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Cross comparison of US, EU, JP and Korean companies patenting activity in Japan and in the Peoples Republic of China

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Abstract

The purpose of this article is to compare and contrast the patent filing statistics of selected US, European, Japanese and Korean companies in Japan and China with their granted patent statistics in the USA to discern patenting in China trends. The companies are IBM, Canon, Hitachi, Fujitsu, SONY, NEC, Toshiba, Mitsubishi Electric, Matsushita, Samsung, LG Electronics, Siemens, Philips, Intel, Motorola, General Electric, Hewlett Packard, Lucent Technologies, Procter & Gamble, 3M and Kodak, and comparison charts are provided for each. The results suggest that a number of major Korean and European companies are now filing as many applications in China, and for LG Electronics twice as many, as the numbers of US granted patents they are obtaining. For most of the selected Japanese companies Chinese filings are now about half that of their US grants. For the selected US companies, the comparison is rather different because US grants result from home filings, but indicate that these companies are only filing Chinese applications, and also often Japanese applications too, at a rate that is a small fraction of their US grants.

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Keywords: Patent activity; Filing statistics; Grant statistics; China; US companies; European companies; Japanese companies; Korean companies

1. Introduction

Patent registrations are generally considered to be an indicator of a company’s prowess in developing new products and an early predictor of likely future hit products and higher company value and share price. Industry savants have heard all the arguments before about volumes of patents registered as opposed to the really small number of valuable basic patents. However, it is generally accepted that while a company may file worthless patents, or at least patents of unknown or untested value, in their home country, filing outside the home country with all its concomitant costs for patent prosecution is an indicator of perceived value of the technology covered by the patent and, hence, filing abroad, especially in developing countries, is seen as a strong indicator of strategic intent.

In simpler terms, a company planning on exploiting its technology lead backed by a patent or patents would be expected to file the patent in all countries where significant markets would be seen to exist for the products of that technology. Conversely, the nightmare scenario is when a new technology is only protected by patents in a small number of leading countries and when the full potential of the technology, be it medicines or electronics, is realized, coverage is found lacking in significant peripheral countries resulting in a free-for-all in those countries and a risk of re-export, though illegal, to patent-covered countries. Hence, we expect companies to file for patents in all countries where a significant market exists for the products of the patented technology, *or where such a market could exist during the lifetime of the patent.*

Recently, the topics of outsourcing, exporting jobs and off-shoring are in the news. Specifically, in order to retain competitive advantage companies move pro-

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duction off-shore to the lowest cost economies. Chief among the destination countries is The Peoples Republic of China. One risk of off-shoring is that while the country of manufacture may not be seen as a significant target market for the product, the mere fact that the production is located there may lead to copy-cat production facilities resulting from know-how and/or technology leakage. Hence, there is a need to file for patent protection not only in significant market countries, but also in production base countries.

In the case of the Peoples Republic of China (PRC), while the market potential will vary by product, price and region, few doubt that PRC is now a de facto 'Factory of the World' and hence patent protection there is a significant issue. The topic of patenting in China has been taken up by others recently and the reader may refer to Bosworth [1], Yang [2] and La Croix and Konan [3] for more detailed treatment of the issues. Indeed a recent article in this Journal by Connie Wu [4] looked at US companies patent activity in China but from a technology based approach using IPC.¹ The purpose of this study is to compare and contrast the patent activity of US, European, Japanese and Korean companies in PRC, Japan and in the USA, and draw conclusions consistent with the patterns seen.

2. Methods

It is generally accepted that the USA is the leading economy in the world. If that is the case then the US market represents the market most worth protecting for the manufacturers of patent-protected products. If we produce a ranked list of top patenting companies for the US, such a list could reasonably be described as a list of companies most active in high technology and patenting, if not global commerce. Fortunately, such a ranked list is produced every year by IFI Plenum (see www.ificlaims.com and click on 'Press Release'). An extract from this ranking, for the top 10 companies ranked by number of patents registered at the USPTO in 2003, is shown in Fig. 1. Actually while the number of patents granted per company usually vary from year to year, the ranking varies little with IBM leading the pack and either Canon or NEC coming second in recent years. Indeed we can comment on a couple of regular features of this ranking. One such feature is that every year at least five or six of the top 10 companies are Japanese. These are all well-known companies mostly in the

Rank	Company	No. of Patents
1	IBM	3439
2	Canon	1997
3	Hitachi	1906
4	Matsushita	1821
5	HP/Compaq	1763
6	Micron	1708
7	Intel	1595
8	Philips	1355
9	SONY	1354
10	Fujitsu	1338

Fig. 1. US patents issued in 2003, ranked by company.

electrical and electronic fields who are significant participants in the US market. Another feature is the recent rise of Korean companies in the ranking, specifically Samsung, followed later by LG. European participation in the ranking is usually led by Philips and Siemens. In this study, the choice of these top ranked US patent registering companies is admittedly arbitrary and one could focus on a particular industry, e.g., Pharmaceuticals or Electronics, but I will leave that to possible follow-on studies when some patterns are identified.

3. Comparing apples and oranges

It is assumed, for the purposes of this study, that companies who are prominent in the ranks of US patents registered would also feature in a similar ranking of patents granted, filed or early published (OPI'ed) in a country which holds significant market potential and/or production base potential. In the case of PRC, I suggest that numbers of early published patents (OPI'ed) should be accepted as a proxy for patents granted in China due to the vagaries of examination delays etc., lack of easy access to numbers of patents filed by year and company. Indeed, since the USPTO is a relatively fast issuing authority then the numbers of patents registered there should be relatively comparable to numbers of OPI'ed patents at State Intellectual Property Office of China (SIPO). Likewise, numbers of patents OPI'ed in Japan by those same companies are shown as Japan is a mature and strategically important market and as many of the companies in the list are Asian in origin, it provides a relevant benchmark to measure companies strategic intent. In any event since I have plotted numbers of patents granted in the US and OPI'ed in PRC for a five-year period up to the end of 2003, any one-year anomalies or phasing issues should be neutralized.

In comparing USPTO numbers with Japanese and SIPO patent numbers, all of the Japanese, Korean and European companies are in the same position as 'foreigners' filing in both the US and PRC. By this I mean

¹ Editor's comment: It is also worth noting that a brief, early indication of foreign patenting activity in PRC was provided in 1989 by Shen Yaozeng [5]. More recently, for the period up to 1999, Yifei Sun [6] also looked at some trends and rationales of foreign patenting activities in PRC. However, neither reference examines these issues from the perspective of particular companies or groups of companies.

140 that any tendency to file a lot of patents at home and
 141 only the important patents abroad should be neutral
 142 as both US and China are foreign countries in their per-
 143 spective. In evaluating US companies patent numbers
 144 for US compared with Japan and China, we should be
 145 on the lookout for a local filing bias in the US, resulting
 146 in higher numbers filed there, but we will let the results
 147 speak for themselves. In the case of Japanese companies
 148 this local filing bias is very pronounced with OPI'ed
 149 numbers by company in Japan in 2003 as follows: Mat-
 150 sushita: 16,223; Hitachi: 14,414; Canon: 10,850; Tos-
 151 hiba: 9272; SONY: 7088; Mitsubishi Electrical: 6840;
 152 NEC: 6201; Fujitsu: 4748. I beg the readers understand-
 153 ing in not adding these numbers to the graphs for Japa-
 154 nese companies shown below because, no matter what
 155 scale I use, these numbers would dwarf US and SIPO
 156 patent numbers and so the graphs for Japanese compa-
 157 nies show only US and SIPO numbers.

158 The numbers of patents OPI'ed each year at SIPO
 159 were gleaned from a search done on World Patent In-
 160 dex, performed at Thomson Derwent and Limited to
 161 producing a list of the top ranked patenting companies
 162 at SIPO by year. The identity of filing company was as-
 163 sumed as they were searched by Derwent Company
 164 Code (DCC). This method proved convenient for iden-
 165 tifying famous name companies with standard DCC.
 166 Where individual companies dropped out of the top 50
 167 SIPO ranking as searched on WPI, Thomson Derwent
 168 was kind enough to research the DCC in question and
 169 provide the numbers. The numbers of Patents OPI'ed
 170 in Japan were gleaned from a search on Nomura Re-
 171 search Institute's CyberPatent (www.patent.ne.jp).
 172 Numbers of patents filed in China and elsewhere by Chi-
 173 nese companies is not shown because standardization of
 174 handling of Chinese company names in English lan-
 175 guage databases leaves something to be desired and
 176 none of them are to be found in the top 50 patentees
 177 at the USPTO. Admittedly, numbers of patents filed,
 178 OPI'ed and/or granted at the EPO could have been re-
 179 searched to yield a global study but this was beyond
 180 the scope of the objectives of this study. Finally, a word
 181 of caution, all the numbers shown were the results ob-
 182 tained on the date of search in a particular database

and slightly different numbers could be obtained if dif- 183
 ferent databases were used, but the differences are slight 184
 and immaterial to the overall trends and pattern discov- 185
 ered. Moreover, as most savvy readers of this journal 186
 will be aware, the results shown ignore the effect of pat- 187
 ents filed and OPI'ed via the PCT route where some 188
 companies prefer to file once at the WIPO office as most 189
 countries republish locally at a later OPI date. 190

4. Results 191

While an all-at-once look at which companies filed 192
 more patents than their peers, globally, by country or 193
 origin, etc. ought to be interesting, plotting say all US 194
 companies on one graph is, at best confusing, and not 195
 very enlightening. Hence I have plotted the patent num- 196
 bers by year at the relevant patent offices and by com- 197
 pany. As the numbers are shown on the graphs, those 198
 who wish may re-plot for accurate cross company com- 199
 parisons by country. Starting from the top we see in Fig. 200
 2 the pattern for IBM. Now it is clear that numbers of 201
 patents issued in the US are holding steady at 10 times 202
 the numbers filed in China. However, when we compare 203
 IBM filings in Japan and China, the numbers in Japan 204
 are three times higher than in China. These results lead 205
 to the conclusion that IBM has a US centric strategy 206
 and that China comes very low in geographical strategic 207
 priorities. The US numbers themselves bear this out and 208
 IBM beats out the second ranked Canon in US patents 209
 issued in 2003 by nearly 1500 patents which is more pat- 210
 ents than the 8th, 9th or 10th ranked companies each 211
 got in total. 212

4.1. Japanese companies 213

The result for Canon is shown in Fig. 3. Historically 214
 Canon filed nine times as many patents in the US as in 215
 China but in recent years that multiplier has shrunk to 216
 three times (3×). Although Hitachi comes next in the 217
 US ranking I would like to contrast Hitachi (Fig. 4) with 218
 Fujitsu (Fig. 5) to comment that both historically and 219
 currently filed five times as many patents in the US as 220

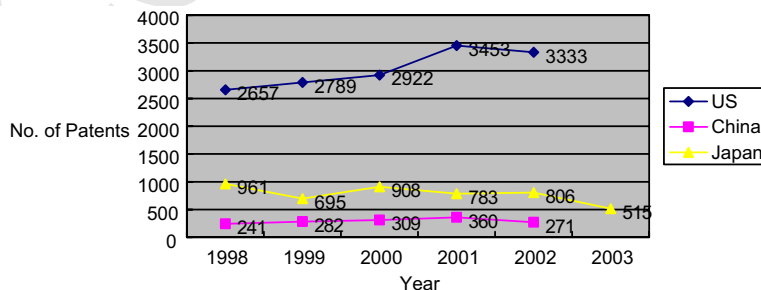


Fig. 2. Comparison of patenting activity in the USA, Japan and in China: IBM.

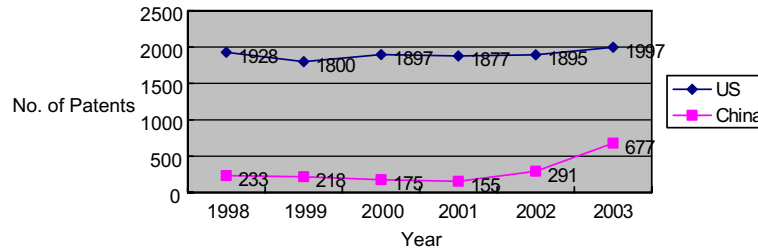


Fig. 3. Comparison of patenting activity in the USA and in China: Canon.

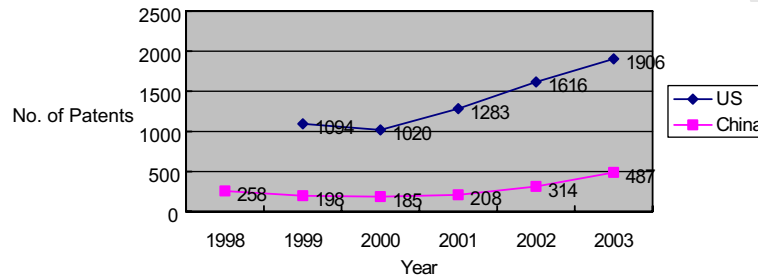


Fig. 4. Comparison of patenting activity in the USA and in China: Hitachi.

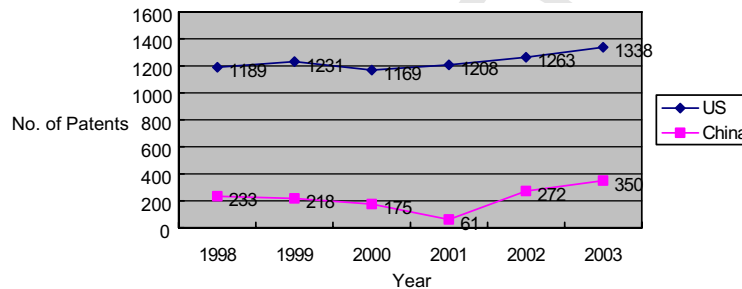


Fig. 5. Comparison of patenting activity in the USA and in China: Fujitsu.

221 China but recently increased SIPO filing to show a 4x
222 ratio.

223 Comparison with SONY (Fig. 6) is worthwhile be-
224 cause SONY always maintained a '2x' policy. Indeed
225 NEC (Fig. 7), Toshiba (Fig. 8) and Mitsubishi Electric
226 (Fig. 9) have also finished up in 2003 with 2x ratios.

227 However, one Japanese company stands out from the
228 pack in this matter and that is Matsushita (see Fig.
229 10) where Matsushita has consistently filed almost as
230 many patents in China as in US and the rising trend
231 in filing is parallel for the two countries since 1999. In-
232 deed a comparison of home filing by Matsushita

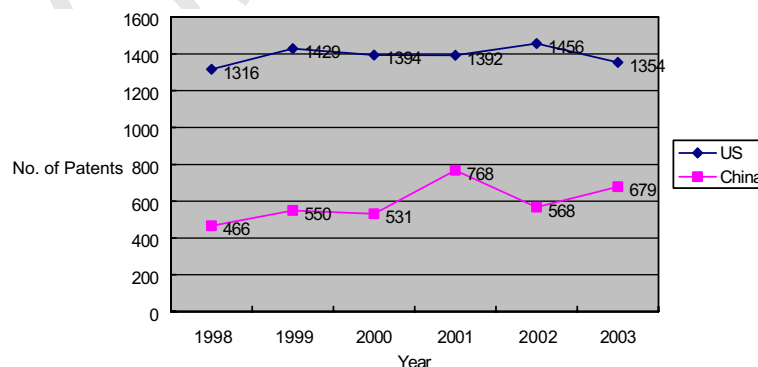


Fig. 6. Comparison of patenting activity in the USA and in China: SONY.

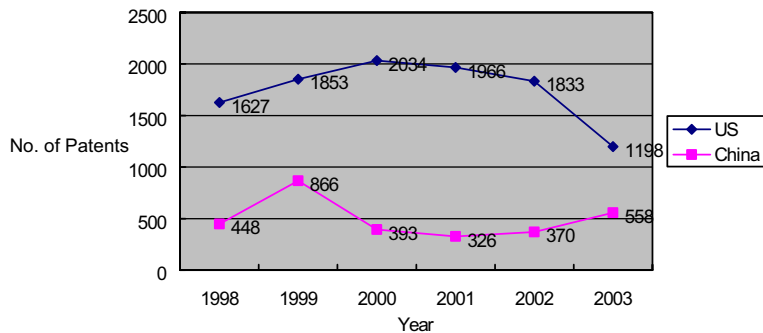


Fig. 7. Comparison of patenting activity in the USA and in China: NEC.

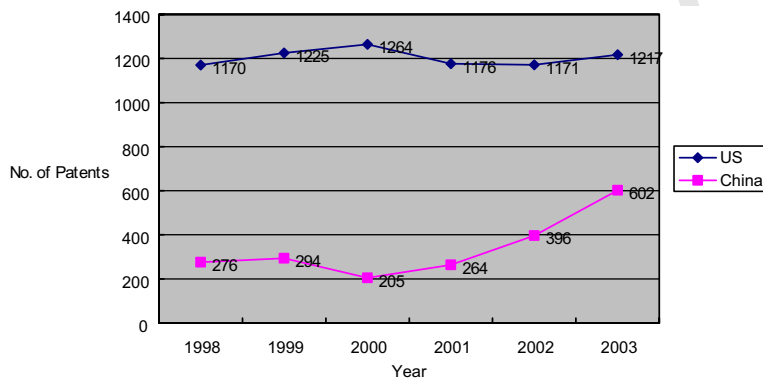


Fig. 8. Comparison of patenting activity in the USA and in China: Toshiba.

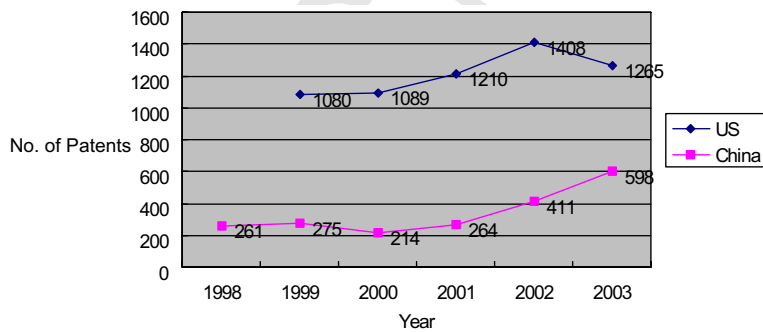


Fig. 9. Comparison of patenting activity in the USA and in China: Mitsubishi Electric.

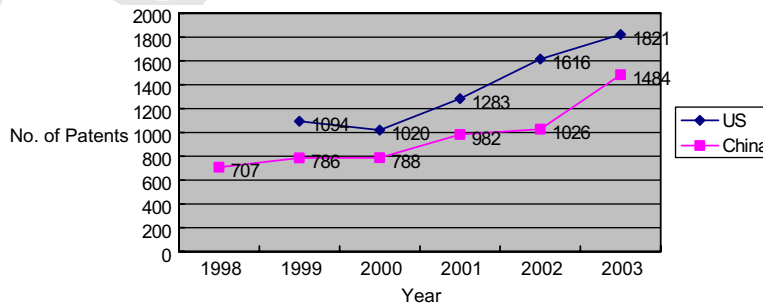


Fig. 10. Comparison of patenting activity in the USA and in China: Matsushita.

233 (16,223 in 2003) shows a 10× home/abroad filing ratio,
 234 just as IBM has. However, the absolute numbers of pat-
 235 ents filed by Matsushita in China are three times higher
 236 than those of IBM.

237 4.2. Korean companies

238 This is a good time to look at what the leading Kor-
 239 ean companies, Samsung (Fig. 11) and LG (Fig. 12), are
 240 doing, as both those companies are in similar markets to
 241 the above mentioned Japanese companies. The Samsung
 242 pattern for the US which shows that they joined the top
 243 10 at one stage (Samsung ranked 5th in US patents reg-
 244 istered in 2001) and then the numbers of patents regis-
 245 tered in the US declined just as the rate of filing in
 246 China increased and the number of patents filed by Sam-
 247 sung in China doubled in a one-year period. Thus, in

2003 Samsung had similar numbers of patents in US, 248
 Japan and China. LG took the process one stage further 249
 and numbers of patents filed in China and Japan out- 250
 stripped US patents registered in 2002 and 2003. Indeed 251
 in the same period, numbers of patents filed annually in 252
 China by LG doubled. 253

4.3. European companies

It is also interesting to see the patterns for the Euro- 255
 pean companies Siemens and Philips, both of whom 256
 have had a strong presence in China for a number of 257
 years. While both companies have patterns more similar 258
 to the Samsung and Matsushita model, there are signif- 259
 icant differences. In the case of Siemens (see Fig. 13) the 260
 number of patent filings in China has held steady 261
 through the 2000–2003 period in the 520–560 range, 262

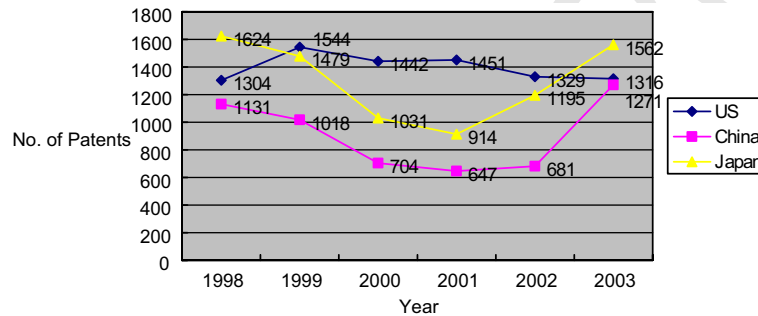


Fig. 11. Comparison of patenting activity in the USA, Japan and in China: Samsung.

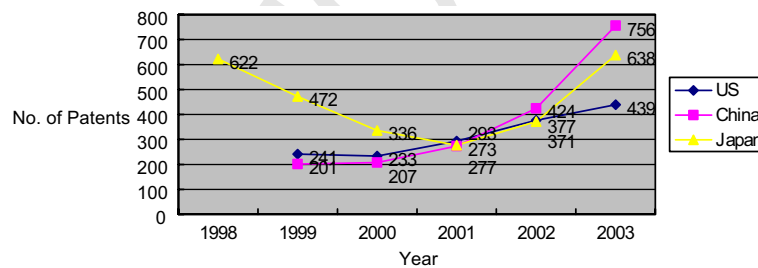


Fig. 12. Comparison of patenting activity in the USA, Japan and in China: LG Electronics.

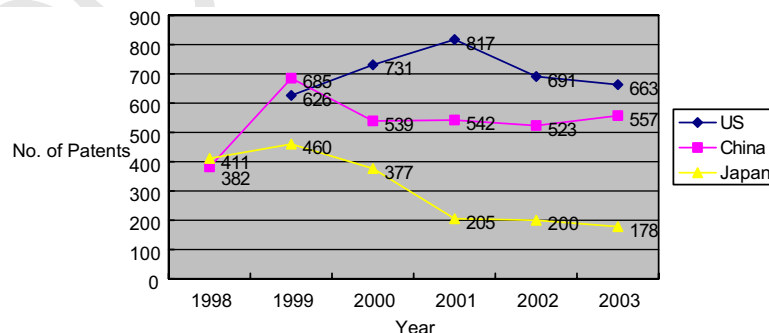


Fig. 13. Comparison of patenting activity in the USA, Japan and in China: Siemens.

263 while US patent registrations declined from a high of
 264 817 in 2001 to 660 in 2003. In the case of Philips (Fig.
 265 14) while US patent registrations gyrated widely, Chi-
 266 nese patent filing rose steadily year on year from 255
 267 in 1998 to 1113 in 2003. In comparing Japan and China
 268 patent numbers for Siemens and Philips, it is clear that
 269 both companies are focussing on China rather than
 270 Japan.

271 4.4. US companies

272 The pattern of IBM with a 10x gap between US pat-
 273 ents registered and Chinese patents filed has been de-
 274 scribed above and we should now contrast that to the
 275 pattern of other US high-tech companies. In the case
 276 of Intel (Fig. 15) where US patent numbers registered
 277 have doubled in the last five years from 701 to 1595,
 278 the Chinese patent filing numbers also grew but from

a low of 26–187 in 2003. In the last three years the ratio
 of US:Chinese has been a steady 10x, like the IBM ratio
 but still significantly different from Japanese, Korean
 and European companies in roughly the same industries.
 But while Intel's Chinese patent numbers are low, Intel
 does not seem to rate filing in Japan at all where patent
 filings are low and declining to single digits! In the case
 of Motorola (Fig. 16) the US:China ratio was a more
 modest 4x over most of the period; Motorola is also
 unusual in showing a consistent decline of both US
 grants and Chinese filings over almost the whole period
 studied, but the 4x ratio is similar to that of Hitachi and
 Fujitsu in the same industry. The Japan:China pattern is
 the same as seen for Intel. For GE (see Fig. 17), a com-
 pany with a long history of leadership in high technol-
 ogy patenting, the current US:China ratio is 5x and
 this is a pattern similar to that of Toshiba (Fig. 8), its
 rival in power systems. The Japan:China ratio shows a

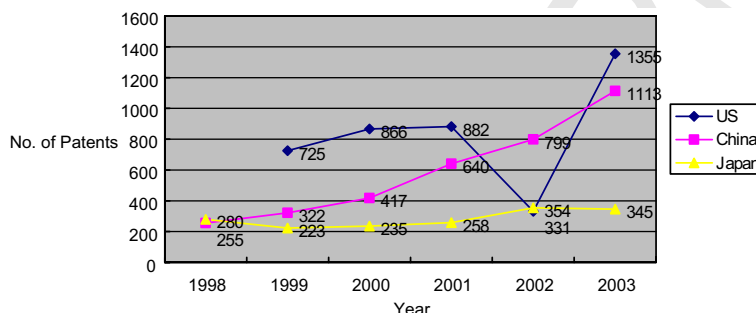


Fig. 14. Comparison of patenting activity in the USA, Japan and in China: Philips.

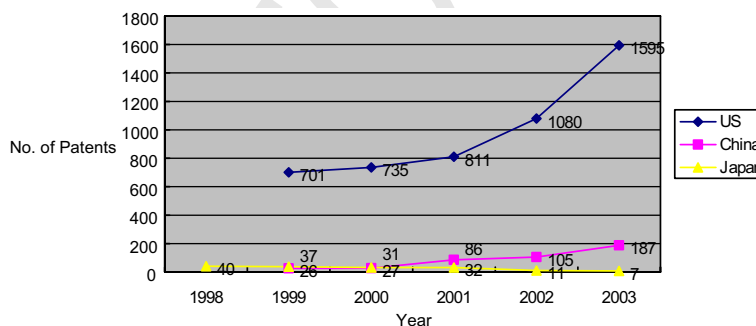


Fig. 15. Comparison of patenting activity in the USA, Japan and in China: Intel.

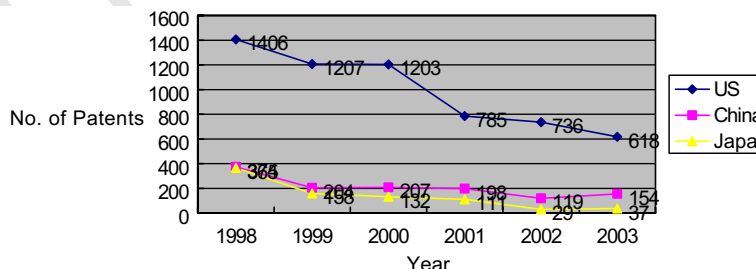


Fig. 16. Comparison of patenting activity in the USA, Japan and in China: Motorola.

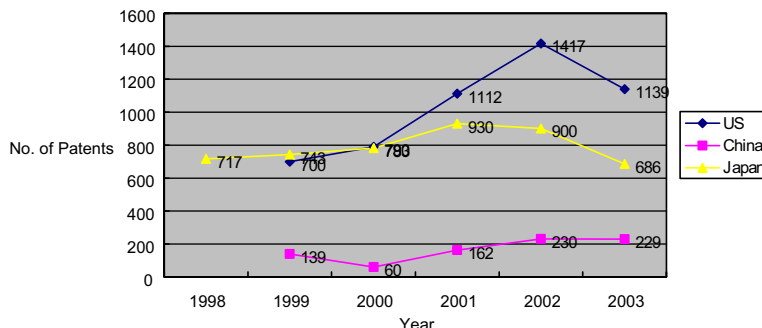


Fig. 17. Comparison of patenting activity in the USA, Japan and in China: General Electric.

297 distinct greater emphasis placed on Japan. Although be-
 298 yond the scope of this study, it would be interesting to
 299 see a further breakdown of the patent numbers by tech-
 300 nology. Please also refer to Figs. 18 (Hewlett Packard),
 301 19 (Lucent) and 22 (Kodak) where each of the compa-
 302 nies operate in different industries but where Japanese
 303 filings exceed those in China. In the case of Procter &
 304 Gamble (Fig. 20) and 3M (Fig. 21) patent filings in Chi-
 305 na exceed those of Japan. More data is needed to make
 306 meaningful conclusions and comparisons with compa-
 307 nies in the same industries.

308 **5. Discussion**

309 The most surprising and clear result from this com-
 310 parison is that while most Japanese companies are pur-
 311 suing a patent strategy in PRC which has them filing one

patent for every two filed in the USA, the Korean com- 312
 panies Samsung and LG as well as Matsushita (Japa- 313
 nese) and the European companies Siemens and 314
 Philips are pursuing a strategy of filing as many patents 315
 in PRC as they do in the US. Contrast this to a patent 316
 strategy pursued by US companies which has them filing 317
 one in 10 (or less) of the patents filed in the US and filing 318
 in China. Moreover, the absolute numbers of patents 319
 filed by US companies in China is low at a half to one 320
 third the numbers of equivalent Japanese companies. 321

Presumably Japanese and Korean companies see Chi- 322
 na as both a huge potential market as well as a valuable 323
 low cost production base. Anecdotally the author has 324
 had discussions with Japanese companies which bear 325
 out this presumption. However, as every reader of IP lit- 326
 erature and business magazines knows, there is a big IP 327
 problem right now in PRC. Most of this problem relates 328
 to counterfeiting of trademarked products. However, 329

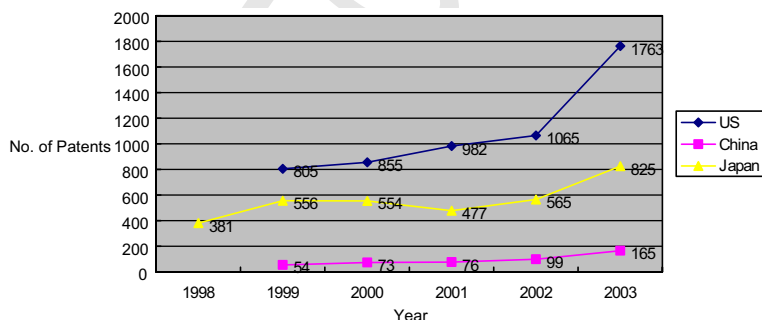


Fig. 18. Comparison of patenting activity in the USA, Japan and in China: Hewlett Packard.

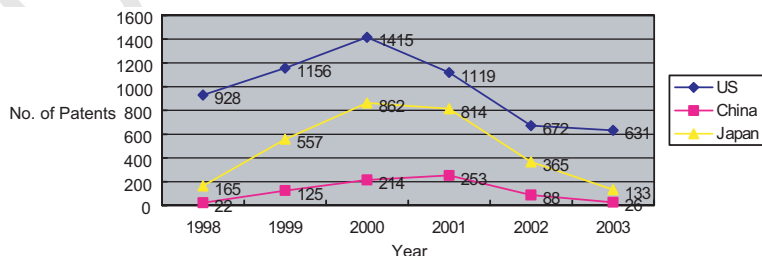


Fig. 19. Comparison of patenting activity in the USA, Japan and in China: Lucent Technologies.

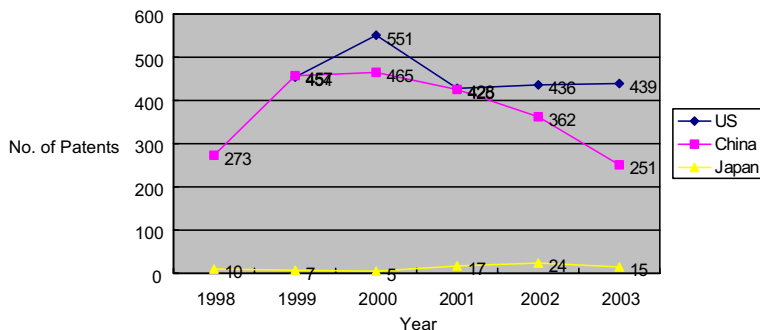


Fig. 20. Comparison of patenting activity in the USA, Japan and in China: P&G.

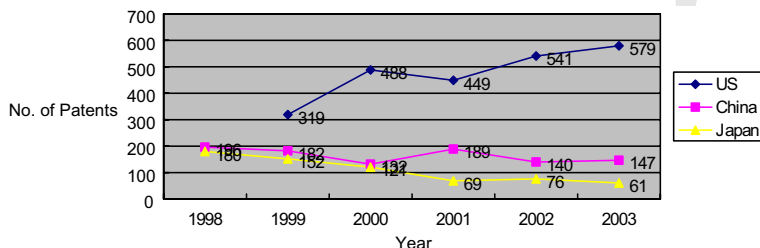


Fig. 21. Comparison of patenting activity in the USA, Japan and in China: 3M.

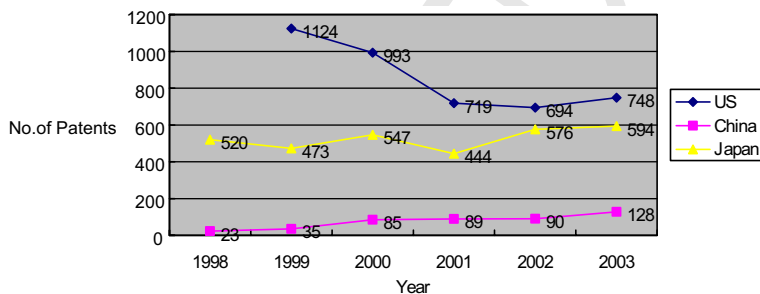


Fig. 22. Comparison of patenting activity in the USA, Japan and in China: Kodak.

330 not a few companies have found that patent products
 331 are also being imitated; i.e., patents are being infringed
 332 too.

333 In summary, it is generally agreed that the IP enforce-
 334 ment environment in China is not currently up to the
 335 standard that we find in Europe, US and Japan. Presum-
 336 ably Japanese, Korea, European and US companies
 337 know this equally well. So why would US companies
 338 still ignore China as a production site and market while
 339 Japanese, Korean and European companies weigh it
 340 heavily? Put another way, why would Japanese, Korean
 341 and European companies ignore the IP enforcement
 342 problems we find in China today and file more patents
 343 every day? Again, the author falls back on anecdotal
 344 comments from Japanese companies where China is
 345 seen as following the same developmental path as Japan
 346 which went from IP pariah to IP power house in
 347 20 years. Off the record comments indicated that the

process was expected to be telescoped into ‘5–10 years’. 348
 Presumably, US corporations do not expect such a swift 349
 transformation in PRC IP enforcement regimes? How- 350
 ever, some US and Korean companies share a pattern 351
 of patent filing where more patents are filed in China 352
 than in Japan. 353

6. Benchmarking 354

It is well known in patenting circles that companies 355
 watch and sometimes mimic what their competitors do 356
 in terms of R&D spending as well as patenting activity. 357
 Looking at the results shown here there is ample evi- 358
 dence for this type of patent behavior. All of Toshiba, 359
 Mitsubishi Electric, NEC and SONY converge at a 2× 360
 ratio of US patents granted in 2003 compared with 361
 PRC patents OPI’ed. Also, surprisingly both Samsung 362

and LG doubled the number of patents in PRC between 2002 and 2003. One other type of benchmarking is to maintain a certain level of filing consistent through a five-year period. For example 3M maintains a consistent number of PRC patents at 150–200 p.a. in the five-year period and Motorola has a gently declining PRC pattern within a similar range. This contrasts with GE which is in the same range but fluctuates more widely between 60 and 230 patents in PRC. Clearly Siemens is benchmarked at 550–600 PRC patents p.a. while Philips grew from 255 to 1113 PRC patents in the same period.

7. Surprises

Leaving aside the fact that IBM is happy to file only one in 10 of its US patents in PRC, there are some other surprises. One is that Samsung, having let its filing rate in China halve from approximately 1200–600 in the 1998–2002 period, increased it again to 1200 in 2003. Another surprise is that Matsushita which trails IBM, Canon and Hitachi in the US ranking has such a clear lead in patenting in PRC where twice as many patents are filed as any Japanese or US rival. Indeed the pattern and recent surge in filing rate is similar to that of Samsung. Unusually for a US company in this group of selected companies, Procter & Gamble files about the same number of patents in the US as China but also P&G has been filing less patents in China each year since 1999, does P&G know something that we do not? Moreover, I am at a loss to explain or even conjecture why P&G files so few patents in Japan; this requires more research.

8. Conclusions

Since the sample size is so small and interviews with leading patent strategists were not conducted, it is not possible to be categorical in concluding what the patenting strategies of the companies in this survey were. However, it seems clear that most leading technology companies in the world, with the exception of US com-

panies, feel that it timely and worthwhile to file patents in PRC now, if only in the hope that the benefits from such patents will become apparent at some future date in the life of the patents. Indeed it is tempting to conclude that companies from the countries such as Korea and Japan, located near China, show the most interest in patenting in China but the interest and numbers of patents filed by the European companies Siemens and Philips tell a different story. I leave to others the task of refining this approach to specific technology sectors such as Pharmaceuticals, Chemical etc. as the data analyzed and presented here was insufficient to be specific but, generally one has to conclude from the data presented here that either US companies are about to be blind-sided in the Chinese market, or that Japanese, Korean and European companies are wasting their IP budgets on filing patents in China. Only time will tell who is right.

Acknowledgment

As noted earlier, the author is grateful for the assistance provided by Thomson Derwent in supplying data for analysis.

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