

## **An insight into the patent systems of fast developing asian countries**

**Vu Tuan Anh**

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JEL Classifications: P14, P51, O34.

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# **AN INSIGHT INTO THE PATENT SYSTEMS OF FAST DEVELOPING ASIAN COUNTRIES**

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## **Abstract**

The aim of this paper is to describe the patent systems of fast developing Asian countries (China, Indonesia, Philippines, Thailand and Vietnam) and understand the factors that drive the demand for patent in these countries. Patent systems in these countries have strengthened to a large extent, the number of patent applications has increased drastically, although at very different pace across countries. The policy mixes that seem to be associated with a strong increase in demand for patents are: i) policies aiming at attracting FDI; ii) low relative costs (or fees); and iii) a relatively low quality of the examination processes. The significant differences in the patent systems of fast developing countries echo the differences observed between the patent systems in Europe, the USA and Japan..

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# 1 Introduction

Developing Asian countries have benefitted from being amongst the top fast growing economies in the world for the past 15 years. They are viewed as promising markets for technology transfer and knowledge spillover in the world. At the same time their economies have evolved towards more openness. One aspect of this openness has been to gradually adapt their patent systems the world standards, essentially through their WTO membership. From 1991 to 2008, these countries saw a fast growing volume of patent applications. Yet there are important differences across countries. The objective of the present paper is to describe and compare these patent systems, and investigate the main drivers of the observed growth in patent applications. The countries under investigation include China, Indonesia, the Philippines, Thailand and Vietnam.

Based on the literature, three factors are worth to be considered: FDI policies, the cost of patenting and the quality of examination processes. These three factors have received attention in the recent literature and this paper aims at investigating their role for the five fast growing Asian countries. The paper is structured as follows.

Section 2 provides a broad picture of IPR systems in the five countries. This comparative analysis illustrates similarities and differences across countries. Section 3 is devoted to the role of FDI and patent fee, which theoretically play a significant role in boosting growths of patent filings. Section 4 investigates the potential impact of the quality of the examination process on the demand for patents. The last section concludes.

## 2 Overview of IPR system in fast developing Asian countries.

### *2.1 Historical development of IPR system in developing Asian countries*

Historically, the Asian culture has not supported the principles of Intellectual Property Rights. In the past memorizing and imitating literature and paintings from well known masters were considered as the ways to show respects to those authors (Kumar and Ellingson, 2007). Secrecy was the most common way to keep ownership of process or product in the past. This argument can be seen clearly through the Traditional Asian Herbal Drugs; the secrecy of some medicines or methods were kept and only passed on to family's members. The eldest son normally was the one who received the secrecy and inherited the ownership. These practices can also be clearly seen in the wine industry and vocational villages.

The establishment of formal intellectual property systems in fast developing Asian countries is rather slow and embedded in more complex judicial systems. For most of these countries, a formal intellectual property system was established a few years after their declarations of independence. However, it took many years for these IP systems to be enacted. They are mainly designed by patent offices which were often first established as small units inside a ministry, such as ministry of trade or ministry of science and technology. For example, the patent office in Vietnam is one unit of the National Office of Intellectual Property (NOIP), which is managed by the Ministry of Science and Technology. The NOIP handles most of the categories relating to intellectual property, except for the copyright (handle by Ministry of Cultural, Tourism and Sports), and the Plant and Variety protection (handle by the Ministry

of Agriculture and Urban Development). More information relating to the administrative bodies can be seen in Table 1.

**Table 1. Patent offices and their competence administrations**

| Country     | Patent Office  | Administrative management          |
|-------------|--|------------------------------------|
| China       | SIPO (State Administration for Intellectual Property Office of People's Republic of China) | State                              |
| Indonesia   | DGIP (Directorate General of Intellectual Property)  | Ministry of Laws and Human Rights  |
| Philippines | IPO (Intellectual Property Office)   | Office of President                |
| Thailand    | DIP (Department of Intellectual Property)  | Ministry of Commerce               |
| Vietnam     | NOIP (National Office of Intellectual Property)  | Ministry of Science and Technology |

Source: WIPO website <http://www.wipo.int/members/en/index.jsp>

## 2.2 IPR policies

The five countries under investigation have fairly new intellectual property laws. IP enforcement processes are however considered very weak and embodied with a high degree of uncertainty. For instance, Brilliant (2006) provides evidence suggesting that less than 1% of 40,000 cases relating to copyrights and trademarks, which were handled by the Chinese administrative enforcement authorities in 2005, were turned over for prosecution. Similar rates of prosecution were found in Vietnam, Indonesia, and the Philippines.

In 2009, the US Department of State reported that most of these countries were on the priority watch list and the rest are on watch lists for different types of infringement, or in violation to copyrights or trade marks. Table 2 shows the estimations performed by Business Software Alliance (2010) for the five countries over the period of 2005-2009. It clearly appears that software piracy rates have slightly declined in the five countries, but the rates are still very high. The value of pirated software has however increased.

**Table 2. Business Software Alliance estimation on pirated software.**

| Country     | Percentage of Pirated Software |      |      |      |      | Value of Pirated Software \$ Million |       |       |       |       |
|-------------|--------------------------------|------|------|------|------|--------------------------------------|-------|-------|-------|-------|
|             | 2005                           | 2006 | 2007 | 2008 | 2009 | 2005                                 | 2006  | 2007  | 2008  | 2009  |
| China       | 86                             | 82   | 82   | 80   | 79   | 3,884                                | 5,429 | 6,664 | 6,677 | 7,583 |
| Indonesia   | 87                             | 85   | 84   | 85   | 86   | 280                                  | 350   | 411   | 544   | 886   |
| Philippines | 71                             | 71   | 69   | 69   | 69   | 76                                   | 119   | 147   | 202   | 217   |
| Thailand    | 80                             | 80   | 78   | 76   | 75   | 259                                  | 421   | 468   | 609   | 694   |
| Vietnam     | 90                             | 88   | 85   | 85   | 85   | 38                                   | 96    | 200   | 257   | 353   |

Source: Business Software Alliance (2010)

Ginarte and Park (1997) and Park (2008) provided an alternative way to assess the strength of IPR systems, including enforcements practices (preliminary injunction, contributory infringement and burden of proof reversal). These criterion are somewhat legitimate but they do not take into account the effective implementation of these regulations. In order to have a better view on enforcement systems two extra criterions are added to the three factors taken into account by Park (2008): the existence of an IP court and the observed level of copyrights violations.

The broad evaluation IPR enforcement systems is therefore based based on the 5 criterions presented in table 3 (preliminary injunction; contributory infringement; burden of proof reversal; having a specialized IP court; moderate violation in copyrights). Each criterion is given 0.2 point when fulfilled. For the violation of copyrights, a threshold value of 50% is chosen to identify the countries with a low effective enforcement, and none of the countries qualify. The evaluation of enforcement practices for the five countries is presented in table 3.

**Table 3. IPR enforcement systems in five South East Asian countries -2009**

| <b>Enforcement norm</b>                          | <b>China</b> | <b>Indonesia</b> | <b>Philippines</b> | <b>Thailand</b> | <b>Vietnam</b> |
|--|--------------|------------------|--------------------|-----------------|----------------|
| Preliminary Injunction                           | 0.2          | 0.2              | 0.2                | 0.2             | 0.2            |
| Contributory Infringement                        | 0.2          |                  | 0.2                |                 |                |
| Burden of Proof Reversal                         | 0.2          | 0.2              | 0.2                | 0.2             | 0.2            |
| Existence of an IP Court                         | 0.2          |                  |                    | 0.2             |                |
| Moderate violation in copyrights (less than 70%) |              |                  |                    |                 |                |
| <b>Enforcement Index</b>                         | <b>0.8</b>   | <b>0.4</b>       | <b>0.6</b>         | <b>0.6</b>      | <b>0.4</b>     |

*Source: adopted from Ginarte & Park (1997)*

Preliminary injunction is available in the five countries. However, its implementation varies in practices. For example, even though preliminary injunction is applicable in Vietnam, it is not clearly introduced in the IPR law. Furthermore, the court only issues preliminary injunction if the claimant has paid a deposit, which should be equal to 20% of the value of the suspected infringed goods (Joint circular No.2/2008).

Perceptions on IP enforcement vary as well in the ways of prosecution. Some countries consider IP infringement as a criminal activity, like in Thailand, whereas other countries, like in Vietnam frequently consider it as an administrative handle. The perception is also depended on types of infringement. Goldstein and Straus (2009) provided evidences that most of the infringement cases relating to copyright and trademark in Thailand were criminally proceeded, whereas the infringement cases relating to inventions or industrial designs were rarely proceeded for criminal prosecution.

As summarized in Table 4, we notice that all these countries follow the first to file scheme. These systems share many characteristics in common, such as: the maximum duration of patent protection, which is 20 years without possibility of extension; the grace period is 6 months (except the Philippines). The procedure of patenting is varied from country to country, but in general, it follows the first to file principle: filing, preliminary examination, publication, substantive examination, and granting or refusal. Most of these countries allow pre-grant opposition (except for China).

**Table 4 Patent systems in the fast developing Asian countries**

| Country            | Patent System Scheme | Grace Period | Publication            | Opposition            | Request for examination from filing date | Duration of Protection |
|--------------------|----------------------|--------------|------------------------|-----------------------|--|------------------------|
| <b>China</b>       | First to file        | 6 months     | 18 months              | No                    | 36 months                                | 20 years               |
| <b>Indonesia</b>   | First to file        | 6 months     | 18 months              | Pregrant <sup>a</sup> | 36 months                                | 20 years               |
| <b>Philippines</b> | First to file        | 12 months    | 18 months <sup>b</sup> | Pregrant              | 24 months                                | 20 years               |
| <b>Thailand</b>    | First to file        | 6 months     | not specified          | Pregrant              | 60 months <sup>c</sup>                   | 20 years               |
| <b>Vietnam</b>     | First to file        | 6 months     | 18 months              | Pregrant              | 42 months                                | 20 years               |
| <b>USA</b>         | First to invent      | 12 months    | 18 months              | No                    | -  | 20 years               |

Source: WIPO <http://www.wipo.int/members/en/index.jsp> and WTO <http://docsonline.wto.org/>

a: Opposition must be made within 6 months of the publication date.

b: Publication must be made within 12 to 18 months of the filing date.

c: Request for examination must be made within 90 days from the publication date.

All countries allow owners of inventions to file patents by themselves, however it is recommended to consult with IP law firms or IP experts to draft the patent application. Non resident applicants need to have a local IP firm acting as a representative to file for a patent. All the studying countries allow certain time frames (grace periods) prior to the filing date for the inventions being considered as novelty.

### 3 The demand for patents

The objective of this paper is to identify the factors that might influence the demand for patents in fast developing Asian countries. It is therefore useful to have a glance through their patent systems. Realizing on the works of Ford and Rork (2010), Pavitt (1985), and recent studies by de Rassenfosse and van Pottelsberghe (2010, 2011), the two factors (Inward FDI and Patenting fee) are analyzed in this section.

#### 3.1 FDI and patent filings

Three patent intensity indicators can be used to assess the development of IPR system: resident patent filings per US\$ billion gross domestic product; resident patent filings per million capita; Resident patent filings per US\$ million of research and development (R&D) expenditure. Hu and Jefferson (2009) suggest that FDI create patenting opportunities in China and hence contribute to increase the demand for patents. Ford and Rock (2010) illustrates the positive correlation between FDI and domestic patenting for the US. Nunnenkamp and Spatz (2004) provide empirical evidence suggesting that stronger IPR protection may induce better quality FDI, thus ultimately increasing patents both in volume and in quality. As the principle of IPR protection is to motivate institution to invent and innovate, through a reduction of infringements, stronger of IPR systems should result in a higher demand, notably via higher FDI.

Reviewing the number of patent applications received by the patent offices in the five countries for the period of 1990-2008, important increases in the numbers of domestic patent filings (see Annex 1) clearly appear. The motivation to patent can be assessed through patent intensity, which is calculated and shown in table 5. China has the highest patent intensity amongst the five countries. This motivation to patent might result from the fact that China has reformed its policies to attract more foreign investments, leading to increase in the inflow of FDI that went from USD 4.3 billion in 1991 to USD 40 billion in 1999 and reached USD 108 billion in 2008 (UNCTAD, 2010).

Table 6 shows a positive strong correlation between FDIs and resident patent filings in the period which suggests that FDI contributed to the growth of Chinese technological capability. Evidence shows that resident patent applications had grown from 7,372 in 1991 to 194,597 applications in 2008. Figure 1 shows that China is the only one among the five countries that has managed to attract FDI and rely this source of funds to leverage its own technological capability (as measured by domestic patent applications). The growths of patent filings and FDIs in China are partly related to the strength of IPR protection. The two amendments of its patent law in 1992 and in 2001 made the Chinese patent law more enforceable and closer to international standards, such as the extension of patent life (from 15 years to 20 years), and preliminary injunction reliefs. Table 5 shows that the patent market in China is still much smaller than in the US, but by far much bigger than in other Asian countries. .

**Table 5. Average patent intensity over 5 year periods**

| Period             | 1991-1995 | 1996-2000 | 2001-2005 | 2006-2008 |
|--------------------|-----------|-----------|-----------|-----------|
| <b>China</b>       | 8.5       | 12.6      | 44.4      | 119.4     |
| <b>Indonesia</b>   | 0.2       | 0.5       | 1.0       | 1.3       |
| <b>Philippines</b> | 2.3       | 1.9       | 1.8       | 2.4       |
| <b>Thailand</b>    | 1.9       | 7.3       | 11.5      | 14.1      |
| <b>Vietnam</b>     | 0.4       | 0.4       | 1.2       | 2.4       |
| <b>US</b>          | 393.1     | 488.3     | 652.7     | 768       |

*Source: Own calculation based on data collected from WIPO and World Bank.*

*Average patent intensity = Resident patent filings / Million capita (Calculation is based on 5 year period)*

Being endowed with an educated workforce and having developed policies designed to attract FDI, including a strong IPR judicial system, the Thai government has succeeded in attracting large amounts of foreign investments, even more than China in relative terms. Figure 1 shows that Thailand had the highest FDI per million capita; it received \$2 billion of FDI in 1991, and nearly five fold this amount in 2008. Table 6 shows high correlations between patent filings and the amount of FDI over the period. However, most of these patent filings were filed by non resident applicants. This suggests that Thailand had given more concern to attract FDI rather than strengthen its own technological capacity (which can be measured with domestic patent filings). Open policies to foreign investors and the strengthening of its IPR enforcement system made the Thai patent market become the second biggest market for patenting.

Vietnam has been considered as an attractive country for foreign investments since the early 1990s. In 1991, Vietnam attracted \$375 million of FDI, and in the same year NOIP received 72 patent applications (37 resident patent applications and 35 non resident patent applications). The amount of FDI and patent filings grew quickly during the next 18 years.

Vietnam enacted its patent law in 2005 and accessed to the WTO in 2007. By 2008, the inflow of FDI reached \$8 billion and 3,199 patent were filed, mainly from non-resident applicants (204 resident patent applications, 2,995 non resident patent applications). Figure 1 shows that even though Vietnam succeeded in being the second highest FDI host in relative terms (per million capita in 2008), its technological capacity is still marginal compared to China and Thailand. Number of patents filed per million capita in 2008 was about the same as number of patents per million capita of Thailand filed in 1991. Moreover, numbers of resident patent applications were very small in comparison to numbers of foreign patent applications received over the period. This suggests that Vietnam has devoted more efforts to attract FDI rather than strengthen its internal technological capability.

**Table 6. Correlation between FDIs and patent filings in the period of 1991-2008**

| Correlation                  | China | Indonesia | Philippines | Thailand | Vietnam |
|------------------------------|-------|-----------|-------------|----------|---------|
| FDI and Resident patents     | 0.91  | 0.24      | 0.74        | 0.86     | 0.73    |
| FDI and Non Resident patents | 0.91  | 0.45      | 0.43        | 0.82     | 0.84    |
| FDI and Total patents        | 0.92  | 0.44      | 0.46        | 0.86     | 0.84    |

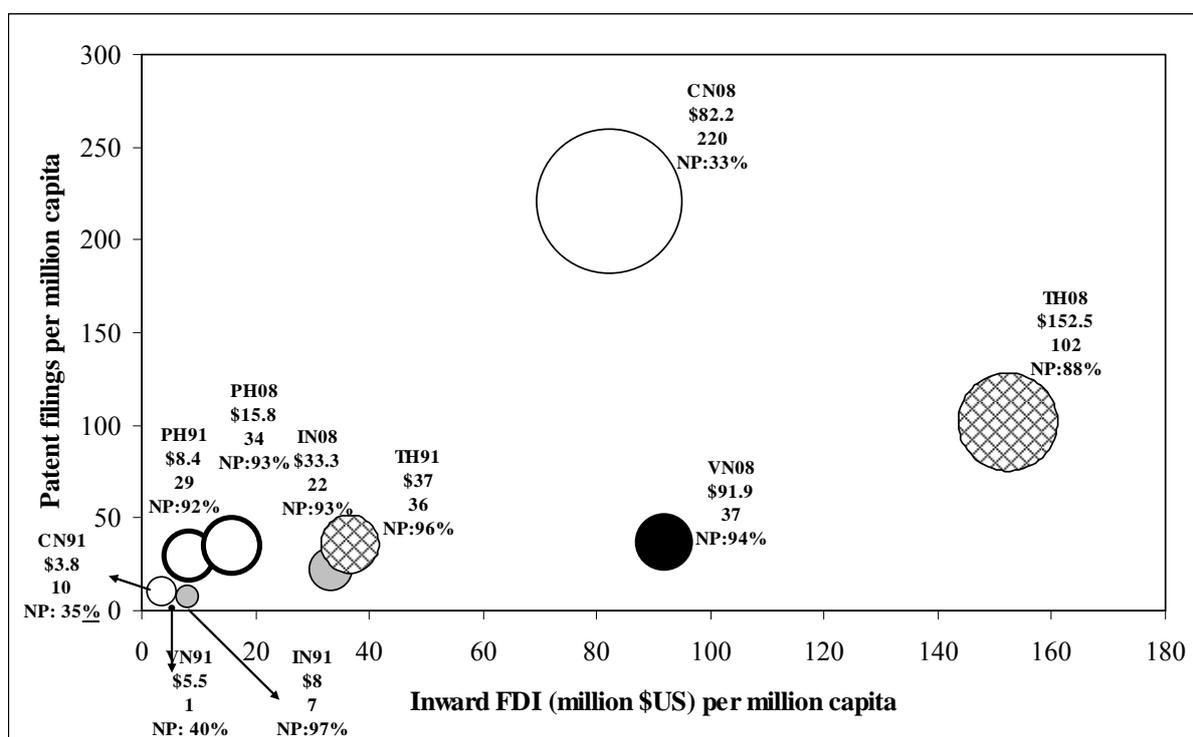
*Source: Data derived from UNCTAD and WIPO*

Weaker correlations between FDI and patent filings are observed for the Indonesia and the Philippines, as illustrated in Table 6 and Figure 1.. Although, the correlation is weak, the amount of FDIs flew in and out of the Indonesia impacted the number of patents filed over the period. The period of 1991-1996, the amount of FDI was increased from 1.5 billions to over 6.2 billions. Patent filings also increased from 1,314 filings in 1991 to 4,067 in 1996. Affecting from the Asian financial crisis, the amount of FDI was radically decreased, thus many foreign investments were pulled out in the period of 1997 to 2003, resulted in negative inflow of FDI. Non resident patent filings were also free-felled in 1998 but then gained its momentum to rise back again. In different view, resident patent filings were steadily increased, even though at small margins. Figure 1 shows that Indonesia weakly improved its technological capacity and its patent market is less attractive than the market of China, Thailand and Vietnam.

Conservatively, the Philippines had not been aggressive enough in attracting foreign investments. In 1991 the Philippines received only \$556 million, which is only about one third of the FDI, which was poured into Indonesia for the same year. Realizing the benefits of FDI, in 1991 the Philippines passed the law on foreign investment, which consequently stimulated incentives to foreign investors. However, due to political uncertainties and frequent foreign investment disputes (Goldstein and Straus, 2009), the amount of FDI went up and down through out the period. However, the Philippines was enable to keep its momentum and slowly leveraged its technological capacity with little incentive to attract FDI.

Figure 1. provides an assessment on the attractiveness of patent markets for the five countries. The assessment is based on the attraction of foreign investment (Inward FDI in millions \$US per million inhabitants and total patent filings per million inhabitants. China and Thailand are the two most attractive countries for patenting. Vietnamese patent market is on the way and considered more attractive than the Philippines and Indonesia.

**Figure 1. Attractiveness of patent markets in Asia**



Source: Own calculation derived from Annex 1 and UNCTAD

○ CN: China    ● IN: Indonesia    ○ PH: Philippines    ⊞ TH: Thailand    ● VN: Vietnam

NP: percentage of non-resident patent applications in total patent applications

CN91: China in the year 1991; CN08: China in the year 2008.

IN91: Indonesia in the year 1991; IN08: Indonesia in the year 2008.

PH91: Philippines in the year 1991; PH08: Philippines in the year 2008.

TH91: Thailand in the year 1991; TH08: Thailand in the year 2008.

VN91: Vietnam in the year 1991; VN08: Vietnam in the year 2008.

### 3.2 Patent Costs

Patenting fee schedules are heterogeneous and complex. The cost of patenting is essentially driven by the patenting strategy adopted by the firm (geographical scope, quality of drafting, number of claims, number of pages). Patent costs can be measured through simulations, as evidenced in van Pottelsberghe and François (2009) and van Pottelsberghe and Mejer (2010) for large patent systems. De Rassenfosse and van Pottelsberghe (2010) provide an in-depth analysis of the role of fees in patent systems and compare a large number of countries. The costs associated with one patent increase over time, and must therefore be assessed through a cumulative approach. Van Pottelsberghe and François (2009) rely on the following structure of fees (these costs do not including the drafting costs and the search for prior art by the patent attorney):

- The filing of a patent

- Searching for prior art by the patent office (and search report)
- Patent publication (after 18 months)
- Substantive examination
- Grant, Refusal or withdrawal
- Possibility of appeal and opposition process

The authors then break down the cost of patenting into four major categories (process costs; translation costs; external expenses; maintenance costs):

Process cost is made of the total fees for filing, publication, search, examination and granting a patent application. These fees are differed from one country to another country, from one region to another region. For the five Asian countries, their patent offices are governmental units, and the fees are set by the governments.. Patent applicants can be residents of their own country or can be residents of other countries (non residents). The cost of filing presented in this paper is the direct filing by domestic applicants. Table 7 presents the detail fees for the five countries.

External expense is the sum of incurred costs, which are paid to a third party (often an IP law firm) for drafting services and interaction with the patent office. Even through these services often are not mandated by laws, they are highly recommended. The variation in fees and quality of services of patent law firms makes the calculation of the external expenses very complex and not straight forward. Due to the unavailable reliable data sources and external expenses, this paper will not take them into account in the comparative analysis of costs across the five Asian countries. .

Maintenance cost is the total renewal fees needed to keep a patent in force for a certain period up to 20 years in the total life of the patent. Some countries require the patentee to pay for the renewal fee each year or in period.

The cost of patenting depends to a significant extent on the number of pages and the number of claims included in the patent. Since there is no reliable data on the average number claims and average number of pages as well as average number of figures in a patent application for these countries. By interviewing different patent experts in the NOIP and INVENCO<sup>1</sup> about the claims, pages and figures in a patent application, on average a patent application contains about 10 claims, 30 pages and 7 figures. These figures will be used as a building block for our cost simulations.

Based on our assumptions, Vietnam has similar filing cost figures as Indonesia and the Philippines. However, it can be very expensive if patentees have more claims in their patent applications, since the fee for patenting is claim dependent. The fee can also be topped up for each page exceeding 5 pages or exceeding one drawing. With the suggested assumption, the official patenting fee (without attorney's fees) is approximately 587 USD for a patent application filing in Vietnam. The cost to maintain a patent in force for 10 years is 1,202 USD and for 20 years is 5,853 USD (for details, see Table 8).

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<sup>1</sup> INVENCO is a patent law firm, which receives about 30% of the total patent application of Vietnamese market.

Table 7 and Table 8 show that China is the most expensive of the five countries. The patent fee in China also includes claim-based and page-based fee schedules. Applicants have to pay additional fee for each claim exceeding 10 claims and each page exceeding 30 pages. Application, which has a total number of pages exceeding 100 pages have to bear additional fee. The official cost for patenting an application with less than 10 claims and less than 30 pages can be up to 1,537 USD. The cost to maintain this patent in force for 10 years is approximately 3,458 USD and for 20 years is 20,878 USD.

The Philippines has claim-based and page-based fee schedules. Additional fees are required if the application contains more than 5 claims or 30 pages. The Philippines gives incentives to “Small” entities and young inventors to patent for their inventions by reducing approximately 50% of the patenting fees. Table 8 shows the full patenting fee for “Big” entity, which is around 606 USD. So the patenting cost for a “Small” entity should be around 300 USD. Moreover, the cost to maintain the protection for 10 years is 1,478 USD and 20 years is 13,814 USD.

**Table 7. Patenting costs (National currencies) for China, Indonesia, Philippines, Thailand, and Vietnam in 2008.**

| Country                                      | China        | Indonesia    | Philippines | Thailand   | Vietnam      |
|--|--------------|--------------|-------------|------------|--------------|
| Currency                                     | Yuan         | Rupiah       | Peso        | Baht       | Dong         |
| Unit   | Thousand     | Thousand     | Thousand    | Thousand   | Thousand     |
| <b>Procedural fees</b>                       |              |              |             |            |              |
| Filing                                       | 0.95         | 575          | 3.6         | 1          | 1,500        |
| Exceeding page                               | -            | -            | -           | -          | 250          |
| Exceeding claim                              | -            | -            | 1.5         | -          | -            |
| Exceeding drawing                            | -            | -            | -           | -          | -            |
| Publication                                  | -            | 250          | 5.6         | 0.5        | 100          |
| Publication with drawings                    | -            | -            | -           | -          | 300          |
| Search                                       | 2.1          | 2,500        | -           | -          | 1,000        |
| Examination                                  | 2.5          | 2,000        | 3.5         | -          | 350          |
| Granting                                     | 0.3          | -            | -           | 0.5        | 100          |
| Administrative cost                          | -            | -            | -           | -          | -            |
| Registration fee/Printing/Stamp              | 0.3          | -            | -           | -          | -            |
| <b>Total procedure fees (Local currency)</b> | <b>6.1</b>   | <b>5,325</b> | <b>14.2</b> | <b>2</b>   | <b>3,600</b> |
| <b>Total procedure fees in US PPP</b>        | <b>1,537</b> | <b>978</b>   | <b>606</b>  | <b>120</b> | <b>587</b>   |

*Source: Data was calculated based on the patenting fee obtained from patent offices (see Annex 2 for details) of presented countries with an assumption on a patent application, which averagely contains 10 claims, 30 pages, and 7 drawings.*

Indonesia also has a claim-based fee system, where applicant has to pay additional fee for the 11<sup>th</sup> claim onward. The cumulated official fee for a patent application is approximately 978 USD. Once a patent is registered, the fee to maintain the patent in force increases drastically from the fifth year to year ten. However, it is fixed from the year 11<sup>th</sup> onward. The cost to maintain a patent in force for 10 years is around 2,867 USD and for 20 years is 12,054 USD.

Thailand on the other hand requests a fixed amount for a patent application regardless of the number of pages or claims. The cost to obtain a patent for an invention in Thailand is approximately 120 USD, which is the lowest among the five countries. However, the cost to maintain a patent in force for 10 years is approximately 2,527 USD and for 20 years is around 26,469 USD, which is the most expensive among the five countries. Applicant can get a discount of around 2,400 USD if they agree to pay upfront for the entire 20 years of protection.

Table 8 provides a comparison the USPTO patenting costs expressed in US PPPs (purchasing power parities), as computed by van Pottelsberghe and Mejer (2010). In the five countries the cost of patenting up to the grant is much cheaper than in the US. van Pottelsberghe (2011) suggests that low fees might be associated with a low quality of the examination process. Therefore, the quality of granted patent in Asian countries will be analyzed in the next section. The maintenance costs over 10 years in most countries are however more expensive than in the US, that may imply that these countries' policies are encouraging inventors to try to protect their inventions. However, if a patent is effectively exploited, its cost logically increases, faster than in the US

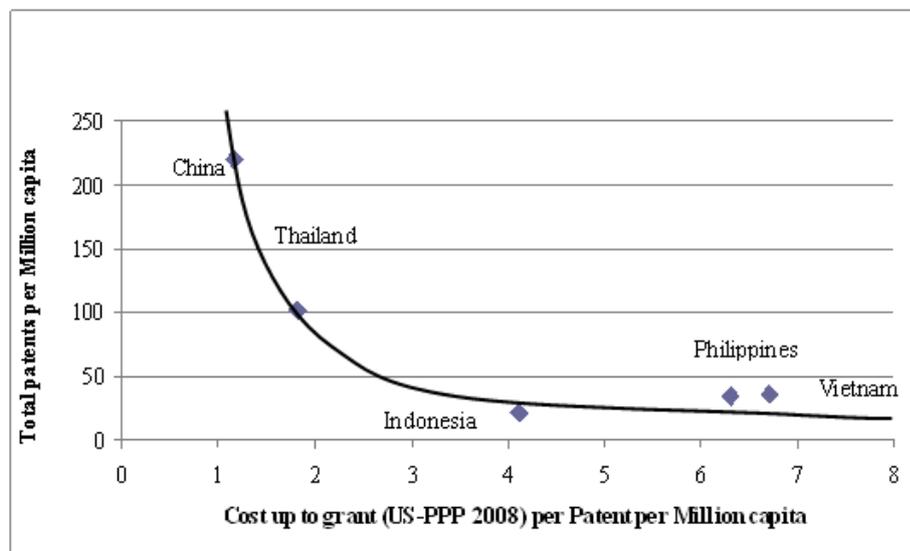
**Table 8. Patenting costs and maintenance costs in 2008 US PPPs**

| Country                              | China         | Indonesia     | Philippines   | Thailand      | Vietnam      | US           |
|--------------------------------------|---------------|---------------|---------------|---------------|--------------|--------------|
| <i>Total filing fee up to grant</i>  | <i>1,537</i>  | <i>978</i>    | <i>606</i>    | <i>120</i>    | <i>587</i>   | <i>2,620</i> |
| <i>Maintenance cost for 10 years</i> | <i>3,458</i>  | <i>2,867</i>  | <i>1,478</i>  | <i>2,527</i>  | <i>1,202</i> | <i>3,290</i> |
| <i>Total cost for 10 years</i>       | <i>4,996</i>  | <i>3,845</i>  | <i>2,084</i>  | <i>2,647</i>  | <i>1,788</i> | <i>5,910</i> |
| <i>Maintenance cost for 20 years</i> | <i>20,878</i> | <i>12,054</i> | <i>13,814</i> | <i>26,469</i> | <i>5,853</i> | <i>7,200</i> |
| <i>Total cost for 20 years</i>       | <i>22,415</i> | <i>13,033</i> | <i>14,420</i> | <i>26,590</i> | <i>6,440</i> | <i>9,820</i> |

*Source: own calculation derived from IMF database, table 7 and Annex 2. The unit is measured in US PPP conversion rates for 2008.*

Figure 2 shows a non linear relationship between the number of patents filed per million capita and the cost per million capita for the five Asian countries. A traditional non linear demand curve appears, where China has the highest relative demand for patents and the lowest cost per million capita. Vietnam and Philippines has the least patents per million capita and the highest costs per million capita.

Figure 2. Patent costs and the demand for patents



Source: own calculation based on data of WIPO, IMF, World Bank and National patent fee schemes.

#### 4 Quality: patent examiners' skills and workload

Many research papers have pointed the negative consequences of granting low quality patents, such as: discouraging inventors, barring entries for small firms, slowing down the diffusion of technologies, increasing the litigations, discouraging spillover of knowledge and social interests (Hal et al., 2004). Patent quality is not straight forward to measure. There are numbers of factors influence to the quality of the granted patent quality, including “exhaustiveness of search and depth of examination” (Guellec and van Pottelsberghe, 2007). van Pottelsberghe (2011) studied in details the many factors that might influence the quality of examination processes in three large patent offices (USPTO; JPO; EPO)..

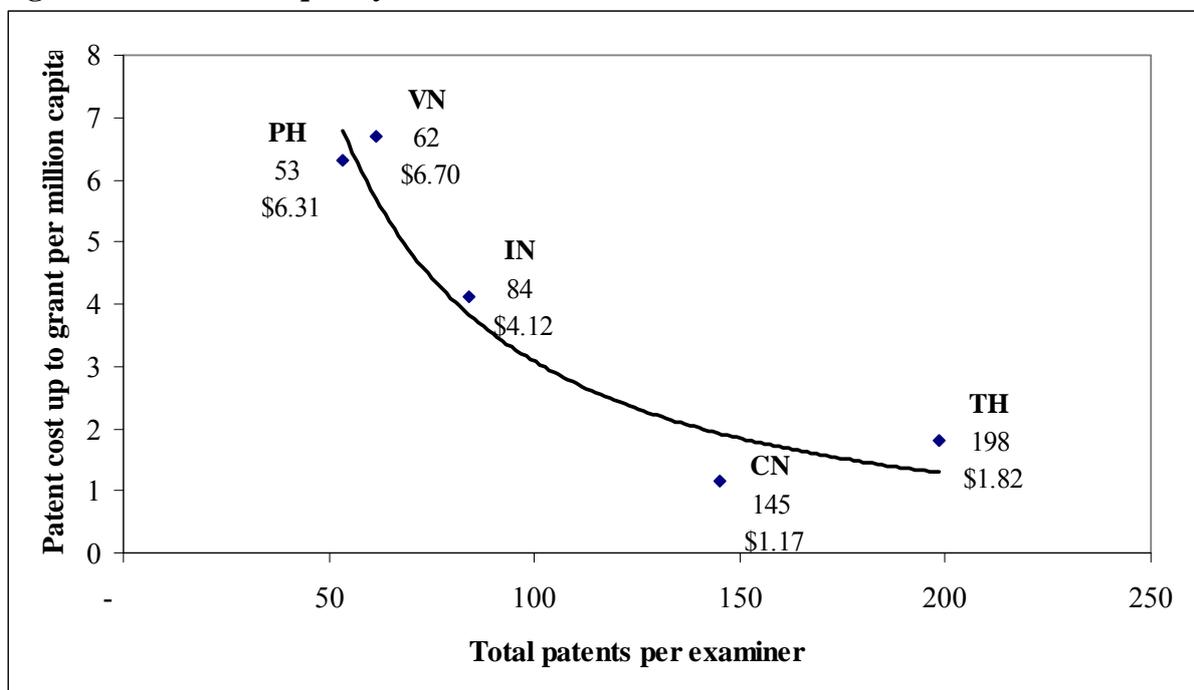
Overloaded examiners might reduce the quality of examination services. Quality also depends on the skills and experience of patent examiners and on the available infrastructure (working condition, search tools ...etc.). Building and developing pool of human resources to allow for a sustainable quality of examination is highly demanded in these countries. Figure 3 shows that Chinese and Thai patent examiners have a much higher workload per head than in the four other countries. SIPO has put “recruiting patent examiner” in its “Tenth five year plans” as one of its critical actions to be done in the soon future. Vietnam has a low average in patent granting rate. As in 2008, there were only 19% of resident patent filings that were granted, against 21% of non-resident patent filings.

Collectiveness of educations, formal trainings, on the job trainings, and the years of experience in the field underly the generation of skills and competencies. Most patent examiners in the studying countries are not formally trained to be patent examiners. As in Vietnam, the general requirement for a person to be a patent examiner is to have a bachelor

degree in science and technology, and passed a public servant entry test<sup>2</sup>. There is no requirement for working experiences. Most patent examiners built up their skills through informal on the job training, international seminars, workshops, and working with peers. Statistically it would take about 3 to 5 years for a new patent examiner to get familiar with examination procedures and gather necessary knowledge and skills to do examination on their own. About half of the patent examiners at NOIP have more than 5 years of working experiences. The Philippines, Thailand, Indonesia and China have established formal IP training system at university levels. Vietnam, however, still struggles to build curriculums for IP training. Most of the IP relating courses are about the basics of IP law, and often it is only accounted as a small unit in the whole four year degree program. The only place, where people can get deeper knowledge about IP is the NOIP's training centre, which provides training for professional certifications. However, the training capacity of the NOIP's training center is considered weak due to lack of lecturer, poor infrastructure, and lack of systemic curriculum. By the year 2006, there were seven universities and training centers in China which provided training in intellectual property. In 2007, the Chinese government declared that higher education training for intellectual property would be one of the key development strategies for the nation.

Indonesia, the Philippines and Thailand are in a somewhat better position in approaching to intellectual property. Kariodimedjo (2006) shows that there are about 10 universities in Indonesia having curriculums relating to the training of IP, and few other universities and institutions were in processing of developing curriculums for their trainings. The curriculums have been developed and the trainings were carried out for number of years. However, the author also indirectly mentioned that they were short of trainer and lecturers. .

**Figure 3. Patent cost-quality Curve**



Source: Own calculation; data is collected from WIPO, World Bank and National Patent Offices  
Costs are measured in US –PPP at 2008 conversion rates.

<sup>2</sup> A general test, which is applicable to everyone, who would like to serve in a public organization.

*CN: China; IN: Indonesia; PH: Philippines; TH: Thailand; VN; Vietnam.*

Most of the patent systems analyzed in this paper are considered of having poor working conditions and institutional infrastructures for their patent examiners. Drahos (2007) provides evidence of lack of infrastructure, equipments, database and assessing to professional information. These create barriers to provide timely and better quality of examination.

Working condition is like a thorn in one eyes, however it is not easy to solve, since most of the studying countries are developing countries. Taking Vietnam is one of examples, the working condition at NOIP is considered as poor, even though it has been leveraged drastically in the past few years. A new entry patent examiner receives the same base salary as other public servant staff, which is normally about 1.9 million VND<sup>3</sup>, which is about nearly 100USD per month. 10 years of working as a patent examiner, one would expect to receive 2.5 million VND (125 USD) per month, whereas a new graduate student working in a bank can receive a salary of 3 million VND and shortly can receive 5 million VND per month. In such situation, the NOIP applies the financial strategy of a public organization having revenue. So a small fixed amount is adding up the base salary of every one according to the seniority and management position. Furthermore, additional compensation can be attributed to patent examiners who perform more examination than scheduled. This would create incentives to patent examiners, however its economical reasons may also encourage patent examiners go for quantity rather than focus on improving quality of patent examination.

A correlation between costs of patenting with quality of patents granted was either directly or indirectly mentioned by MacLeod et al. (2003), Nicholas (2011) and van Pottelsberghe (2011). This induces that more expensive patenting cost leads to better quality of patent. Figure 3 shows a relationship between patent cost per million capita and patents per examiner for presented countries in the year 2008. The curve shows that the cheaper the patent s per million capita the higher is the workload per patent examiner.

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<sup>3</sup> The salary is calculated by Salary rank \* Minimum wage, leading to  $2.67 * 730,000\text{VND} = 1,941,000 \text{ VND}$ .

## 5 Concluding remarks

This paper has briefly described IPRs system in China, Indonesia, the Philippines, Thailand and Vietnam. Overall, the IPRs systems in these countries have improved, but low prosecution rates of infringements opposed to high rate infringements suggests that their enforcements were still considered weak and inefficient. By assessing their enforcement systems among the five countries, this paper found that China and the Philippines seemed to be the strongest. On the other extreme Indonesia and Vietnam were the weakest.

By looking at the FDI, patent intensities of those countries, this paper found that China, Thailand, and Vietnam are the three biggest markets for patenting. Providing favorable policies to attract FDI over the survey period, those countries have not only benefited from knowledge spill over, but also pushed innovators to file for patents.

Given assumptions on number of pages, number of claims, and number of drawings, a scenario of patent cost was constructed based on the official fees assigned by each of the presented country's authority. A non linear traditional demand curve was observed in studying the relationship between the cost per patent per million capita and the patent per million capita. This suggests that cheaper patenting cost attracts more patent applications. This study also found that the cost schedules of the presented countries do not support big patent application (many pages, many claims) and long protection.

Having cheaper costs up to grant for a patent, and being fast developing countries with attractive policies to attract FDI, these countries may experience backlog problems. This fast pave of growth of patent filings may become heavy burden to their IP systems, which were assessed to have poor working conditions, informal trainings, lack of experienced patent examiners. This induces a suspicion on quality of granted patents.

These findings suggest authorities need to provide stronger executions on enforcements, and using patent fee as an adjustment tool to balance the patent filings and workload of patent examiners to ensure the quality of patents granted. Working conditions, formal trainings, accessing to international patent databases and professional groups are necessities for patent examiners to improve their working quality.

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## ANNEX 1 Patents filed at National Patent Offices 1991-2008

| Patent Office | Applicant Type | 1991    | 1992    | 1993    | 1994    | 1995    | 1996    | 1997    | 1998    | 1999    | 2000    | 2001    | 2002    | 2003    | 2004    | 2005    | 2006    | 2007    | 2008    |
|---------------|----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| China         | Resident       | 7,372   | 10,022  | 12,084  | 11,191  | 10,011  | 11,628  | 12,672  | 13,751  | 15,626  | 25,346  | 30,038  | 39,806  | 56,769  | 65,786  | 93,485  | 122,318 | 153,060 | 194,579 |
|               | Non resident   | 4,051   | 4,387   | 7,534   | 7,876   | 8,688   | 11,114  | 12,102  | 33,645  | 34,418  | 26,560  | 33,412  | 40,426  | 48,548  | 64,598  | 79,842  | 88,183  | 92,101  | 95,259  |
|               | Total          | 11,423  | 14,409  | 19,618  | 19,067  | 18,699  | 22,742  | 24,774  | 47,396  | 50,044  | 51,906  | 63,450  | 80,232  | 105,317 | 130,384 | 173,327 | 210,501 | 245,161 | 289,838 |
| Indonesia     | Resident       | 34      | 67      | 38      | 29      | 61      | 40      | 79      | 93      | 152     | 156     | 208     | 228     | 201     | 226     | 234     | 282     | 279     | 375     |
|               | Non resident   | 1,280   | 3,905   | 2,031   | 2,307   | 2,813   | 4,027   | 3,939   | 1,753   | 2,784   | 3,733   | 3,714   | 3,609   | 3,099   | 3,441   | 4,069   | 4,324   | 4,850   | 4,747   |
|               | Total          | 1,314   | 3,972   | 2,069   | 2,336   | 2,874   | 4,067   | 4,018   | 1,846   | 2,936   | 3,889   | 3,922   | 3,837   | 3,300   | 3,667   | 4,303   | 4,606   | 5,129   | 5,122   |
| Philippines   | Resident       | 147     | 133     | 178     | 181     | 169     | 163     | 125     | 163     | 144     | 154     | 135     | 149     | 141     | 158     | 210     | 223     | 225     | 216     |
|               | Non resident   | 1,774   | 1,687   | 1,860   | 1,965   | 2,207   | 2,634   | 3,440   | 3,280   | 3,217   | 3,482   | 2,470   | 705     | 1,732   | 2,538   | 2,141   | 3,034   | 3,248   | 3,095   |
|               | Total          | 1,921   | 1,820   | 2,038   | 2,146   | 2,376   | 2,797   | 3,565   | 3,443   | 3,361   | 3,636   | 2,605   | 854     | 1,873   | 2,696   | 2,351   | 3,257   | 3,473   | 3,311   |
| Thailand      | Resident       | 80      | 67      | 110     | 150     | 145     | 203     | 246     | 479     | 738     | 561     | 534     | 615     | 802     | 819     | 891     | 1,040   | 945     | 802     |
|               | Non resident   | 1,907   | 1,906   | 2,353   | 2,816   | 3,387   | 4,355   | 5,148   | 4,592   | 4,438   | 4,488   | 4,798   | 3,874   | 4,329   | 4,554   | 5,449   | 5,221   | 5,873   | 5,939   |
|               | Total          | 1,987   | 1,973   | 2,463   | 2,966   | 3,532   | 4,558   | 5,394   | 5,071   | 5,176   | 5,049   | 5,332   | 4,489   | 5,131   | 5,373   | 6,340   | 6,261   | 6,818   | 6,741   |
| Viet Nam      | Resident       | 37      | 34      | 32      | 22      | 23      | 37      | 30      | 25      | 37      | 34      | 52      | 69      | 78      | 103     | 180     | 196     | 219     | 204     |
|               | Non resident   | 25      | 49      | 193     | 270     | 659     | 929     | 1,234   | 1,080   | 1,105   | 1,210   | 1,234   | 1,142   | 1,097   | 1,328   | 1,767   | 1,970   | 2,641   | 2,995   |
|               | Total          | 62      | 83      | 225     | 292     | 682     | 966     | 1,264   | 1,105   | 1,142   | 1,244   | 1,286   | 1,211   | 1,175   | 1,431   | 1,947   | 2,166   | 2,860   | 3,199   |
| US            | Resident       | 87,955  | 92,425  | 99,955  | 107,233 | 123,962 | 106,892 | 119,214 | 134,733 | 149,251 | 164,795 | 177,513 | 184,245 | 188,941 | 189,536 | 207,867 | 221,784 | 241,347 | 231,588 |
|               | Non resident   | 84,160  | 90,922  | 84,241  | 95,522  | 104,180 | 105,054 | 101,282 | 102,246 | 116,512 | 131,100 | 148,958 | 150,200 | 153,500 | 167,407 | 182,866 | 204,182 | 214,807 | 224,733 |
|               | Total          | 172,115 | 183,347 | 184,196 | 202,755 | 228,142 | 211,946 | 220,496 | 236,979 | 265,763 | 295,895 | 326,471 | 334,445 | 342,441 | 356,943 | 390,733 | 425,966 | 456,154 | 456,321 |

## ANNEX 2 Patenting cost in the developing Asian countries

| Country                         | China       |       | Indonesia         |              | Philippines     |             | Thailand |        | Vietnam         |            |
|---------------------------------|-------------|-------|-------------------|--------------|-----------------|-------------|----------|--------|-----------------|------------|
| Currency                        | Yuan        |       | Rupiah (thousand) |              | Peso            |             | Baht     |        | Dong (thousand) |            |
| Filing                          |             | 950   |                   | 575          |                 | 3,600       |          | 1,000  | 1 claim         | 150        |
| <i>Exceeding page</i>           | 30 pages    | 50    |                   |              | <i>30 pages</i> | <i>30</i>   |          |        | <i>5 pages</i>  | <i>10</i>  |
|                                 | 100 pages   | 100   |                   |              |                 |             |          |        |                 |            |
| <i>Exceeding claim</i>          | 10 claims   | 150   | 10 claims         | 40           | <i>5 claims</i> | <i>300</i>  |          |        |                 |            |
| <i>Publication</i>              |             |       |                   | 250          |                 | <i>5550</i> |          | 500    |                 | <i>100</i> |
| <i>Publication of drawing</i>   |             |       |                   |              |                 |             |          |        | >1 drawing      | <i>50</i>  |
| Search                          |             | 2,100 | local             | 250          |                 |             |          |        | 1 claim         | 100        |
| Examination                     | substantive | 2,500 | substantive       | 2,000        |                 | 3500        |          | 500    | 1 claim         | 350        |
| Granting                        |             | 255   |                   |              |                 |             |          |        |                 | 100        |
| Administrative cost             |             |       |                   |              |                 |             |          |        |                 |            |
| Registration fee/Printing/Stamp |             | 255   |                   |              |                 |             |          |        |                 |            |
| <b>Annual renewal fee</b>       | 1st year    | 900   |                   | 700+50 *AC   |                 |             |          |        |                 | 250        |
|                                 | 2nd year    |       |                   | 700+50 *AC   |                 |             |          |        |                 | 250        |
|                                 | 3rd year    |       |                   | 700+50 *AC   |                 |             |          |        |                 | 400        |
|                                 | 4th year    | 1,200 |                   | 700+50 *AC   |                 |             |          |        |                 | 400        |
|                                 | 5th year    |       |                   | 1000+100 *AC |                 | 2700        |          | 2,000  |                 | 650        |
|                                 | 6th year    |       |                   | 1500+150 *AC |                 | 3600        |          | 4,000  |                 | 650        |
|                                 | 7th year    | 2,000 |                   | 2000+200 *AC |                 | 4500        |          | 6,000  |                 | 1,000      |
|                                 | 8th year    |       |                   | 2000+200 *AC |                 | 5400        |          | 8,000  |                 | 1,000      |
|                                 | 9th year    |       |                   | 2500+250 *AC |                 | 7200        |          | 10,000 |                 | 1,500      |
|                                 | 10th year   | 4,000 |                   | 3500+250 *AC |                 | 9000        |          | 12,000 |                 | 1,500      |
|                                 | 11th year   |       |                   | 5000+250 *AC |                 | 11,600      |          | 14,000 |                 | 2,100      |
|                                 | 12th year   |       |                   | 5000+250 *AC |                 | 14,400      |          | 16,000 |                 | 2,100      |
|                                 | 13th year   | 6,000 |                   | 5000+250 *AC |                 | 17,000      |          | 18,000 |                 | 2,100      |
|                                 | 14th year   |       |                   | 5000+250 *AC |                 | 20,700      |          | 20,000 |                 | 2,750      |
|                                 | 15th year   |       |                   | 5000+250 *AC |                 | 24,300      |          | 30,000 |                 | 2,750      |
|                                 | 16th year   | 8,000 |                   | 5000+250 *AC |                 | 27,800      |          | 40,000 |                 | 2,750      |
|                                 | 17th year   |       |                   | 5000+250 *AC |                 | 31,400      |          | 50,000 |                 | 3,500      |
|                                 | 18th year   |       |                   | 5000+250 *AC |                 | 37,700      |          | 60,000 |                 | 3,500      |
|                                 | 19th year   |       |                   | 5000+250 *AC |                 | 45,300      |          | 70,000 |                 | 3,500      |
|                                 | 20th year   |       |                   | 5000+250 *AC |                 | 54,300      |          | 80,000 |                 | 3,500      |

AC: Additional exceeding claim