A Comparative Analysis of Domestic Patent Applications of South-East Asian Countries using Harschman-Herfindahl Index

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Abstract: The lists of domestic patent and design applications of Indonesia, Malaysia, Thailand and Vietnam were obtained and analyzed by technological fields and regional distributions. For the regional distributions, the Harschman-Herfindahl Index (HHI) is used to check the centralization of centralization, and the numbers of different countries are compared. For comparison, a uniform distribution to every province and distribution of Japan before 1905 were selected as the denominators.

Keywords: *patents, technological distributions, Harschman-Herfindahl index*

1. INTRODUCTION

The modernization of any country needs foreign currency to import new technologies and to maintain them.

To spend such money, those countries must cultivate new and competitively advantageous products to export and obtain foreign currency continuously. Such products are only generated from traditional knowledge.

Considering the patent systems have a role to promote the domestic development of technology, I obtained and analyzed the lists of patent and design applications of South-East Asian countries. Such an analysis is fruitful for I had a related experience in analyzing real patent data in editing the "Centennial History of Patent System of Japan" (1984-85), and checked more than 20,000 patents before World War II. Such data were based upon real specifications and provided us very useful information.

I bought the following data with a subsidy of Scientific Research Subsidy of the Ministry of Science and Education.

Here, I use a six large classifications to compare the data (not the sections of IPC) in order to compare the data with those of Japan before 1903.

I obtained the patent, utility model and design applications of Indonesia, Malaysia, Thailand and Vietnam. The numbers of applications obtained and analyzed are:

Indonesia: Patent and Design from 1983	866
Malaysia: Patent from 1986 to 99	315
Thailand: Patent and Design from 1987	4453
Vietnam: Patent, Utility Solution and Design from 1980	2241
Total	7460

Each data point contains the dates and numbers of application, publication and grant, title of invention in the original languages and in English, and the names and provinces of inventor and applicant.

The data are classified and calculated with the field of technology and provinces.

2. TECHNOLOGICAL DISTRIBUTIONS

For technological distributions, we can take the International Patent Classification and Locarno Classification as the standard tool.

First, we discuss the comparison of numbers of patent applications of those four countries. They are divided into 6 fields, agriculture, machinery, textile, chemistry, electricity, and daily materials including stationary. For Malaysia, the data are granted numbers. In the graph there is comparable data for Japan that totaled the data before 1903 when the earliest book of statistical data was published. Typically, all South-East Asian countries lack the patent applications in the field of textiles. The field of textiles contains inventions of machinery and dying processes for textiles and inventions of papers. This phenomenon indicates those countries having sub-contract industries of textiles for exports cannot develop related industries which need further highly advanced engineering such as machine-tools. Contrary to these countries, Japan in the latter half of the 19th Century had a reasonable number of patents, which were similar to those in other fields.

3 GEOGRAPHICAL DISTRIBUTIONS

3.1 Comparison of Centralizations

We calculated the applications of every province for each country. Most of those applications were

applied by the inhabitants of the Metropolis, but each country has some different tendencies. It becomes necessary to compare those central tendencies.

To measure the centralization of distributions, the Harschman-Herfindahl Index (HHI) is often used.

HHI is suitable to check the change of the centralization or comparison of centralization of in a country. The HHI of patent applications of two countries are not directly comparable as the numbers of their provinces are different.

Here I take two ratios of HHI of patent and design applications for purposes of comparison.

A standard is HHI of uniform distributions of the provinces of every country, and the other is the HHIs of granted patents and designs in Japan in the 19th Century (up to 1904).

At the time, Japan had a very good development and the distribution of granted patents spread well throughout the country and had many local centers. This is a very good standard for discussing the development of local areas.

With this analysis, we find the applications of patent and design for Thailand and Indonesia are very centralized, but Malaysia and Vietnam have very suitable distributions.

In Table A, we show the real HHI of the populations, patent and design applications, and uniform distributions of Indonesia, Malaysia, Thailand, Vietnam and those of Japan until 1904 as the first yearly report published in 1905. For the "uniform", I take every province as having the same number of distributions.

In Table B, the HHI of Table A is normalized with the HHI of the uniform. In Table C, the HHI of Table A is normalized with JAPAN (19C). In Table D, we normalize the HHI with both uniform distributions and those of Japan.

3.2 INDONESIA

Almost all of Indonesian patent applicants dwell in Jakarta and East and West of Java, and some applications were made in Medan and Bali island. Noticeable is Brunei, which is a neighbor of Malaysia. This province may develop as an industrial region in the future.

3.3. MALAYSIA

The total population is about 20 millions, and the number of patent applications is distributed in all of the country with approximately uniform density.

Kuala Lumpur and the province of Selangor have similar numbers of patent applications, and Johore is next.

A special province is Sarawak, where 4 Chinese and 1 Malay have granted patents. The province is next to Kalimantan and the relationship is considerable.

3.4 THAILAND

From 1979 to 2001 there are 738 published applications having the address of applicants, and 516 of them dwelt in Bangkok. Other applicants also dwelt near Bangkok. It means that the local provinces have little vitality, and rather weak competition.

3.5 VIETNAM

There are many provinces distributing well throughout the country, which have some applicants of patents. The distribution is very similar to Japan in the late 19th Century.

The applicants distributed in southern Mekong Delta and Ho Chi Minh City have the highest number of applications.

3.5.1 Patent

In their patent applications, Hanoi has the largest number of summed applications. Hanoi has had continuous applications since 1980, 19 applications in 1998 and decreasing, whereas the applications of Ho Chi Minh jumped from 5 to 19 from 1997 to 1998.

To consider future development, Ho Chi Ming will have to come first among South-East Asian countries.

3.5.2 Design

For the applications of Design, the situation is much more clear. We compare the application numbers of Hanoi and Ho Chi Minh in several fields.

Here we compare some numbers of applications in Hanoi and TP Ho Chi Minh. The following data of bags, bottles and medicines are totals through the duration we obtained the data.

Bags	Candy	Cake	Noodle	Peanuts
Binh Duong	11			
Dong Nai	5			
Ha Noi	12		3	
Tay Ninh	2			
TP Ho Chi Minh	8	8	21	10
_ total	38	8	24	10

Bottles	
Ha Noi	3
TP Ho Chi Minh	146

Medicine box and Medicine-oil box

An Giang	8
Ha Noi	4
Ha Tay	6
Nam Dinh	10
TP Ho Chi Minh	31
Tra Vinh	22
11 provinces	1_11_

Total design applications

To compare these data, we find TP Ho Chi Minh make further than Hanoi.

	1999	2000	2001
Hanoi	33	80	45
TP Ho Chi Minh	151	240	268
Binh Duong	3	13	13

4. JAPAN AS THE COMPARISON

Here I compare these data with Japan at the beginning of the patent system from 1885 to 1900.

The number of patents granted was very few in the field of electricity, but all other fields had suitable numbers of patents, especially agriculture, machinery, textile and chemistry.

In the field of textiles, there were suitable numbers of patent. It is also said that Japan established engineering of textiles independently of foreign technologies, especially England.

To compare the numbers of populations in 1903, patents from 1885 to 1905, and designs from 1888 to 1905 in every prefecture, we find they are distributed very evenly.

5. CONCLUSION

Now I have the data as to what situations the industry and markets of South-East countries are, and where the next developments are likely to occur. Predicting from the viewpoint of patent applications, they reflect the activities of any country and any province.

The comparison of HHI is one of method. We must establish many indices to compare and evaluate the prefectural distributions of many countries.

6. ACKNOWLEDGEMENT

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Table 1: Real Harschman-Herfindahl Index

	population	patent	design	uniform
INDONESIA	1066	2749	3836	344
MALAYSIA	958	2494		724
THA ILAND	236	4945	6067	152
VIET NAM	232	2123	4092	166
JAPAN (19C)	261	1459	2682	192

Table 2: Normalized with "uniform"

INDONESIA	3.10	7.99	11.15	1.00
MALAYSIA	1.32	3.44		1.00
THAILAND	1.55	32.53	39.91	1.00
VIET NAM	1.40	12.79	24.65	1.00
JAPAN (19C)	1.36	7.60	13.97	1.00

Table 3: Normalized with JAPAN (19C)

INDONESIA	4.08	1.88	1.43	1.79
MALAYSIA	3.67	1.71		3.77
THAILAND	0.90	3.39	2.26	0.79
VIET NAM	0.89	1.46	1.53	0.86
JAPAN (19C)	1.00	1.00	1.00	1.00

Table 4: Normalized with both "uniform" and JAPAN (19C)

INDONESIA	2.28	1.05	0.80	1.00
MALAYSIA	0.97	0.45		1.00
THAILAND	1.14	4.28	2.86	1.00
VIET NAM	1.03	1.68	1.76	1.00
JAPAN (19C)	1.00	1.00	1.00	1.00

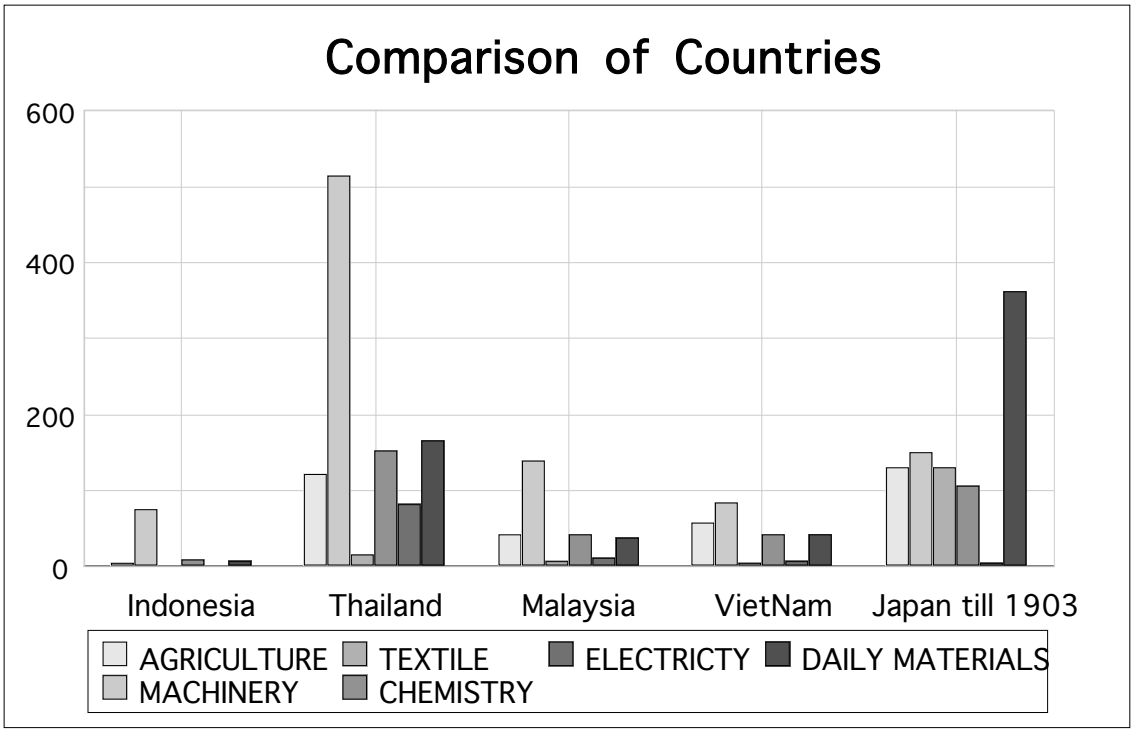

Fig. 1 Comparison of Numbers of Patents in Indonesia, Malaysia, Thailand, and Vietnam and Japan of the 19th Century

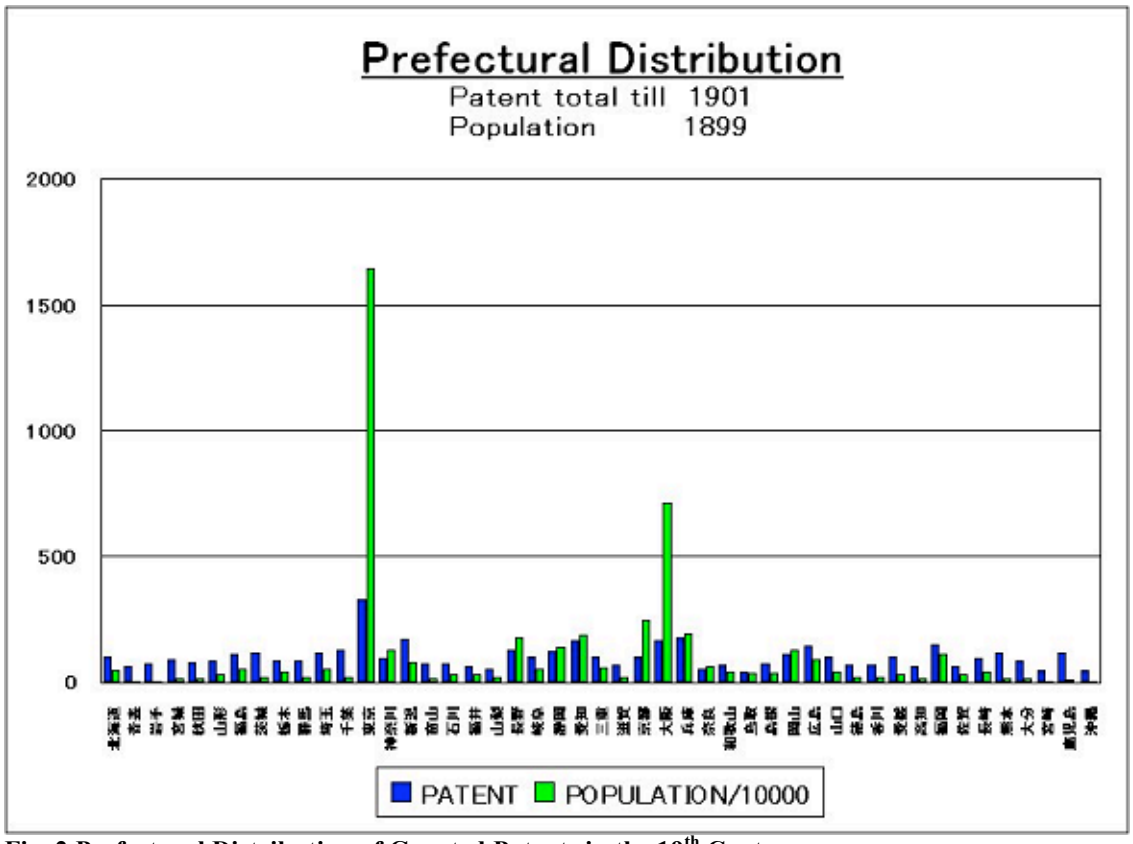

Fig. 2 Prefectural Distribution of Granted Patents in the 19th Century

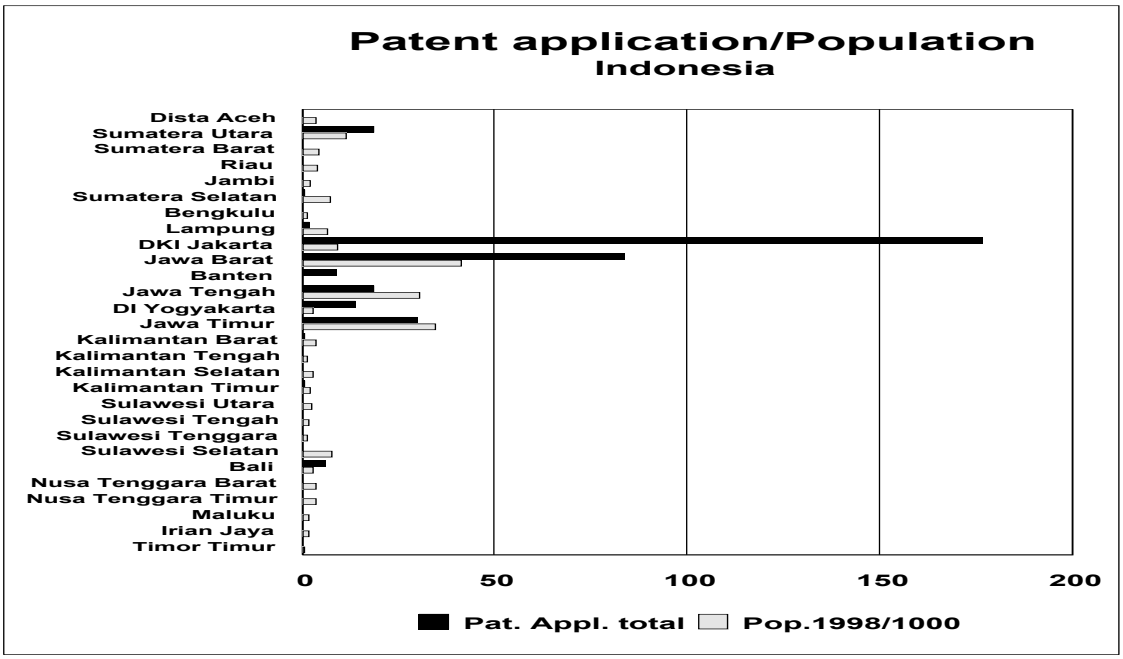

Fig. 3 Prefectural Distribution of Patent Applications and Population in Indonesia

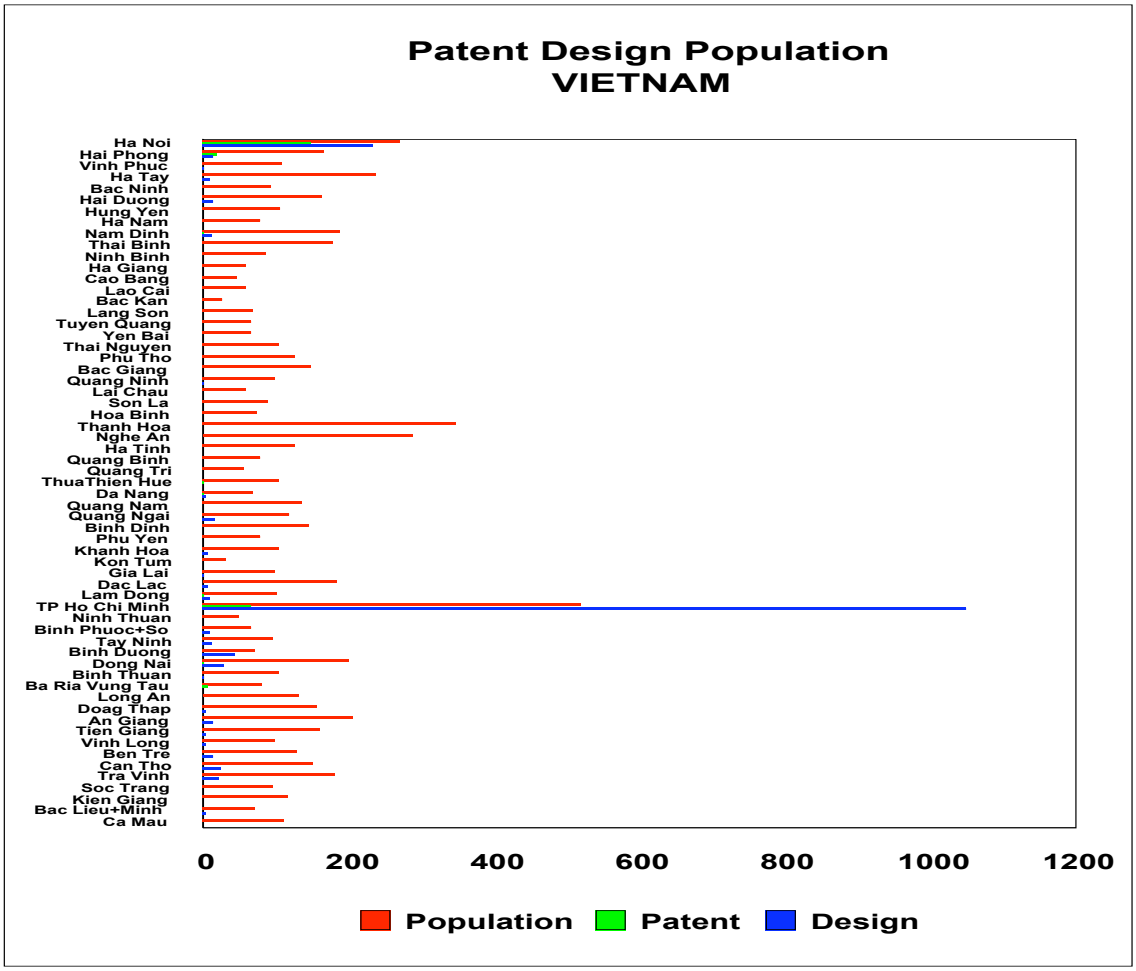

Fig. 4 Prefectural Distribution of Applications of Patent and Design, and Population in Vietnam