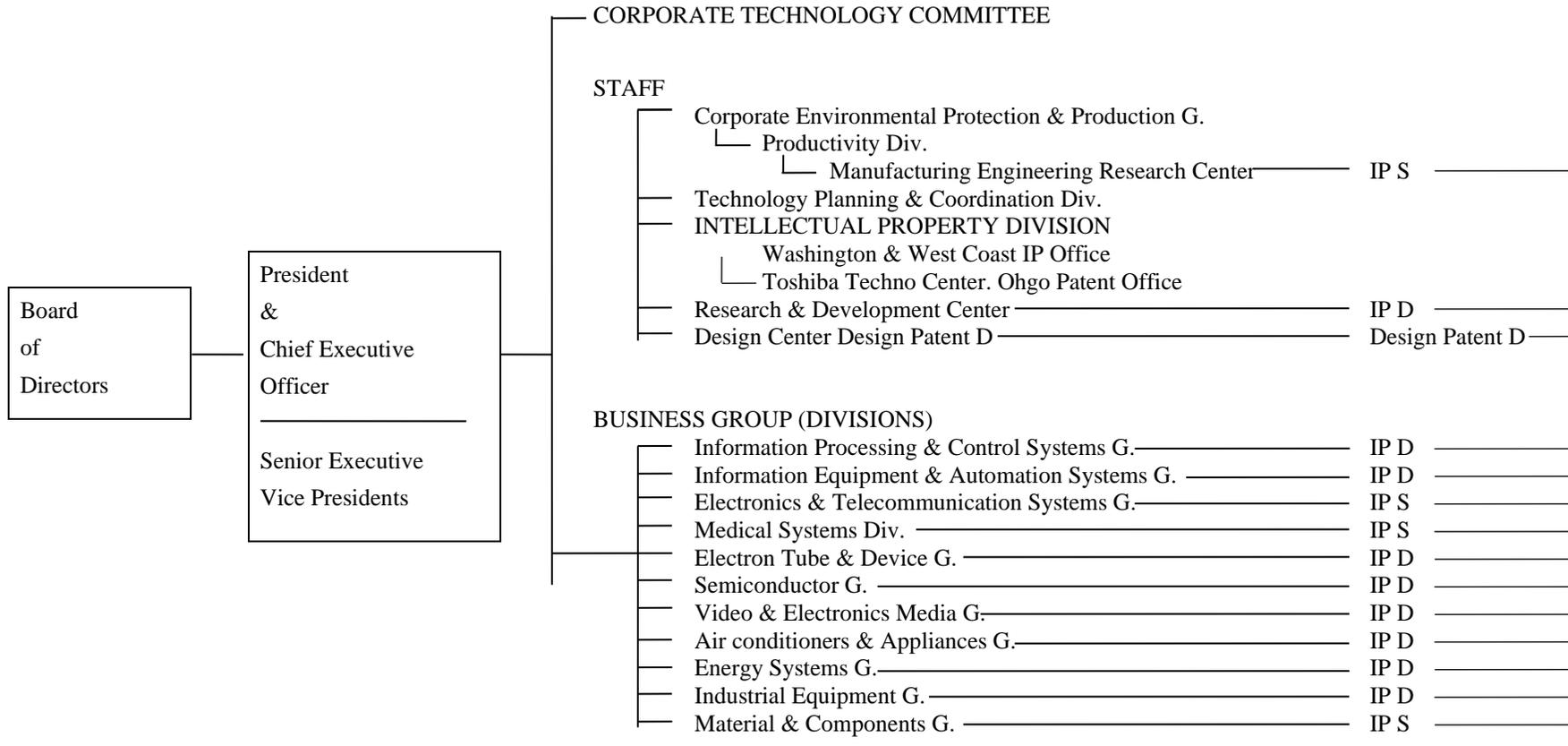
Career stage	IP-related personnel	Engineers
When entering the company	IP generally	IP generally
Introductory education	Basic education First term collective education Second term collective education	Freshman course on business and patent/IP rights
1–3 years	Advanced course Research of precedent cases	Basic knowledge about the patent system Patent surveys Ways to summarize proposals
Mid-level personnel	Selection Drafting specifications in English Patent application management Patent specialty courses System of overseas patent study	Patent review/patent maps Improving the quality of proposals
Deputy managers	Family training ¹⁾ Patent supervision	Family training ¹⁾ Patent supervision
Managers	Family training Patent strategy	Family training Patent management

Note:

¹⁾ Training and socializing in off-the-job settings (signs of titles and positions removed, night-time sessions etc.)

Source: Mr. K. Norichika, Toshiba.

Figure 8.1 Toshiba IP organization (as of 1995)



Legend:

IP = Intellectual Property, D = Department, S = Section, G = Group

———— Organizational Management (with direct business line responsibility)

----- Administrative Management (with indirect functional staff responsibility)

Figure 8.2 Toshiba IP division (as of 1995)

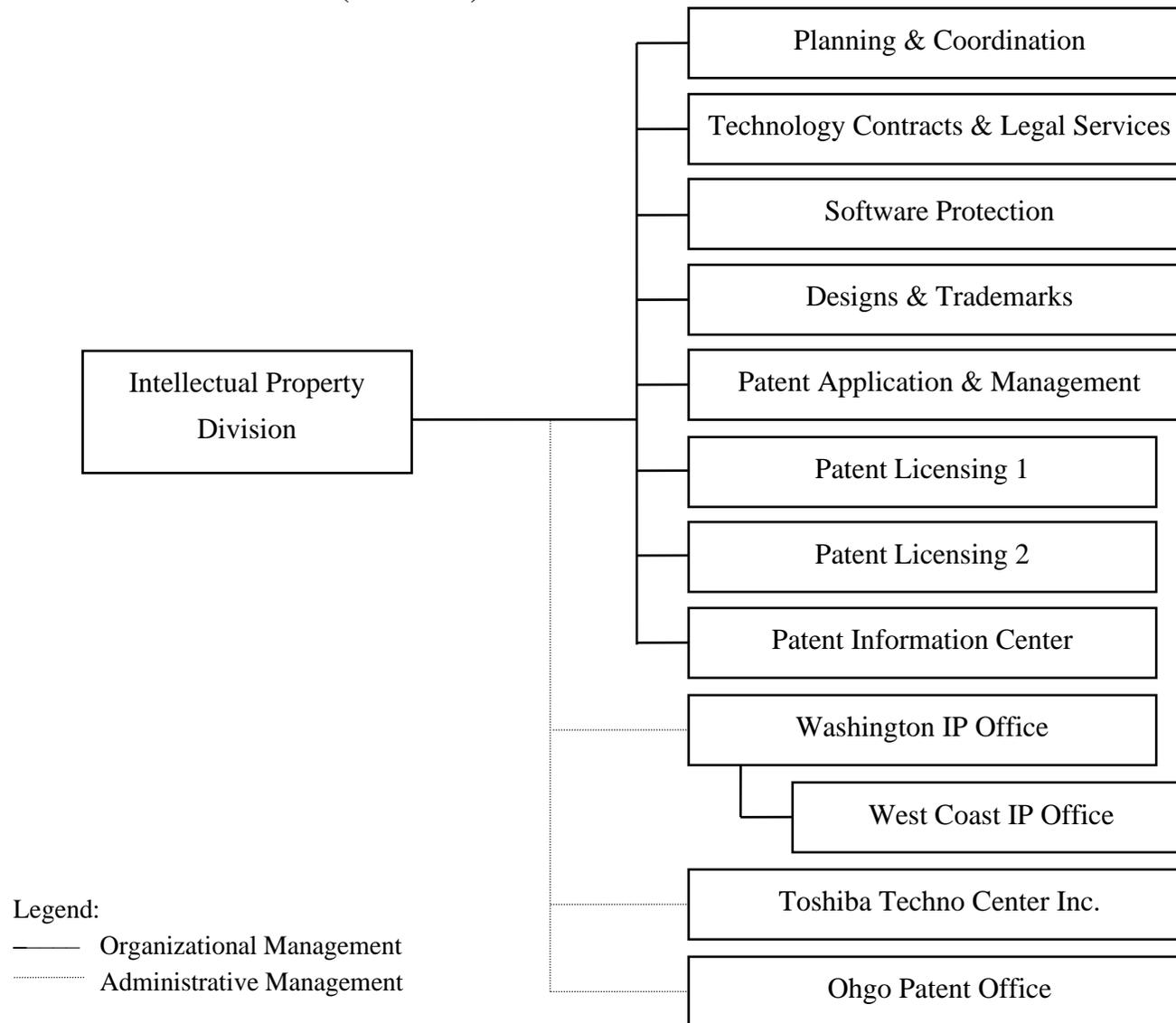
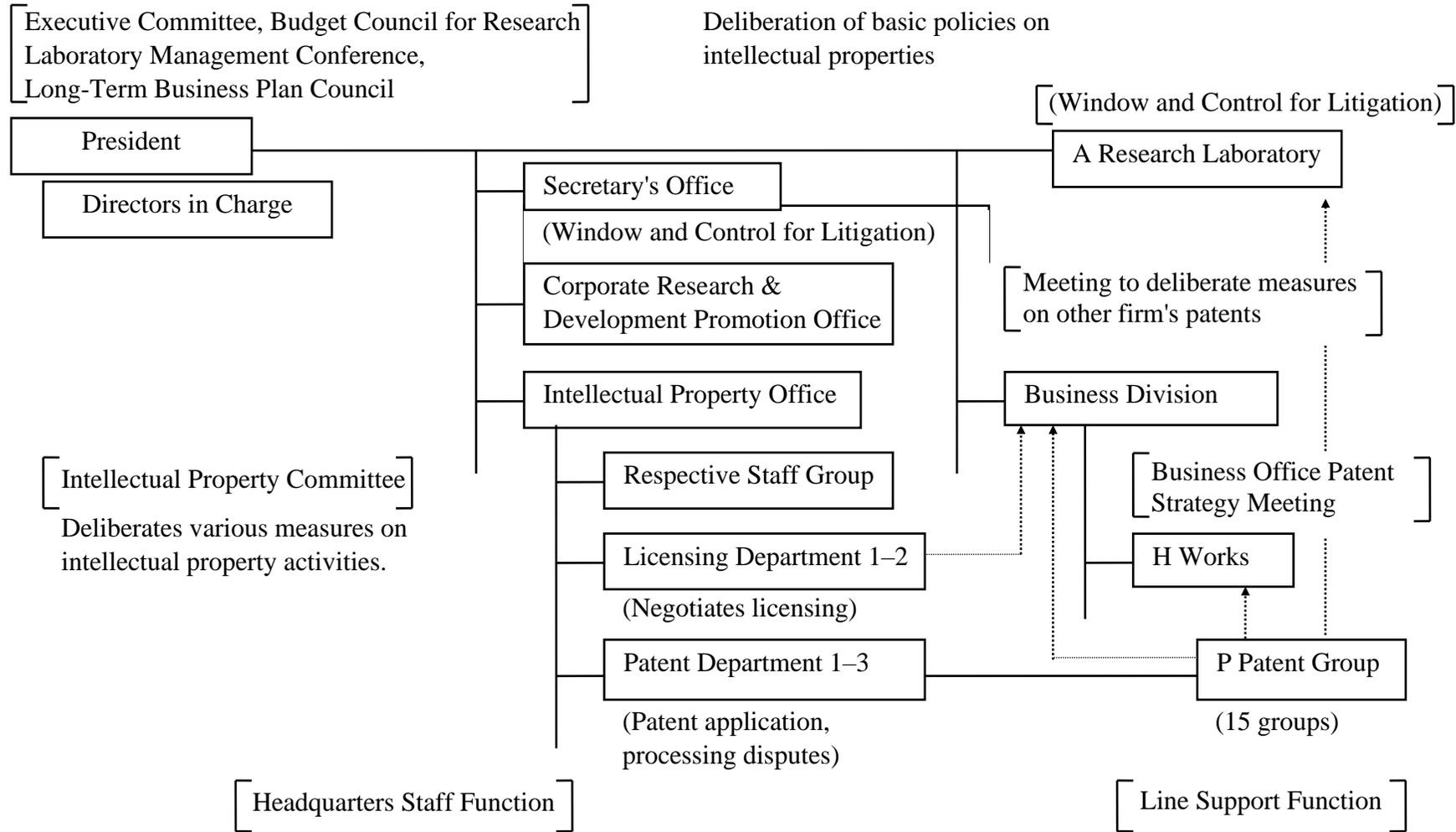


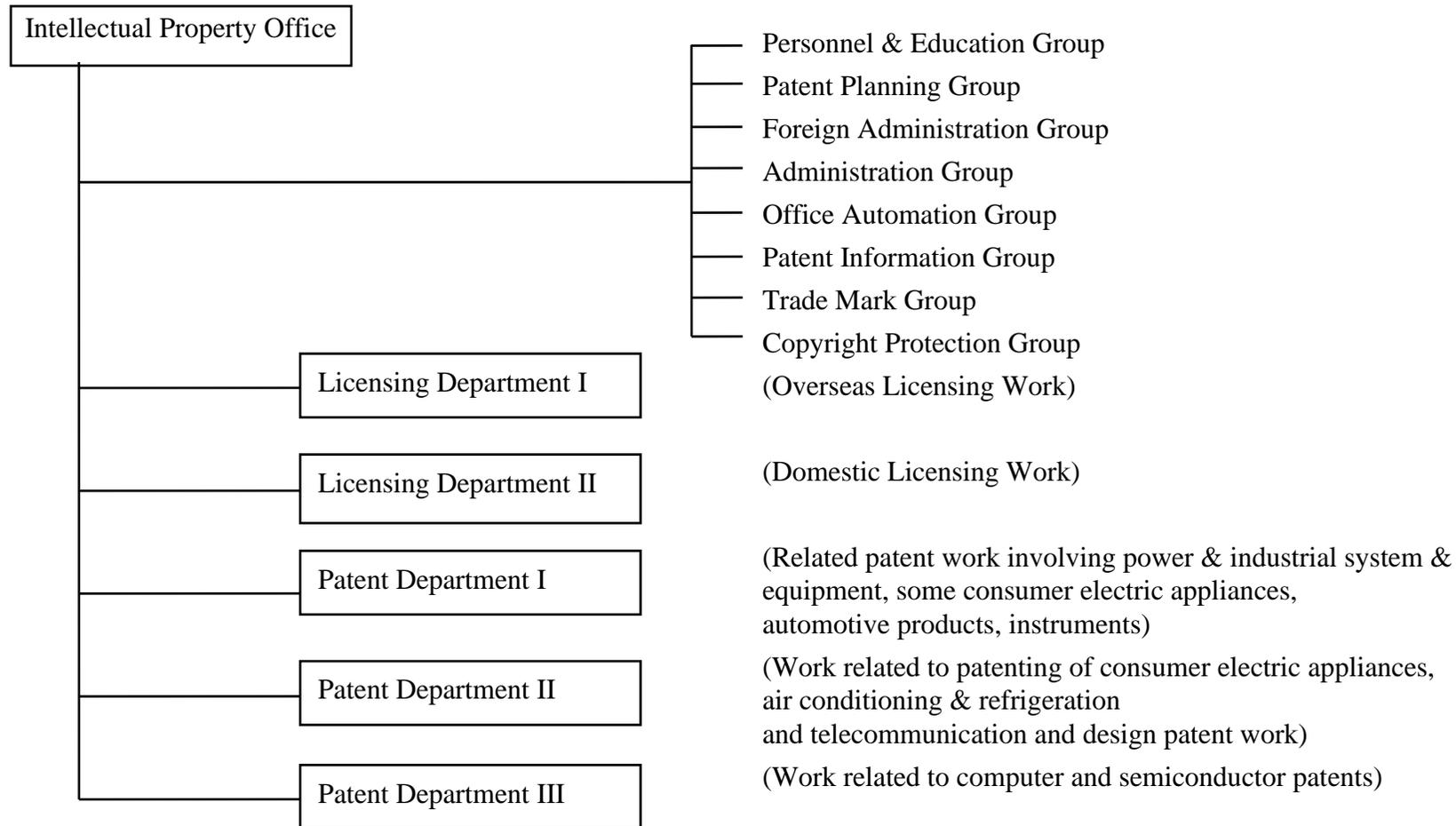
Figure 8.3 IP management in Hitachi

Management Function of Intellectual Property



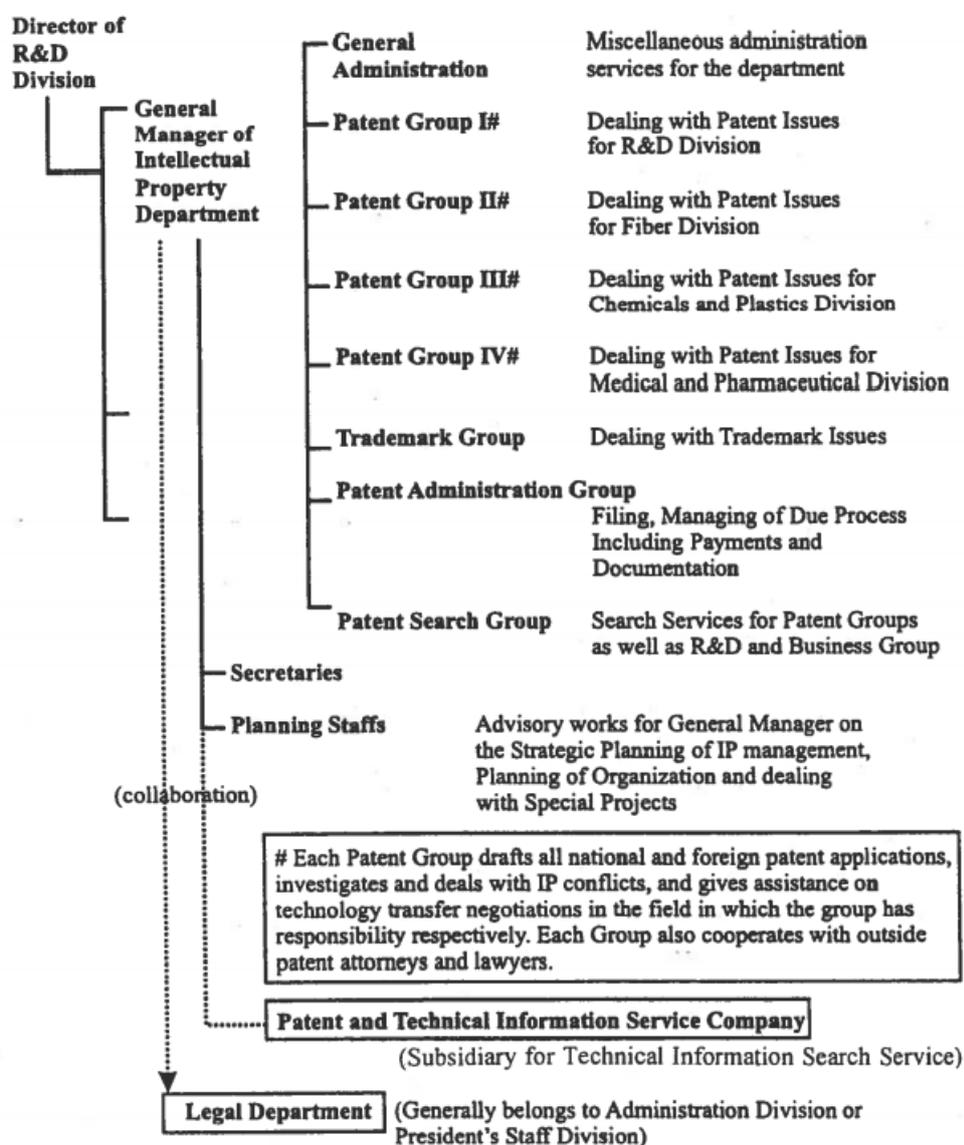
Source: Hitachi

Figure 8.4 Organization of Hitachi's corporate IP department



Source: Hitachi

Figure 8.5 Representative organization of a corporate IP department in a large Japanese chemical corporation



Source: Kindly provided by Dr Akira Mifune.

Figure 8.5 Representative organization of a corporate IP department in a large Japanese chemical corporation

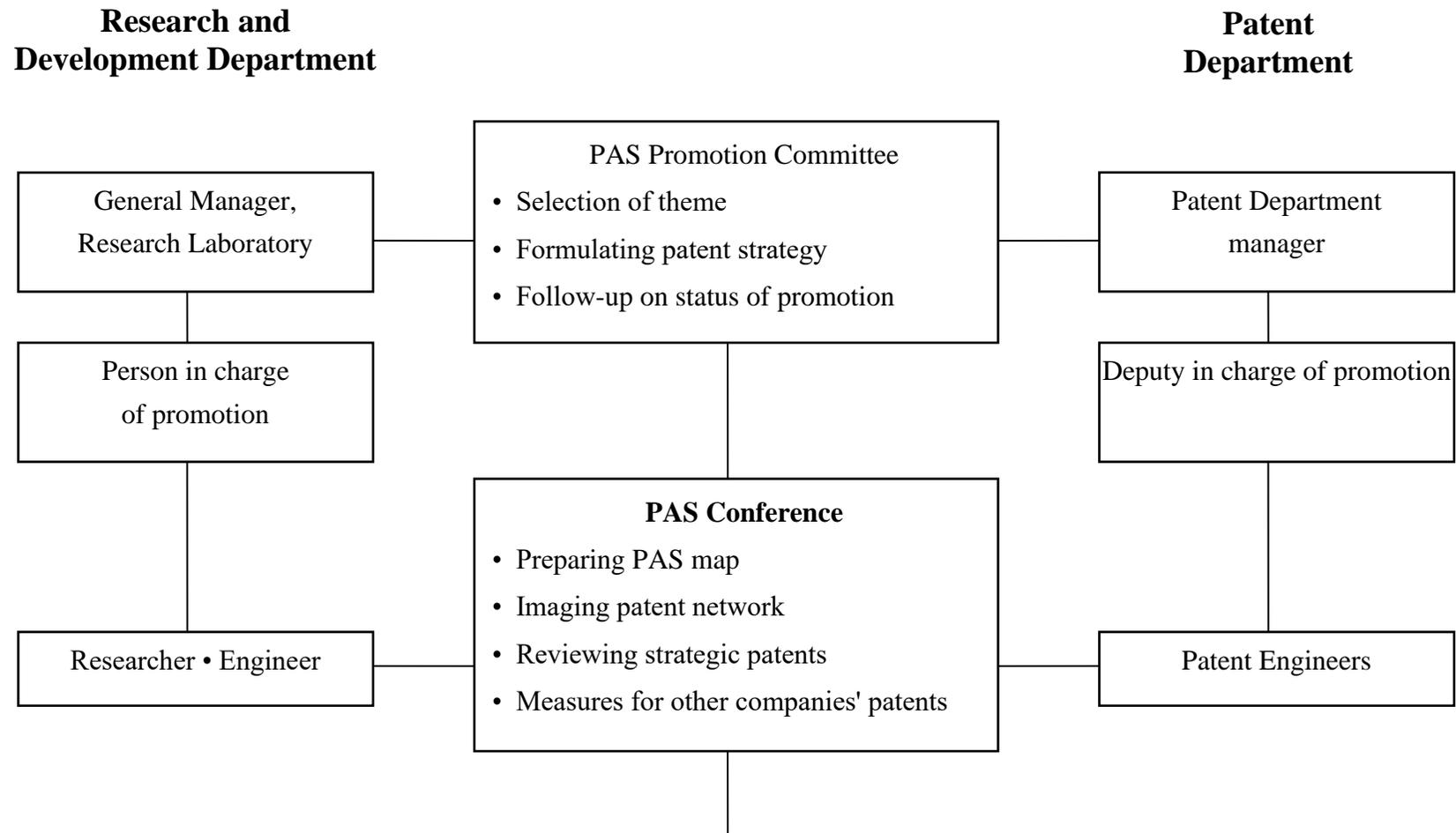
Figure 8.6 An IP organization model representative for a large Japanese corporation

IP Tasks	Invention group	Business group	Relevant department	IP department	Committee or conference
1 Strategic planning of Intellectual property management					Steering Committee for R&D activities
2 Obtaining of patent rights					
Drafting & request for application	○				
Final drafting & application procedure	●	▽		◎☆	
Request for examination	○	●		◎☆	
Registration & payments	▽	●		◎☆	
3 Obtaining of Foreign Patent Rights					Patent evaluation & foreign patent application committee
Request for application	●	◎◎	▽	●	
Drafting and application	●	▽		◎☆	
Registration & payments	▽	●		◎☆	
4 Patent assessment & maintenance	●	◎	●	○☆	Patent evaluation & maintenance committee
Watching for possible conflicts	●	○	▽	◎	
Opposition & actions for infringements	●	◎	▽	☆	
5 Agreement on technology transfer	▽	◎◎	● (Legal dept)	●	Steering committee for project
6 Patent approval or patent clearance	○ or ●	● or ○	● or ▽	◎	Patent committee for project
7 Patent information management	☆	● or ★	▽ or ●	☆ or ★	
8 General affairs					
System management				◎&☆	
Award management	○	◎	●	○&●	
IP education	▽	●	▽	☆	
Follow up of new laws & regulations	▽	▽		☆	

Legend: ◎ = Decision; ○ = Requesting or Planning; ● = With discussion; ▽ = Information; ☆ = Execution; ★ = Collaboration

Source: Kindly provided by Dr. Akira Mifune.

Figure 8.7 Hitachi's "PAS System" (Patent strategy system)



Pivotal research and development • Acquiring strategic patents and use of rights • Eliminating patents posing as obstacles

Source: Hitachi

8.6 Further stages of the IP organization

8.6.1 Introduction

As we have described in this chapter, the leading-edge Japanese patent department of the 1990s is clearly another stage beyond the "super patent department" found in a few leading UK firms during the late 1960s as studied by Taylor and Silberston (1973). The patent departments in some of the largest US firms have also evolved substantially since the 1980s. In the wake of the patent wars and the pro-patent era, many Western firms have in fact initiated processes for overhauling their patent organizations.

A natural question, then, is how the patent and IP organization in large firms will evolve into still further stages. First, one can note that temporary variations occur which may not be significant for long-term trends or shifts. A certain cooling has affected the US-Japan patent wars since the early 1990s, and some reductions of IP staff have been made in several Japanese corporations during the Japanese recession in the mid- and late 1990s.

The long-run trend showing an increasing role for intellectual capital (IC) in firms, as described in Chapter 4, are most likely to have profound effects on their future IP organization and management, especially in an increasingly competitive environment. Already, many industrial firms have major portions of their assets as well as their investments geared towards intellectual capital, and new types of firms are emerging in which IC clearly dominates (see Chapters 1 and 4). Compared to the large share of IC in the total resources of large, technology-based corporations, the share of resources devoted to the IP department appears minor and mis-matched indeed. Patent departments have always been minor entities in firms, even in Japan, and still are viewed as functional departments despite the growth of their resources and their transformation into IP departments with more comprehensive IP management responsibilities. However, the formal organization of IP-related activities is not the most important concern. For the foreseeable future, few people in a traditional manufacturing firm would dream of formally reorganizing R&D, advertising, human resource

departments etc. into one large department, division or business area for intellectual capital with some kind of executive corporate IC manager.⁸ Nevertheless, an organizational arrangement of that sort could be feasible. In fact, a "pure" IC firm or a firm in which IC resources dominate could in itself be viewed as such an arrangement, in which case the CEO is the corporate IC manager. Having an IC unit accountable on a normal balance sheet and profit/loss account is thus feasible. This is certainly not to say that accounting and organizational principles would make a large IC unit an attractive solution in a more traditional manufacturing firm. A few US companies have tried to let the patent department operate as an internal profit centre. Internal and external licensing agreements then provide a suitable institutional mechanism. The experiences are mixed, however, and there are risks of short-termism, high transaction costs and transactions detrimental to the core business divisions. There have also existed pure technology license brokers in traditional industries, but without manufacturing and the possibilities to bundle proprietary technology with physical products they are vulnerable in the long run. In service industries, like insurance, more creative attempts have been made to account for IC on the balance sheet, but so far without separate profit/loss accounting.⁹ Appointments of IC managers or Intellectual Capital Directors have also occurred in this context. What is more important than the formal organization, though, is how the informal organization, the culture, and the organization as a whole will change in response to the increasing role of IC.

At a general level, there is a shift in management thinking towards knowledge management, the knowledge-based corporation, the learning organization etc. However, it could be argued that knowledge per se is not the primary concern for a firm. It is when knowledge is turned into an exploitable resource in a competitive environment that it becomes

⁸ Labels such as Chief Information Officer (CIO), Chief Knowledge Officer (CKO), IC Director, Intellectual Asset Manager, and the like do crop up, however, as fads within information businesses proliferate.

⁹ See Fortune (1994) for the case of the European insurance company Skandia. The article also illustrates how US companies like Dow Chemical run their patent departments as profit centres.

of value to a firm, i.e. when knowledge becomes an asset or a piece of intellectual capital. The same could be said about inter-personal relations when viewed as corporate resources. The ways (or strategies) to turn knowledge and relations into IC are many, some of which are objectionable in society. Ownership is one way in principle, but it is difficult to exercise for institutional and social reasons. Having intellectual workers as "slaves" owned by the firm is indeed infeasible, and exploitation of personal relations is limited by social conventions. Many limitations of ownership of intellectual resources relate to very strong and fundamental cultural elements in societies in general, such as concern over personal integrity, individual freedom, democracy and so on. Some limitations also derive directly from the institutional framework, in particular, the legal framework.

More important to a firm than the ownership aspect of IC per se is the control or managerial aspect. That is, the key issue from a firm's point of view is how to obtain and maintain sufficient control of the possible rents from IC for appropriation purposes. It does not necessarily have to be total control, only control that in some sense enables satisfactory appropriation of rent streams for the firm as an IC possessor (or IC controller). For this purpose, there are no ready-made managerial philosophies or tools. What we can call IC management and IC organization are most likely to develop as a professional area in the future at various levels – corporate, individual, national etc. Two kinds of scenarios for organizational and management development will be elaborated here. The first will be called an extended patent department, and the second shall be called a distributed IC management with IC resources and responsibilities distributed in the organization.

8.6.2 An extended IP department

Can the patent and IP department in large, technology-based corporations be extended beyond the type of IP departments emerging in Japanese industry? Without elaborating in detail, a few arguments for such extensions will be offered.

Communication node

IP-related aspects penetrate a wide range of activities in a firm. The more IC based the firm is the greater the penetration. This penetration often requires two-way communications, which give IP staff large contact networks in the organization and the IP department the potential to become a communication node in the firm.

Attention to detail

IP-related activities have to be focused, especially because of their legal aspects. Dealing with IP requires focusing on concrete inventions, trademarks etc., and attention to order and detail. Trade secrets are less concrete but may still require attention to detail.

Emergence of IC

As has been repeatedly emphasized, the value of IPRs as assets and competitive means has increased substantially since the 1980s and will probably continue to increase. Firms in general will become increasingly IC-based. In addition, the range of "pure" IC firms will evolve further in various industries and service businesses, and new types of IC firms are likely to emerge.

Short and long term management

IP-related activities have a wide span in the time dimension. They interact with technical and commercial activities in both the short and long run. There are immediate patent races where the winner takes all, as well as patents that may be kept valid for 20 years. Licensing contracts are typically long-term, which necessitates long-term planning. Thus, IP-related activities instil both urgency and long-termism, and thereby have the potential to induce people to try to integrate the often conflicting short-term and long-term views of a business firm.

Technical information centre

IP-related activities are, and must be, closely connected to many sources of detailed information of various kinds – technical, commercial etc. Thus, the IP department may also function as an information centre or clearing-house for technical and commercial information in the organization. This is especially the case for technical information, which will be dealt with more in Chapter 9. The time value of patent-related information also gives an incentive to deploy new information and communication technologies. This in turn may further be used to extend the role of the patent department as a technical information centre, as well as to extend its role in information security, which also relates to trade secret protection.

Integration of licensing and patenting

Licensing in and out is one area that sometimes has been integrated with patenting and IP. Although company situations and licensing strategies differ, the need to centralize licensing and integrate it more with patenting have increased in general, everything else equal. This is mainly due to the increasing amount of cross-linkages between patents, technologies, products, companies and markets arising from diversification and internationalization. New generic technologies emerge, products and companies become increasingly "mul-tech", i.e. multi-technology based, and companies increasingly become globalized (see Granstrand and Sjölander 1990 and Granstrand and Oskarsson 1994). These cross-linkages or interdependencies in turn require increased coordination, especially since licensing contracts are long-term in nature. Too often companies, small as well as large, regret having sold a license on an ad hoc basis by a too independent and opportunistic business unit.

Integration of IP and R&D

R&D and technical cooperation agreements of various types also increasingly involve IP matters that, just like licensing, may require central coordination and cooperation with the IP department.

Integration of patenting and technology scanning

Another area that to some extent has been integrated with patenting is technology scanning, using patent information. This is an area in which capabilities of various sorts (methods, data bases, communication networks, software tools etc.) develop fast, and Japanese companies are in the forefront together with some US companies. (This will be the main topic of Chapter 9.) At one extreme, these activities could be limited to a rudimentary form of "patent watching" and the standard distribution of the front pages of patent documents in the company, something that is not uncommon in Western firms. At another extreme, activities could extend into full-fledged technology intelligence integrated with business intelligence and perhaps further integrated with technology planning.

Technology planning

Technology planning in itself is an activity that is quite emphasized in Japanese large corporations – again in contrast to many Western companies, in which strategic planning, long-range planning, technology planning etc. on the whole became demoted after the oil crises. It could be argued that an activity like technology planning is more justified in companies trying to catch up. However, that argument does not fully explain the emphasis put on technology planning in some leading Japanese corporations, where technology planning departments are headed by highly qualified, mid-career technologists supported by a staff of considerable size.

Trade secret and information security management

One further area, which naturally relates to IP but has not yet been managed in a systematic way, is the trade secret area. Trade secret legislation is weak in many countries, but strengthening measures are being taken and companies seem more willing to take trade secret-

related disputes to court.¹⁰ However, it is in the nature of secrecy itself that measures must be strengthened primarily by the companies themselves. This could be done in various ways, but an extended IP department is a natural locus for a central lead-house responsibility for corporate-wide trade secret management, an area that probably will develop in the future and possibly under other names such as information security. Such an arrangement is also aligned with the role of the IP department in technology intelligence, as well as with the need to complement patent protection with a more comprehensive view on protecting rent streams, rather than protecting pieces of property.

Generate inventions

One possible, although controversial, role for an extended IP department is to generate inventions, i.e. to perform some inventive work, a role that is traditionally assigned to R&D. The IP department should, of course, not take over that responsibility from R&D but have it as a supplementary task. With competent patent engineers, cross training of engineers in the IP department, and technology intelligence and IP activities vested, the IP department would be well positioned to contribute to inventive work.¹¹

Competence development

Certainly more roles and responsibilities could conceivably be relevant for an extended IP department, and some are likely to evolve in the future that are as yet inconceivable. One role deserving special consideration is the role of the IP department as a platform for competence development, in other words as a training ground or a section in a corporate university. IP-related activities need to link technological, commercial, economic and legal competencies.

¹⁰ An example of a large-scale secrecy legal case is the one regarding Volkswagen's hireover of Mr. Lopez from GM, where GM allegedly lost many trade secrets. Other examples come from biotech firms in Silicon Valley, where movement of key personnel between firms are accompanied by secrecy suits.

¹¹ Note also, as described in Chapter 9, that patent mapping, as developed in Japan, could be and is used as a creative tool as well.

These correspond to distinct bodies of professional knowledge, education and careers, which gives an IP department the potential for being a platform for extended competence development. This competence development is primarily not intended for the IP department itself, but for the company as a whole. Clearly, many companies have not been particularly patent-oriented in the past and have consequently staffed their patent department with too few qualified people.¹² If the IP department takes on additional new roles and responsibilities, its need for internal competence development further increases. However, what is suggested here is that IP-related activities are suitable elements in learning processes for many other company activities as well. IP is a nexus of technological, commercial and legal aspects that requires order and attention to detail, focused both on the short term and the long term. Thus IP can provide a vehicle for competence development in several professional disciplines, as well as for linking those disciplinary competencies together in concrete ways. Moreover, general IP-oriented training may be needed in management and employee development in general in order to make the company more IP-conscious. For example, engineers get training in systematic functional design and technology analysis through analyzing patents, as well as getting a feel for market analysis and business operations through preparing license agreements and negotiations. These perspectives and skills are then useful to build upon in technology management training. Similar examples could be given for other non-engineering professional categories. An extended IP department can provide such an interdisciplinary training ground in many of the usual ways – courses, seminars, case work, projects, on-the-job training, job rotation and so on.

8.6.3 Distributed intellectual capital management

As IC becomes increasingly important to firms and countries, it is natural to ask what the proper managerial responses should be, which of course is the million dollar question. In the second scenario of distributed IC management the following are a few response strategies that

¹² In all fairness it must be said that some of these have a high level of professional competence and insight in the company's technologies, but they are bogged down in various tasks, leaving their real competence underutilized.

could be employed the following are a few strategies that could be employed.

Extensions of the IP organization

What has been said so far points to the need to consider an extended IP organization as one response. However, a formal organization with departments, committees, managers, specialists and so forth is insufficient. The arguments in the quality-management movement of the 1980s against sole reliance on such an organizational response apply in this context as well.

Transformations of corporate culture

The transformation of corporate culture is likely to be a complementary response to an extended IP organization. Just as the patent organization could be extended to an IP organization, which could further be extended to an IC organization (perhaps ultimately encompassing the whole firm if it became sufficiently IC-based), the patent culture could be transformed into an IP culture and perhaps further into an IC culture. Needless to say, cultural change is far from something that can be managed at will. However, as described in the previous section, cultural change can be influenced to various degrees by managerial action. Having some kind of patent culture already in place is thus a good starting point.

Extending a patent culture to be a more comprehensively IP-oriented culture means extending the property dimension. A further extension from IP to IC means adding a value dimension and broadening the concern from mere legal property protection to rent control or rent protection and the acquisition, development and exploitation of IC on the whole. In principle, then, the managerial actions mentioned in the preceding section have relevance for building an IC culture as well, although there will be additional difficulties (e.g. in clashes between the company and a wider range of groups of people with strong concern about their individual IC or their group's IC).

Distributed management

Cultural formation and change take time, often too much time in the fast pace of contemporary business. Thus a third type of managerial response may be necessary. This is what could be called distributed management, which refers to a corporate-wide focused reorientation with responsibilities distributed at management levels with no central responsibility except to top management. For the most part, such an organization is implemented swiftly on a broad front in order to create momentum in mobilizing and motivating the organization, as well as to save time. Only a few (at the most) corporate-wide re-orientations can be implemented at the same time. Often a similar reorientation is implemented in many companies across industries at about the same time. Its form could be labelled as a corporate campaign, a crash program and the like, and its content as a managerial or organizational innovation, a management revolution and the like. It could also be a short-lived management fad, especially if it fails. Attempts to make too many corporate re-orientations at the same time also considerably weaken their prospects of success.

In the recent past, there have been several such re-orientations in the corporate world based on various rationales, reorientations which on the average have been quite successful, at least on the surface. Thus, there have been re-orientations focusing on inventory levels, total quality, lead times and core competencies. The foci of these re-orientations or movements share certain features, which then can be seen as likely requirements for success. Thus the focus for a successful corporate-wide reorientation can be characterized as:

- 1) being concrete in character
- 2) being able to penetrate a wide range of activities
- 3) having a potential for visible improvements

- 4) attracting realistic expectations in a situation susceptible to organizational change
- 5) having a direct and credible (and positive) influence on the basic and acceptable objectives and visions of the organization.

These requirements could very well be fulfilled by IC-related activities. Thus, IC could be the focus of a reorientation through distributed management. As with any form of distributed management, there are then two sorts of rationale. One is that the activities or operations in focus become improved. The other is that many other types of related activities become improved as well in the process. This might seem to be a superficial side effect, but it may in fact be the most important effect. By focusing on lowering inventory costs at all stages (through Kanban etc.) the whole production and distribution organization can be improved, since its slacks and deficiencies are more likely to surface. By securing and increasing quality in a broad sense, innovativeness in the organization can be improved. By lowering lead times, both improved efficiency and innovativeness across R&D, production and marketing functions can be attained. By focusing on core competencies, which by common definition are deemed more valuable, widely applicable and difficult to imitate, these competencies could be improved and exploited more efficiently, while at the same time increasing the awareness of the strategic value of IC. By focusing further on IC and its dynamics, IC management could be improved at all levels in the corporation, while at the same time improvements in overall efficiency and innovativeness are likely. Anyone with experience in intellectual work knows that it has a tremendous potential for productivity improvements, although it takes hard work to achieve.

8.7 Summary and conclusions

Partly as a result of a long process of catching up with the West and partly as a response to the pro-patent era emerging in the 1980s and the "patent wars" – hot as well as cold – with US corporations, large Japanese corporations have developed leading patent management

practices and resourceful, comprehensive IP organizations. Apparently patent management is still another example of a management area in which Western corporations have much to learn from Japan.

Taylor and Silberston (1973), being one of the very few systematic studies of patent organizations in industry, identified four types or stages. In relation to these, the patent organization in large Japanese corporations represents a quite different fifth type, as summarized in Table 8.5. A hypothetical sixth type is also described. Needless to say the different types do not have to follow upon each other, and the table certainly does not suggest that the future IC firm will be or should be organized around the patent department.

Table 8.5 The evolution of the corporate patent organization.

Type	Characteristics
1	Headed by part-time technology manager plus outside patent agents ¹⁾
2	Full-time patent manager with small staff plus outside patent agents
3	Specialized patent manager with a corporate patent department and liaison people in business divisions
4	"Super patent dept." (35 – 50 persons). Separate licensing dept. ²⁾
5	Comprehensive IP dept. (50 – 500 persons) of Japanese type. Patent culture. ³⁾
6?	Extended IP organization? (E.g. for technology acquisition and exploitation, technology intelligence, technology planning, information management, idea generation, competence development.)
(Future scenario)	Merging with distributed Intellectual Capital Management ?

Notes:

- 1) Outside patent agents are used in all types but their relative importance is largest in types 1 and 2.
- 2) This is the fourth and most advanced type identified in the study of UK firms by Taylor and Silberston (1973).
- 3) Comprehensive IP departments of this size can also be found in some leading Western firms. For example, IBM reportedly in 1989 had 240 professional employees linked to its Intellectual Property Law Department. However, in contrast to large Japanese IP departments, IBM's was much more internationalized (with about 30 locations globally and circa 10% of the patent professionals located in Japan) and decentralized (with only about 5% working in corporate headquarters) and lawyer intensive (with circa 60% being US lawyers). Cf. Table 8.2 above.

Many large Japanese corporations could also be said to possess a patent culture, which can be characterized as having: top management involvement in patenting and IP; patenting and IP as a common concern for all engineers; patent policies and strategies integrated in business plans; clear patent objectives; clear patenting incentives for R&D personnel and organizational units; behavioural attitudes and norms conducive to technology protection and technology intelligence; visible organizational means to promote attention to patenting; and special language, methodology and philosophy.

Patent organizations have also developed in many companies in the West during the pro-patent era, although to a lesser extent on average than in Japan. In general, the patent department has moved from being a small, reactive service department, often with low status and narrow operative tasks decoupled from the business and top management, towards a larger pro-active organization with more comprehensive IP responsibilities, more status and power, more commercially oriented, more strategic concern and more interaction with technology management, business management and top management. In addition to having grown, diversified and become more integrated in the corporation, the IP organization has also become internationalized as the R&D organization has internationalized.

Further developments in IP management and organization are conceivable. As the role of intellectual capital, comprising IPRs, human capital and other intangibles become more important in firms, intellectual capital management, encompassing IP management, might develop in various ways. The IP organization may be further extended in terms of resources, tasks and responsibilities, and there are a number of arguments for different types of extensions. The IP organization may also become subordinate to a type of distributed management of intellectual capital, signifying a reorientation of the whole company organization towards its intellectual capital, somewhat analogous to the total quality management movement.