Chapter 4

PATENT ACTIVITY AT THE IP5 OFFICES

This chapter presents trends in patent application filings and grants at the IP5 Offices only, including also some breakdowns by technologies. While in Chapter 3 the latest data were for 2017, most of the information that appears here includes data for 2018[31]. The patent office statistics for Europe in this chapter are for the EPO only and do not include statistics from the EPC states' National Offices. Whereas the EPO is indicated from the viewpoint of an office, the EPC states are still indicated as a bloc of origin.

The activities at the IP5 Offices are demonstrated by counts of the patent applications that were filed. For patent applications, the representations are analogous to those appearing in Chapter 3 (Figs. 3.5, 3.6, 3.7, and 3.14) which show the numbers of requests for patents as patent applications[32]. Direct applications to the offices are counted at the date of filing. PCT applications are counted at the moment they enter the national or regional phase. Direct national and direct regional filings are counted only once. PCT national/regional phase filings are replicated over the numbers of procedures that are started.

The demand at the EPO is given in terms of applications rather than in terms of designations.

For granted patents, the statistics combine information by office and bloc of origin, displaying comparisons by year of grant. The representations here are similar to those for Fig. 3.11, where granted patents are counted only once, except that, for EPC states, only the EPO is considered as the granting authority. Hereinafter, "patent grants" will signify the number of grant actions (issuances or publications) by the IP5 Offices.

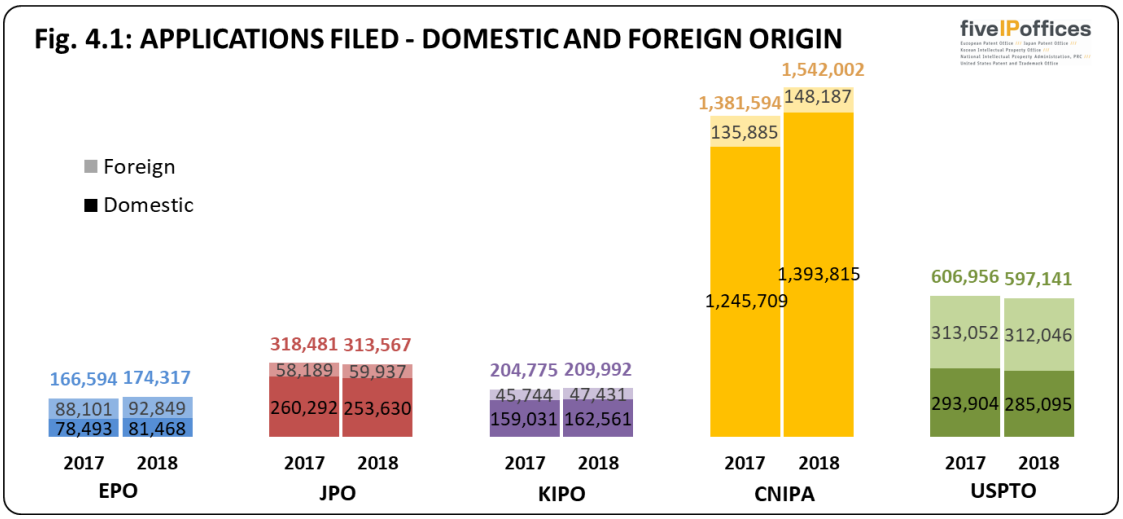
For information about specific terminology and associated definitions used in Chapter 4, please refer to Annex 2.

[31] The statistical tables file found in the web version of this report includes extended time series for much of the data included in this chapter. http://www.fiveipoffices.org/statistics/statisticsreports.html
[32] See the section "Guide to figures in Chapter 3" at the beginning of Chapter 3.

PATENT APPLICATIONS

ORIGIN

Fig. 4.1 shows the number of patent applications that were filed at each of the IP5 Offices during the two most recent years, broken down by domestic and foreign origin (based on the residence of first-named applicants or inventors). For the EPO, domestic applications correspond to those filed by residents of the EPC states.



In 2018, a total of 2,837,019 patent applications were filed at the IP5 Offices, an increase of 6 percent from 2017 (2,678,400).

Patent applications increased by 12 percent at the CNIPA, by 5 percent at the EPO and by 3 percent at the KIPO. They decreased by 2 percent at the JPO and at the USPTO.

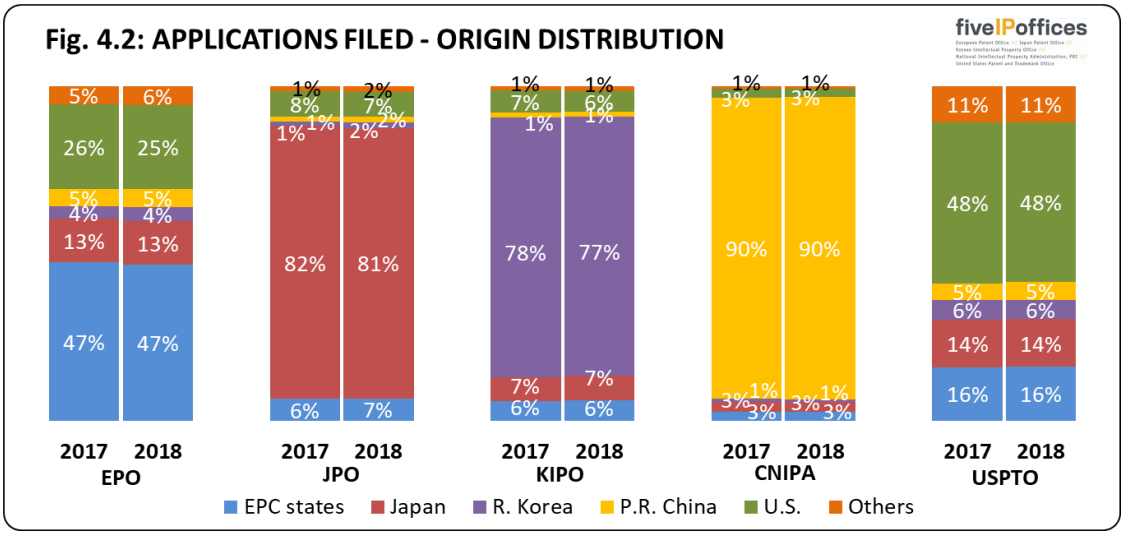
Domestic and foreign applications both increased at the EPO, at the CNIPA and at the KIPO. At the JPO, domestic applications decreased by 3 percent and foreign applications increased by 3 percent. At the USPTO, domestic applications remained stable and foreign applications decreased by 4 percent.

Table 4.1 shows the number of patent application filings by origin (residence of first-named applicants or inventors) relative to total filings at each office for 2018.

Table 4.1: 2018 APPLICATIONS FILED - ORIGIN

Office	EPO	JPO	KIPO	CNIPA	USPTO	Total
EPC States	81,468	20,884	12,702	39,810	95,699	250,563
Japan	22,615	253,630	15,595	45,284	85,322	422,446
R. Korea	7,296	5,070	162,561	13,875	33,961	222,763
P.R. China	9,401	5,325	3,140	1,393,815	32,615	1,444,296
U.S.	43,612	23,121	13,035	38,859	285,095	403,722
Others	9,925	5,537	2,959	10,359	64,449	93,229
Total	**174,317**	**313,567**	**209,992**	**1,542,002**	**597,141**	**2,837,019**

Fig. 4.2 shows the respective shares of patent applications filings by origin (residence of the first-named applicant or inventor) relative to the total number of applications filed at each office, for 2017 and 2018.



The shares of patent application filings by bloc of origin vary between Offices, but are generally consistent for 2017 and 2018 within each Office.

Caution should be used when comparing the numbers of applications between the IP5 Offices, due to the fact that the average number of claims contained in individual applications varies significantly. On average, in 2018, an application filed at the EPO contained 14.2 claims, (14.7 in 2017) while an application filed at the JPO contained an average of 10.7 claims (10.4 in 2017), and an application filed at the KIPO contained an average of 11.1 claims (11.2 in 2017). At the CNIPA, an application contained an average of 8.7 claims (8.1 in 2017), while one filed at the USPTO had 17.8 claims (18.6 in 2017) on average.

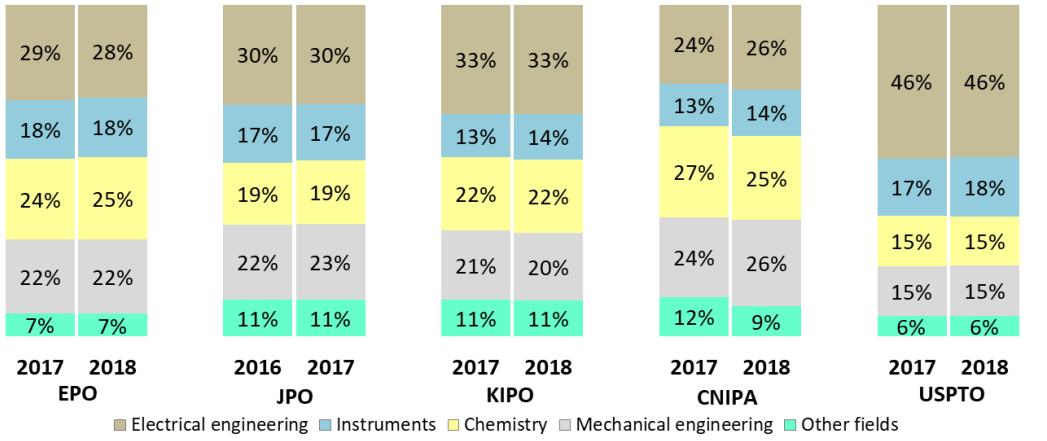
See the annexed statistical tables for longer trends.

SECTORS AND FIELDS OF TECHNOLOGY

Patents are classified by the IP5 Offices according to the IPC. This provides for a hierarchical system of language independent symbols for the classification of patents and utility models according to the different areas of technology to which they pertain. The WIPO established a concordance table to link the IPC symbols with thirty-five fields of technology grouped into five sectors[33]. Fig. 4.3 shows the distribution of applications at each office according to the five main sectors of technology.

The classification takes place at a different stage of the procedure in the offices. As a result, data are shown for the EPO, the KIPO, the CNIPA, and the USPTO for the filing years 2017 and 2018, while for the JPO the breakdown is given for the filing years 2016 and 2017[34].

Fig. 4.3: APPLICATIONS FILED - SECTOR OF TECHNOLOGY



The Electrical engineering sector is more prominent at the USPTO than in the other IP5 Offices. A higher proportion of applications are filed in the Chemistry sector at the CNIPA and at the EPO than in the other IP5 Offices. At each office, the distribution between sectors of technology was fairly stable between the two years reported. On the longer term, there are some slow variations that can be seen in the statistical annex. For example, at JPO there was a slow decline in the proportion for the Electrical Engineering sector since 2011.

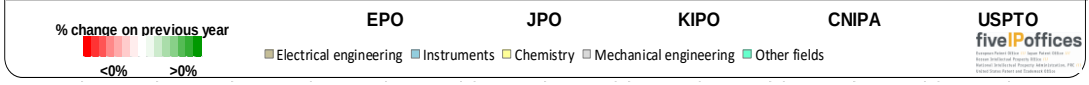
[33] www.wipo.int/meetings/en/doc_details.jsp?doc_id=117672
www.wipo.int/export/sites/www/ipstats/en/statistics/patents/xls/ipc_technology.xls

[34] JPO data for 2017 are the most recent available figures because the IPC assignment is completed just before the publication of the Unexamined Patent Application Gazette (18 months after the first filing). Percentages may not total 100 due to rounding.

Fig. 4.4 describes the distribution of the 2018[35] applications by the more detailed fields of technology at each office (left column for each IP5 Office), and the change in application counts compared to 2017 (right column). Actual shares and percentage changes in application counts are shown for the top 10 leading fields at each Office. The distribution of applications is represented by a colour scale: the darker the shade of a colour, the greater the share. The extent of change is reflected by a red–to-green colour scale, the dark red indicates a marked decrease and dark green indicates a marked increase.

Fig. 4.4: DISTRIBUTION OF APPLICATIONS FILED BY FIELD OF TECHNOLOGY - 2018

	EPO		JPO		KIPO		CNIPA		USPTO	
	Share	Change	Share	Change	Share	Change	Share	Change	Share	Change
1. Electrical machinery, apparatus, energy	6%	+5%	9%	-1%	8%	+2%	7%	16%	6%	-8%
2. Audio-visual technology			4%	-6%					4%	-11%
3. Telecommunications										
4. Digital communication	7%	+1%			4%	+0%	3%	+8%	9%	-7%
5. Basic communication processes										
6. Computer technology	7%	+3%	6%	+1%	6%	-4%	8%	+27%	15%	-6%
7. IT methods for management					5%	+11%			4%	-3%
8. Semiconductors			4%	-1%	5%	+10%			5%	-7%
9. Optics			5%	-8%					3%	-7%
10. Measurement	5%	+9%	5%	+3%	4%	+4%	6%	+26%	4%	-4%
11. Analysis of biological materials										
12. Control										
13. Medical technology	8%	+5%	5%	+3%	5%	+18%			8%	-4%
14. Organic fine chemistry	4%	-4%								
15. Biotechnology	4%	+12%								
16. Pharmaceuticals	4%	+14%								
17. Macromolecular chemistry, polymers										
18. Food chemistry										
19. Basic materials chemistry										
20. Materials, metallurgy										
21. Surface technology, coating										
22. Micro-structural and nano-technology										
23. Chemical engineering							5%	+30%		
24. Environmental technology										
25. Handling			3%	+6%			4%	+28%		
26. Machine tools							5%	+24%		
27. Engines, pumps, turbines										
28. Textile and paper machines										
29. Other special machines	4%	+11%			4%	+2%	5%	+14%		
30. Thermal processes and apparatus										
31. Mechanical elements										
32. Transport	5%	+6%	5%	+5%	5%	+0%	4%	+21%	4%	-5%
33. Furniture, games			7%	+0%						
34. Other consumer goods										
35. Civil engineering					4%	+0%	5%	24%		



Three fields are leading fields at all the IP5 Offices: *1.Electrical machinery, apparatus, energy*, *6.Computer technology* and *10.Measurement*.
Six of the leading fields at the USPTO and five of the leading fields at the KIPO are related to the Electrical engineering sector (1 to 8). At the JPO, KIPO and USPTO, most of leading fields are related to the Electrical engineering sector (1 to 8) or to Instruments sector (9 to 13). At the CNIPA and the EPO, the leading fields are more spread between sectors, with EPO a little more concentrated in the Electrical engineering (1 to 8) and in the Chemistry (14 to 24) sectors.

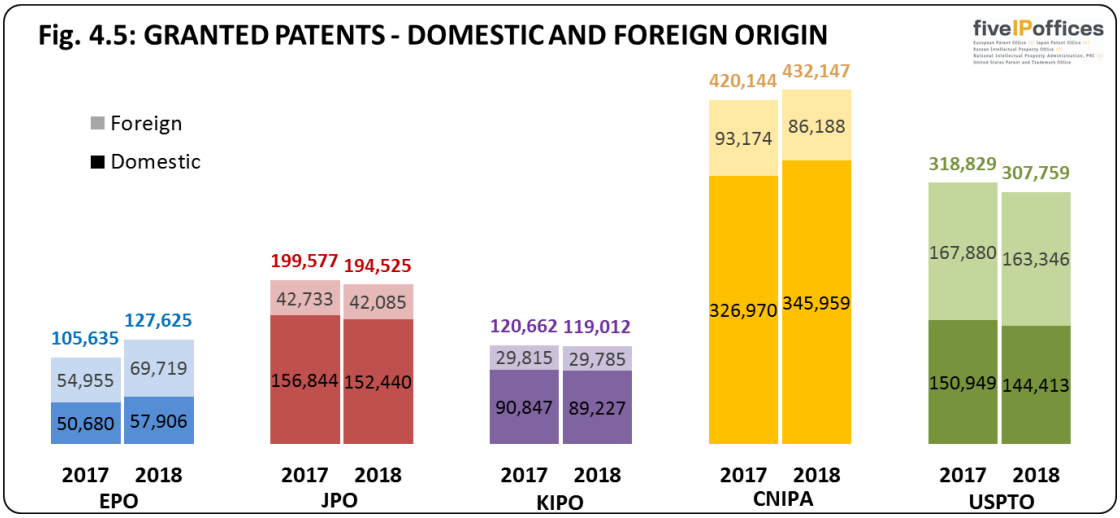
[35] In the case of JPO data for 2017 are reported and compared to data for 2016.

The highest share in a field can be found in *6.Computer technology* receiving 15 percent of all applications at the USPTO. Applications in the leading fields at the CNIPA experienced very diverging growth.

GRANTED PATENTS

ORIGIN

Fig. 4.5 shows the numbers of granted patents by the IP5 Offices, according to the bloc of origin (residence of first-named owner or inventor).



Together the IP5 Offices granted a total of 1,181,068 patents in 2018. This was 16,221 more than in 2017 and represents an increase of 1 percent.

The numbers of granted patents increased in 2018 at the EPO and the CNIPA. At the EPO, there was an increase of approximately 21 percent, which is especially marked in foreign grants. There was an increase of 3 percent at the CNIPA, which is caused by domestic grants. The number of granted patents decreased by 3 percent at the USPTO, by 3 percent at the JPO and by 1 percent at the KIPO.

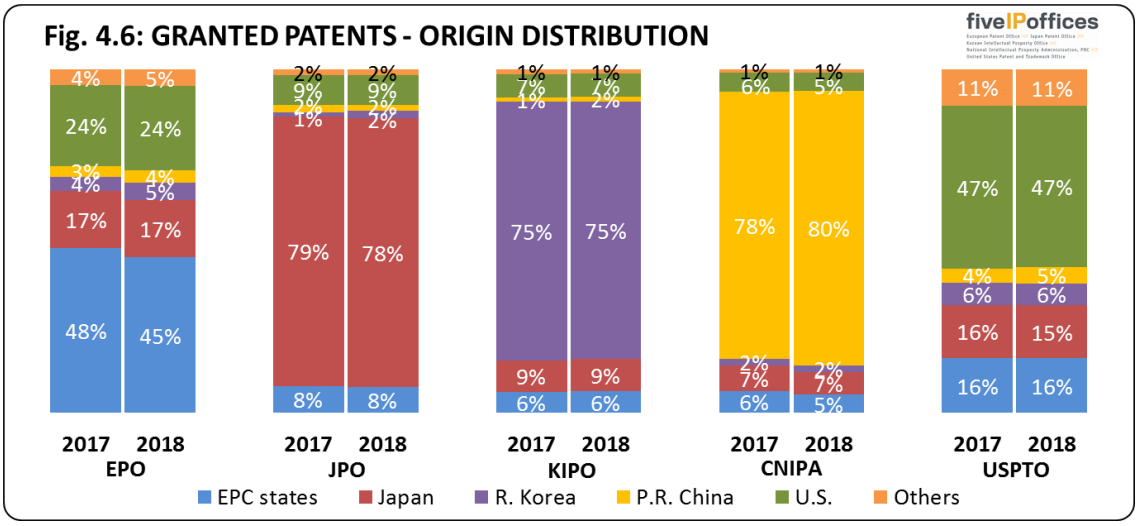
The differences between the IP5 Offices regarding the absolute numbers of granted patents can only be partly explained by differences in the numbers of corresponding applications. These numbers are also affected by differing grant rates and durations to process applications by the IP5 Offices (see the section below "Statistics on Procedures").

Table 4.2 shows the number of granted patents by origin (residence of first-named owner or inventor) at each office for 2018.

Table 4.2: 2018 GRANTED PATENTS – ORIGIN

Office / Origin	EPO	JPO	KIPO	CNIPA	USPTO	Total
EPC States	57,906	14,653	7,467	22,978	48,963	151,967
Japan	21,343	152,440	11,239	28,094	47,566	260,682
R. Korea	6,262	4,199	89,227	8,623	19,780	128,091
P.R. China	4,831	3,152	1,801	345,959	14,488	370,231
U.S.	31,136	17,080	7,912	22,915	144,413	223,456
Others	6,147	3,001	1,366	3,578	32,549	46,641
Total	**127,625**	**194,525**	**119,012**	**432,147**	**307,759**	**1,181,068**

Fig. 4.6 shows the shares of granted patents by origin (residence of first-named owner or inventor) at each office for 2017 and 2018.

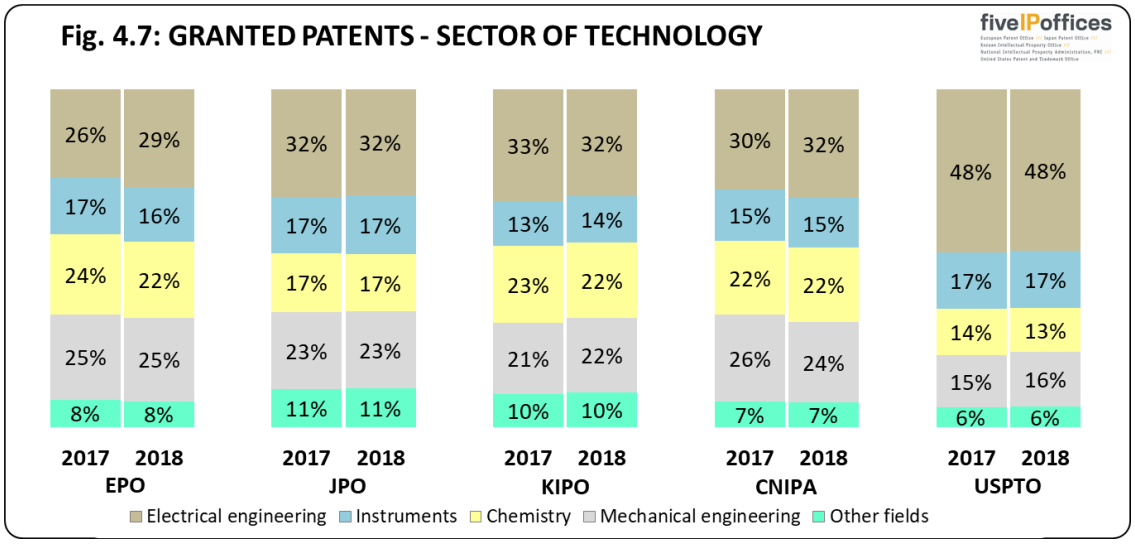


At the EPO, the share of domestic granted patents continued to decline in 2018, while it increased at CNIPA.

At all offices, the share of domestic granted patents in 2018 is lower than the share of domestic applications that is shown in Fig. 4.2. For CNIPA, the difference is larger than for the other offices, which can be partially explained by the strong growth in domestic applications observed during the past few years. That is not yet reflected in the distribution of granted patents.

SECTORS AND FIELDS OF TECHNOLOGY

Fig. 4.7 shows the distribution of the granted patents in 2017 and 2018 at each office according to the five main sectors of technology.

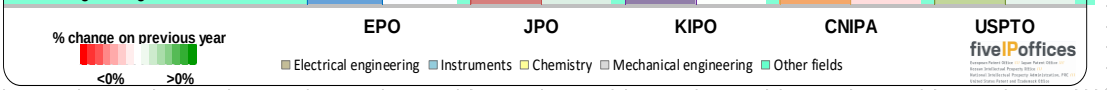


The distribution of granted patents by sectors is fairly consistent with that shown in Fig. 4.3 for applications. At the CNIPA, the share of Chemistry in granted patents is noticeably lower than the share in applications.

Fig. 4.8 describes the distribution of the 2018 granted patents by the more detailed fields of technology at each office (left column for each IP5 Office), and the change in granted patents counts compared to 2017 (right column). Actual shares and percentage changes in patent counts are shown for the top 10 leading fields at each Office. The distribution of applications is represented by a colour scale: the darker the shade of a colour, the greater the share. The extent of change is reflected by a red–to-green colour scale, the dark red indicates a marked decrease and dark green indicates a marked increase.

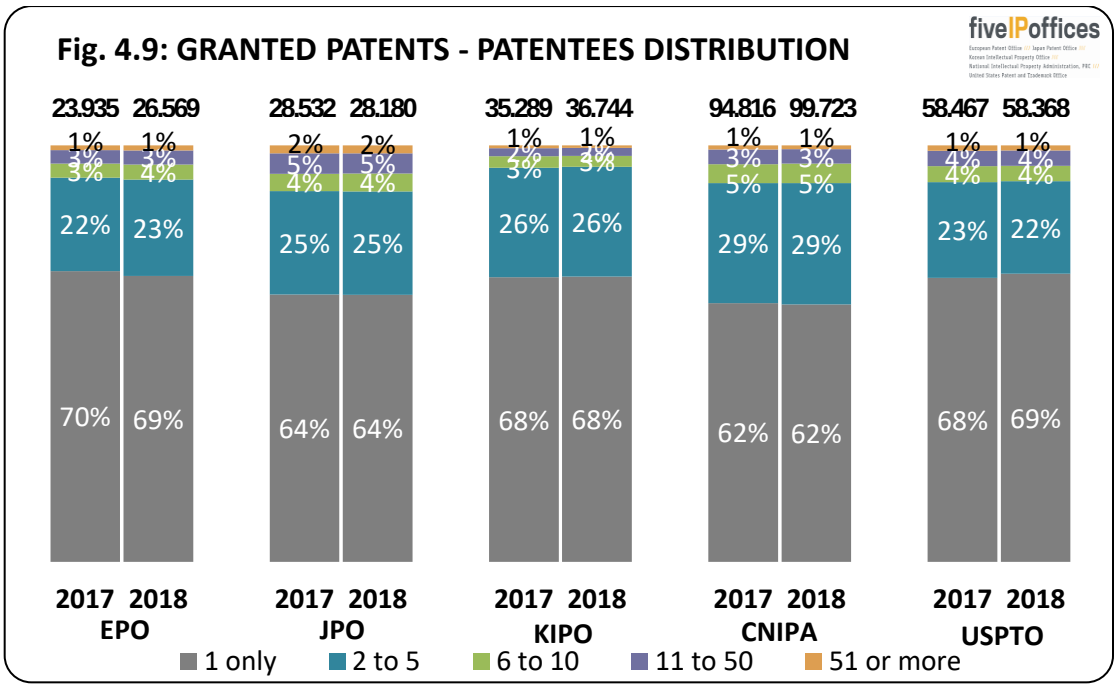
Fig. 4.8: DISTRIBUTION OF GRANTED PATENTS BY FIELD OF TECHNOLOGY - 2018

	EPO		JPO		KIPO		CNIPA		USPTO	
	Share	Change	Share	Change	Share	Change	Share	Change	Share	Change
1. Electrical machinery, apparatus, energy	7%	+14%	10%	-8%	9%	-9%	8%	+2%	7%	-3%
2. Audio-visual technology			4%	-2%	4%	-11%			5%	-5%
3. Telecommunications		+29%							4%	-10%
4. Digital communication	9%	+49%			4%	-7%	6%	+33%	8%	+2%
5. Basic communication processes										
6. Computer technology	6%	+59%	6%	-6%	5%	-5%	9%	+10%	16%	-7%
7. IT methods for management										
8. Semiconductors			5%	-10%	5%	+9%			6%	-8%
9. Optics			5%	-6%					4%	-6%
10. Measurement	5%	+24%	5%	+6%	4%	-5%	7%	+2%	5%	-5%
11. Analysis of biological materials										
12. Control										
13. Medical technology	7%	+10%	5%	-1%	4%	-3%			6%	-4%
14. Organic fine chemistry	3%	-2%								
15. Biotechnology										
16. Pharmaceuticals										
17. Macromolecular chemistry, polymers										
18. Food chemistry										
19. Basic materials chemistry										
20. Materials, metallurgy							4%	-6%		
21. Surface technology, coating										
22. Micro-structural and nano-technology										
23. Chemical engineering							3%	+1%		
24. Environmental technology										
25. Handling							3%	-3%		
26. Machine tools							5%	-5%		
27. Engines, pumps, turbines	4%	+20%								
28. Textile and paper machines										
29. Other special machines	4%	+22%			4%	+12%				
30. Thermal processes and apparatus										
31. Mechanical elements										
32. Transport	6%	+28%	5%	-3%	5%	-12%	4%	-5%	4%	+1%
33. Furniture, games			6%	-4%						
34. Other consumer goods										
35. Civil engineering	4%	+1%	3%	+4%	5%	+1%	4%	-6%		



At the EPO *27.Engines, pumps, turbines* and *35. Civil engineering* are leading fields in granted patents but not in applications. At the JPO, *35.Civil engineering* is a leading field in granted patents but not in applications. At the KIPO *2.Audio-visual technology* is a leading field in granted patents but not in applications. At the CNIPA, *20. Material, metallurgy* is leading fields in granted patents but not in applications. At the USPTO *3. Telecommunications* and *5. Basic communication processes* are leading fields in granted patents but not in applications.

The large increase in the number of granted patents by the EPO is reflected by a higher number of fields for which the count of granted patents increased.
Fig. 4.9 shows the breakdown of patentees by their numbers of granted patents in 2017 and 2018.



This diagram shows that the distribution of grants to patentees is similar at each office in that it is highly skewed at all of them, because there are many more grantees that receive low numbers of grants rather than high numbers of grants. The proportions are generally consistent between 2017 and 2018 for each office. See the annexed statistical tables for longer term trends. These data are fairly static.

At the CNIPA there is a slightly higher share of the “2 to 5” category than at the other IP5 Offices.

Most of the patentees received only one grant in a year. In 2018, the proportion was between 62 percent (CNIPA) and 69 percent (EPO). The proportion of patentees that received less than 6 patents was between 89 percent for the JPO and 94 percent for the KIPO. The proportion of patentees receiving 11 or more patents was higher at the JPO (7 percent) than at the USPTO (5 percent), at the EPO (4 percent), at the CNIPA (4 percent) and at the KIPO (3 percent).

In 2018, the average number of granted patents received remained unchanged for most offices when comparing 2017 to 2018. The numbers were 5 for the EPO, 7 at the JPO, 3 at the KIPO, 4 at the CNIPA and 5 at the USPTO. The greatest number of patents granted to a single applicant was 2,538 at the EPO, 4,344 at the JPO, 2,912 at the KIPO, 3,369 at the CNIPA and 9,088 at the USPTO. This maximum number for 2018 was larger than for 2017 at the EPO, the KIPO and the USPTO.

MAINTENANCE

A patent is enforceable for a fixed term that depends on actions taken by the owner. In the IP5 Offices, the maximum term is usually twenty years from the date of filing the application. In order to maintain protection during this period, the applicant has to pay what are variously known as renewal, annual or maintenance fees in the countries for which the protection pertains. Maintenance systems differ from country to country. In most jurisdictions, including those of the IP5 Offices, protection expires if a renewal fee is not paid in due time.

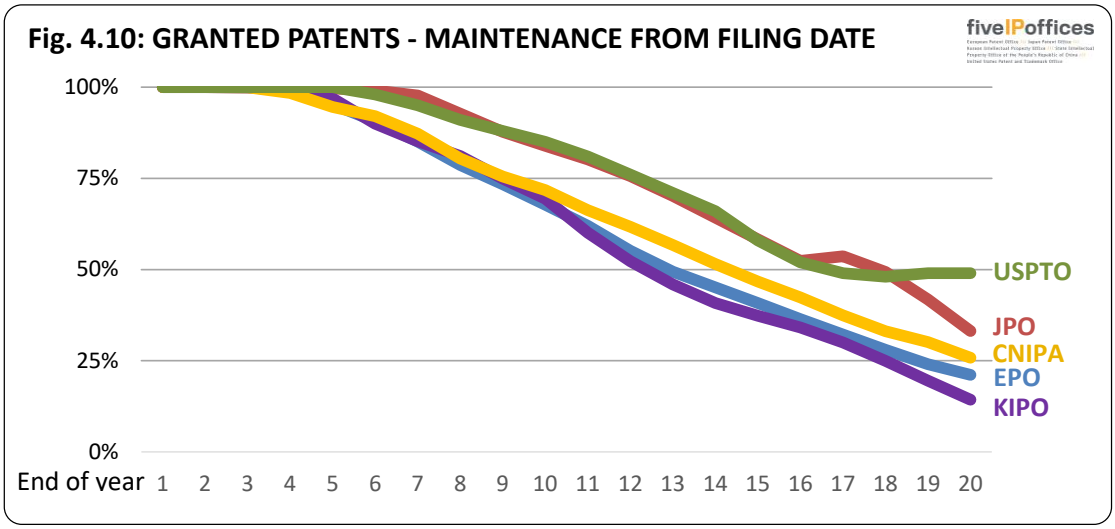
At the EPO, annual renewal fees are payable at the beginning of the year from the third year after filing in order to maintain the application. After the patent has been granted, renewal fees are then paid to the national office of each designated EPC contracting state in which the patent has been registered. These national patents can be maintained for different periods in the contracting states. Therefore, rather than maintaining one patent after grant, patentees have to deal with the maintenance of several patents and need to choose how long to maintain each one.

For a Japanese or Korean patent, the annual fees for the first three years after patent registration are paid as a lump-sum and for subsequent years there are annual fees. The applicant can pay either yearly or in advance.

At the CNIPA, the annual fee for the year in which the patent right is granted is paid at the time of going through the formalities of registration, and the subsequent annual fees are paid before the expiration of the preceding year. The date at which the time limit for payment expires is the date of the current year corresponding to the filing date.

The USPTO collects maintenance fees at 3.5, 7.5, and 11.5 years after the date of grant and does not collect an annually payable maintenance fee.

Fig. 4.10 shows the proportions of granted patents by each office that are maintained for differing lengths of time. It compares the rate of granted patent registrations existing and in force each patent year starting with the year of application. Figures are based on the most recent relevant data that are available at each IP5 Office. The EPO proportion represents a weighted average ratio of the maintenance of the validated European patents in the 38 EPC states[36].



At the USPTO, 49 percent of the granted patents are maintained for the 20 years from filing. This compared to 35 percent at the JPO, 26 percent at the CNIPA, 21 percent at the EPO and 14 percent at the KIPO.

More than 50 percent of the JPO and the USPTO granted patents are maintained for at least 16 years, compared to 14 years at the CNIPA, 13 years at the EPO and 12 years at the KIPO.

In addition to patentees' behaviour, these differences can be partly explained by differences in the procedures, such as a multinational maintenance system (EPO), deferred examination (JPO, KIPO, CNIPA) and a stepped maintenance payment schedule (USPTO). Changes in patent laws and administrative processes also may have some effect on maintenance rates.

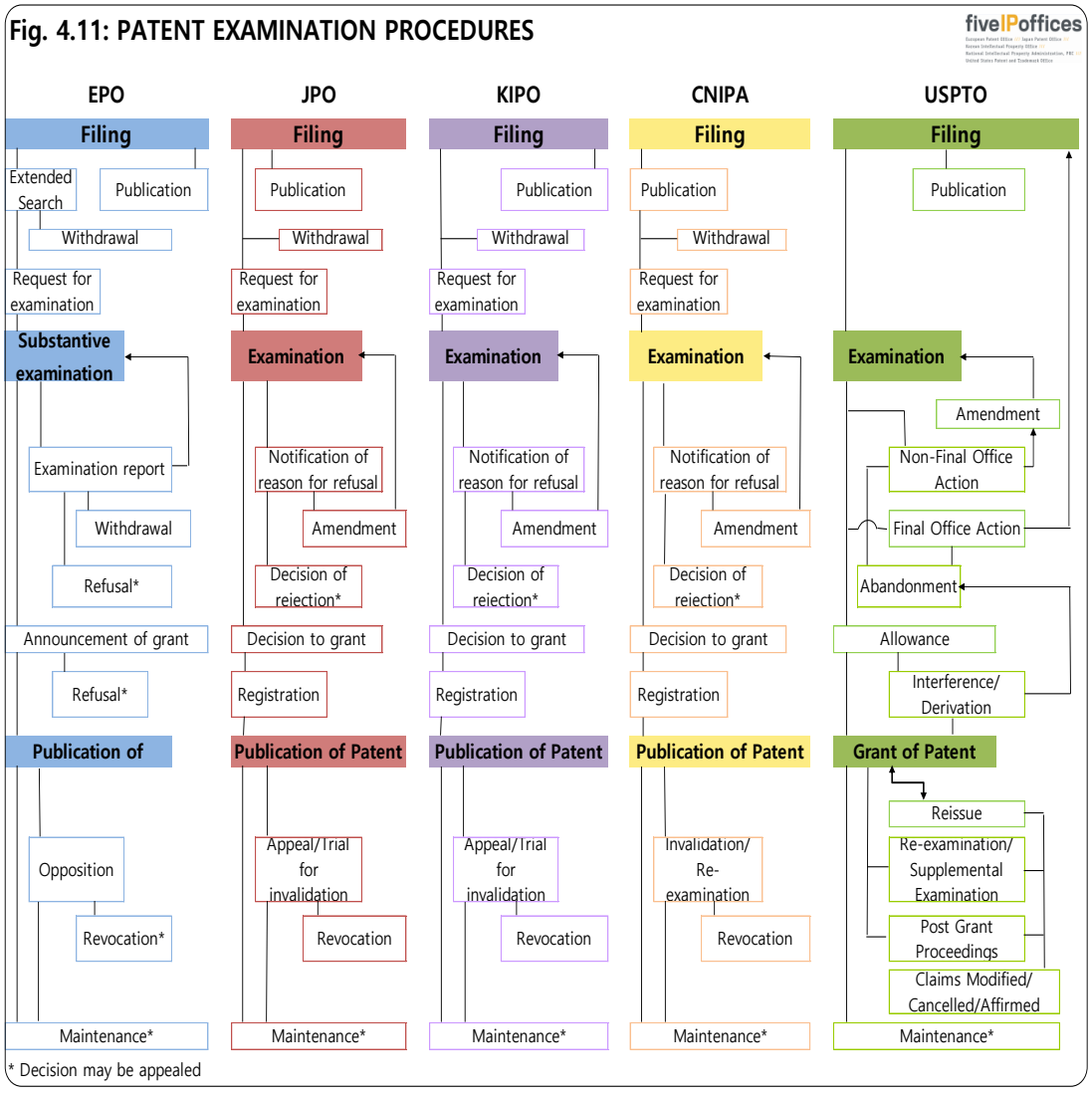
The USPTO payment schedule is somewhat hidden because the data are shown on a time basis (by year after application) that is different from the time basis used for collection of the fees (by year after patent grant).

[36] Once granted by the EPO, European patents need to be validated to come into force in the various member states that are designated at the time of grant.

PATENT EXAMINATION PROCEDURES

PROCEDURE FLOW CHART

Fig. 4.11 is a simplified view of the major phases of the procedures at the IP5 Offices and concentrates on the similarities between offices to motivate the comparative statistics to be presented in Table 4.3. However, the reader should bear in mind when interpreting such statistics that details of the procedures differ between offices, sometimes to quite a large degree (e.g. in time lags between stages of the procedures).



See Annex 2 for some further details about the procedures.

Fees are due at different stages of the procedure. Information on main comparable fees at the IP5 Offices is made available online on the IP5 home page[37].

[37] See www.fiveipoffices.org/statistics/statisticaldata_index.html under fees. These data are not guaranteed to be entirely accurate or up to date. Official fee schedule information and associated regulations from each IP5 Office take precedence.

STATISTICS ON THE PROCEDURES

Table 4.3 shows various statistics as average rates and numbers where applicable for 2017 and 2018. Definitions of the various terms are given in Annex 2.

Details on the definition of the terms presented in Table 4.3 can found in Annex 2. In the following cases, there exist some differences between the offices:

- Pending examination: For the KIPO, only the unexamined patent applications with a request for examination filed have been counted. In the reports prior to the 2016 edition, the figure of this category included the entire unexamined patent applications.

- Pendency first office action: For the EPO, the first office action is the extended European search report that includes a written opinion on patentability or, in the case of a PCT without supplementary search, the international search report with a written opinion. The USPTO measures pendency starting from the date of initial filing, and the EPO, JPO, KIPO and CNIPA measure from the request for examination.

- Pendency final action: The pendency in examination is calculated from the date at which the file was allocated for examination (EPO, usually 6 months after the first action), the date of the request for examination (JPO, KIPO), the date on which the application enters the substantive examination phase (CNIPA), and the filing date (USPTO).

For the JPO, the pendency time is the number of months in FY 2017 or FY 2018 and excludes some cases where the JPO requests an applicant to respond to the second notification of reasons for refusal and where the applicant performs procedures they are allowed to use, such as requests for extension of the period of response and for an accelerated examination.

Note: The length of time until request for examination can vary, this leads to significant differences between offices in the time periods that are reported.

Table 4.3: STATISTICS ON PROCEDURES

Definitions of the various terms are given in Annex 2.

Progress in the procedure Rates in percentage	Year	EPO	JPO	KIPO	CNIPA	USPTO
Examination	2017	94.9	71.8	85.4	75.8	100.0
	2018	94.7	71.8	84.4	83.8	100.0
Grant	2017	57.1	74.6	63.1	56.4	71.9
	2018	62.2	75.3	65.2	53.5	74.5
Opposition	2017	3.7	0.6	-	-	-
	2018	3.2	0.6	-	-	-
Appeal on examination	2017	18.2	30.7	6.9	14.7	3.1
	2018	16.4	29.2	6.5	13.3	2.7

Pendency	Year	EPO[38]	JPO	KIPO	CNIPA	USPTO[39]
Awaiting request for examination	2017	96,000	643,788	294,257	466,067	-
	2018	95,643	633,244	235,969	294,079	-
Pending examinations	2017	407,443	171,508	151,352	1,431,757	546,286
	2018	371,884	168,679	166,878	1,968,203	546,792

[38] EPO's new definition for "Awaiting request for examination": count all applications awaiting completion of the European search and a request for examination by the end of the year.

[39] USPTO pendency is measured from the date of initial filing, not the request for examination.

Pendency first action (months)	2017	4.8	9.3	10.4	14.4	15.7
	2018	4.4	9.3	10.3	15.4	15.6
Pendency final action (months)	2017	24.9	14.1	15.9	22.0	24.2
	2018	25.1	14.1	15.8	22.5	23.8
Pendency invalidation (months)	2017	-	10.6	-	5.2	-
	2018	-	11.1	-	5.1	-

- = not applicable

RATES

The examination rate at the USPTO is 100 percent, since filing implies a request for examination, whereas at the EPO, the JPO, the KIPO and the CNIPA a specific request for examination has to be made. At the EPO, a large proportion of PCT applications in the granting procedure give a high examination rate, as almost all of them proceed to examination. The examination rate is somewhat lower at the JPO and the KIPO since the deferred examination system allows more time for the applicants to evaluate whether or not to proceed further with the application.

The grant rates at the EPO, JPO, KIPO and at the USPTO increased between 2017 and 2018. At the CNIPA, the grant rate decreased between 2017 and 2018.

The appeal on examination rates vary between offices, mainly due to the differing procedures.

PENDENCIES

In the successive stages of the procedure, there are pending applications awaiting action in the next step of the procedure. The number of pending applications gives an indication of the workload (per stage of procedure) from the patent grant procedure in each of the IP5 Offices. Although this may seem to be an indicator for the backlog in handling applications within the offices, it is not in fact a particularly good one because substantial parts of pending applications are awaiting action from the applicant. This could be for instance a request for examination or a response to actions communicated by the office.

As shown in Table 4.3, about 4.5 million applications were pending (i.e. awaiting request for examination or pending examination) in the IP5 Offices at the end of 2018. The total number of applications pending at the IP5 Offices increased by 6.5 percent between 2017 and 2018. As a consequence of the large increase in filings, the number of pending applications kept increasing at CNIPA. Pending applications decreased at EPO and JPO, increased at KIPO and CNIPA, and remained stable at USPTO.
The pendency to first action decreased at the EPO, the KIPO and the USPTO, while it remained unchanged at the JPO. The pendency to final action decreased at the KIPO and the USPTO, but remained unchanged at the JPO.

These numbers should be compared with caution, taking account of the differences in the procedures. At the EPO, the examination is done in two phases: a search and a substantive examination, while they are done in one combined phase at the other IP5 Offices.

Contrary to the system at the USPTO, where there is no delay, at the EPO substantive examination may be requested up to 6 months after the issue of a search report. For the JPO, KIPO and the CNIPA, a request for examination may be made up to 3 years after filing.

At all IP5 Offices, various options to initiate a faster examination are available.