The Effect of Intellectual Property Rights on Export: A Case Study on G15 Countries

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Abstract: Different levels of knowledge and technology, is one of the factors influencing development gap between countries. Hardware technology consists of machinery and equipment, in the other hand; software technology is arising from intellectual secretions of human which is supported by intellectual property rights. Supporting of inventions in the framework of intellectual property plays a decisive role in the country's commercial development, because new ideas, whose ownership is preserved, will establish or strengthen competitive advantage. In this paper, we study the effect of intellectual property rights protection on exports of Group 15 countries between 1995-2007. For this purpose, the index of patent programs is used as an indicator of intellectual property rights protection. The effect of intellectual property rights protection on exports has been examined both directly and through other variables such as Gross domestic product (GDP), foreign direct investment and research and development expenditure. The results indicate that broader supporting for intellectual property rights in terms of mutual needs of members of the group 15, will provide fertile ground for increased investment in research and development and in addition to attract foreign direct investment, increase competitiveness and thereby increase high-tech exports.

Keywords: Exports, intellectual property rights, competitiveness

1. Introduction

The importance of intellectual property rights protection in order to promote intellectual creativity and protection of intellectual property on one hand, and extend communication and international exchanges, on the other hand, has led to lots of international efforts to develop regulations governing the intellectual property rights supporting carried out mainly under the auspices of the World Intellectual Property Organization. International system of intellectual property with two core treaties, the Treaty of Paris in 1882 for the Protection of Industrial Property and the Berne Convention for the Protection of Literary and Artistic Works in 1886, took root in the minds. These efforts reached its peak by the approval of the commercial aspects of intellectual property rights agreements in 1995 [1].

Intellectual property has a pivotal role in international business transactions. Intellectual property is now one of the most valuable, or often the most valuable asset in business dealings. The most important point of the granted rights within the framework of intellectual property rights is their exclusivity feature. This means that utilization of the rights is solely belong to its author and owner and others do not have the right to use them without the owner's permission and due to this, the rights for merchantability and assignment possibility there will be for a certain limited period of time[1]. Hence some of developing countries believe that the extent of protection of intellectual property rights policy will damage to the technology procedure. Instead, developed countries use trade policy as a major factor to strengthen intellectual property rights for bilateral or multilateral negotiations. So it can be said that stronger protection of intellectual property rights will effect on international trade flows.

Property rights protection policies, depending on the impact of the extension or market power can increase or decrease the trade flow. To investigate these two effects one can see that the demand for exporter country goods in countries with stronger intellectual property rights would be increased because it will reduce the likelihood of fraud in the importing country. So despite the impact of the market extension, trade flows will increase towards countries with strong intellectual property rights. On the other hand the effect of the market power will reduce demand strength facing foreign firms and also will be result in exports volumes toward countries with strong intellectual property rights, because exclusive right holders with strong intellectual property rights can decrease exports by increasing prices and limiting exports.

This paper examines the role of intellectual property rights in exports of group 15 member's countries over the period of 1995 – 2007. The group 15 has considerable capabilities and potential, and according to the composition of the members and having rich natural resources, 30% of the business share between developing countries, as well as with 30 percent of the world population can play a key role in promoting South-South and North-South cooperation.

2. Theoretical basics and experimental studies

Intellectual property rights was legislated internationally recognized for the first time in 1882 under the Treaty of Paris which was signed by 55 countries in Paris for the protection of intellectual property industries. The Treaty of Paris was signed due to the failure of Vienna international exhibition in 1873, where many industrialists and inventors did not participate because of disclose of their inventions. According to the international treaty, the intellectual property rights were divided to 3 main categories including the inventions, trademarks and industrial designs. In other words, industrial property includes patents, trademarks, industrial designs, origin geographical indications, full circuits and trade secrets, and right of authorship includes literary and artistic works such as novels, poems, games,
videos, musical works, drawings, paintings, photos, sculptures, construction projects and other related relations.

Yang and Huang (2009) have evaluated the sensitivity of Taiwan's exports goods regarding to the importing countries differences in terms of intellectual property rights and the degree of imitation risk for the period of 2005-1997. The results show the positive impact of intellectual property rights of countries on the export of Taiwan. Also, while distinguishing the degree of imitation risk in countries, they state that intellectual property rights protection can have both positive and negative impact on exports. The other interesting point is that high-tech exports are more sensitive to the protection of intellectual property rights than low-tech exports[2].

Taylor (1993) have investigated the relationship between intellectual property rights and trade and expressed that support for intellectual property rights have two different simultaneous effects on business (positive effect of market expansion channel and negative effect of market power. The impact of the market extension have positive effect on trade, since the strengthening of intellectual property rights increase the cost of duplication and thereby reduce duplication of existing technologies in imported goods by the importing countries. In contrast, the impacts of market power decrease exports in countries with strong intellectual property rights. This decrease is due to the owners of new products restrict the export volume and increase prices through their market power.

So because of the impacts of market power and expansion assuming other conditions be constant, the effect of intellectual property on trade is unpredictable and depends on its importance degree. The effects may be simultaneous, while Maskas and Penobarty (1995) using the extended monopolistic competition model to estimate the effect of the protection of intellectual property rights (patent) on the flow of international trade, concluded that the impact of the market extension in the major countries that their internal firms have high imitate ability, tends to be more dominant. While the effect of the market power in small countries with limited ability to imitate is more powerful[3].

The results of Yang and kua (2008) shows a positive powerful correlation between the protection of intellectual property rights with expanding exports and foreign direct investment in 30 member states of the World Intellectual Property developers (WIPO) between 1995 and 1998[4].

Rafiquzzaman (2002) examined the role of intellectual property rights protection on exports of 10 Canadian provinces to 67 countries in 1990, and states that to improve the rights of intellectual property, regardless of the degree of development in importing countries, will increase exports[5].

Falvey and colleagues (2006) examined the effect of intellectual property rights protection on industrial exports of 5 advanced countries to 69 countries in the period of 1970 to 1999. The results of this study show that the effect of intellectual property rights on trade and business is related to the level of development, ability to imitate and the importing country's market size[6].

Ivus (2010) has examined the role of patent rights protection of 55 developing countries on exports in developed countries (24 members of OECD) during the period of 2000-1962. The results of this study indicate that increase of protection of intellectual property rights increased exports of developed countries about 53 billion dollars. Because developed countries are more patent-sensitive than developing countries[7].

Yang and Maskus (2009) examined the role of protecting the rights of intellectual property on the ability of export of developing countries firms engaged in export markets. They found that stronger intellectual property rights, facilitate technology transfer and reducing the marginal cost of production in the south side firms. As a result, if developing countries have a high absorption capacity (lower), an increase (decrease) in exports and welfare will be obtain in the south. They also noted that an excessive increase in protection of intellectual property rights will reduce the competitiveness and prosperity of the country[8].

Smith (2001), has considered the effect of intellectual property rights and export licenses. Experimental findings show that stronger foreign intellectual property rights, would increase further American exports in particular among the countries with more imitation ability though the effect of market expansion. In contrast, stronger foreign intellectual property rights will decrease the American exports to countries with less imitation capabilities, through the effect of market power [9].

D. Pham (2010) examined the economic impact of innovation and protection of intellectual property rights on export of 27 America's industry during the period 2000 to 2007, and states that increase in protection of property rights will create new jobs, and thereby, increased competition and the development of exports [10].

Lin and Liu (2005) examined the relationship between foreign patent rights and export of hi-tech industries in Taiwan's economy during the period 2000-1989, and according to estimates, states that both the impact of the market power and expansion exist in the export of economy of Taiwan[11].

3. Statistical Analysis of Exports Determining Factors

Intellectual property rights are the cornerstone of a free economy and individual countries needs to have strong intellectual property rights protection system in order to liberalization of economic policies. Therefore, countries should seek to create a stronger system for intellectual property rights to maintain or boost its position in the international arena or to join the World Trade Organization. We use analytical-comparative method to study the effect of intellectual property rights on exports ofG-15 for the period of 1995–2007. For this purpose, we used the index of patent programs for intellectual property rights measurement and then we compared countries in the G15 but the main focus is...
on the Islamic Republic of Iran. To evaluate the indirect effect of intellectual property rights on the export, we use components such as GDP, foreign direct investment, exports and high-tech products and also research and development expenditures.

3.1 Exports of goods and services

Export Development increased income and employment and performance and productivity of the production factors will improve due to the economies resulted from scale and improving production methods, and if there is unused production capacity or defective employment in developing countries (which actually exists), then the increase in production and exports of not only would not increase domestic prices, but also, it extend increase in efficiency, economies of scale and improving production techniques production and domestic production (even with constant data), and reduces the price of goods produced within the country[12].

New knowledge and ideas whose intellectual property system have been reserved, is considered as foundation of the success of many businesses. The exclusive right of patent provides a unique opportunity for protector country to work in international markets as a monopoly for export their product or service. So if all other conditions are provided, greater protection of intellectual property rights could lead to greater exports.

Based on the data from Table 1 as well as statistical data, during the years 1995 to 2007 the first to third place in exports of goods and services belongs to Mexico, Malaysia and India respectively, and last place is also owned by Senegal. While the first to third order of high-tech products exports belong to Malaysia, Mexico and Brazil respectively, and the last place also belongs to Jamaica.(See Appendix A).

It is worth noting that the average level of exports of goods and services of Asian, American and African countries in groups 15 in 2007 is 92/61, 75/31 and 31/53 billion dollars respectively, while the average high-tech products exports in Asian, American, and African countries in groups 15 in 2007 is 13.3, 4/31 and 0/02 billion dollars, respectively. Noteworthy point is that the share of exports of high technology products out from total exports in groups 15 is 145/84% growth during given period. So it can be said that increase of number of patents wouldn't be able to develop exports of goods and services. According to table 2, the average ratio of exports to GDP in Asian, American and African countries of groups 15 in 2007 is 0/43, 0/19 and 0/25, respectively. The highest and lowest average ratio of exports to GDP of Asian countries of G15 re related to Malaysia and Sri Lanka (respectively 1/18 and 0/15) and about American countries is Chile and Argentina, (respectively0/33 and 0/12 without considering Jamaica) and about African countries is Algeria and Nigeria (0/38 and 0/11 respectively).In general we can conclude that among the G-15 countries, the highest and lowest average ratio of exports to GDP over the study period belongs to Malaysia and Nigeria and the eleventh place is devoted to the economy of Iran. According to Table 2, the average ratio of high-tech products exports to GDP in Asian, American and African countries of groups 15 in 2007 respectively is0/073, 0/006 and 0/001. The highest and lowest average ratio of high-tech products exports to GDP of Asian countries belongs to the Islamic Republic of Iran and Malaysia respectively, 0/39 and 0/005 respectively and about American countries it belongs to Mexico and Jamaica 0/004 and 0/001 respectively, and for African countries it belongs to Kenya and Egypt and is equal to 0/00009 and 0/002. Overall, it can be said that, among the G-15 countries, the highest average ratio of high-tech exports to GDP over the study period was owned by Malaysia and Egypt and fifteenth position has been allocated to the Islamic Republic of Iran. Although Malaysia, Mexico, Nigeria and Indonesia have been top countries in terms of the ratio of exports of goods and services to GDP and the ratio of exports of high-tech products to GDP, they have been placed in third (Mexico), fifth (Malaysia) and sixth (Indonesia) regarding patent programs.(See Appendix B).

3.2 Patent

Patent is a kind of copyrights which is granted to inventor or his/her legal representative for a given invention (WIPO).According to table 3, indicators of patent programs have been considered by Patent Office as an indicator for the protection of property rights, among Asian countries, India ranked in first position with an average of (20746/4) and Sri Lanka with average of (344/6)was considered as of last rank. Mexico (12960/2) and Jamaica (96) from American countries and Egypt (1564/25) and Kenya (71) from African countries (without considering Nigeria and Senegal) have occupied first and last ranks. In general, among G15 countries India is in first and Kenya is in last place.(See Appendix C).

3.3 Gross domestic production (GDP)
According to endogenous growth patterns, invention is economic growth driver. So, intellectual property rights protection is an economic determinant. Ivus, O(2010) says that intellectual property rights protection is responsible for industrial revolution in 20th century. Because patent usually results in increase of patent incomes through licensing canal and then it can lead to economic growth motivation[13].

According to table 4, first to third ranks of GDP of understudying countries belong to Brazil, India and Mexico, while the last place is owned by Senegal.(See Appendix .D).

Also it should be noted that, average gross domestic product in Asian, American and African countries of G15 in 2007 were 206, 293 and 50 billion dollars respectively, while Iran GDP was equal to 151 billion dollars in 2007, which is lower than all other Asian countries in G15.In total, the top three countries in the field of patent applications, India, Brazil and Mexico, with a slight displacement can also be taken into account as top countries in terms of GDP, and countries ranks are very closely together almost regarding these two indicators. As mentioned earlier, patent revenues has led to economic growth of countries.

3.4 Foreign Direct Investment

Foreign direct investment (FDI) may increase the production capacities, especially in the case of export goods and in terms of linking and communication with international economy through the development of export markets and progress in the areas of research and development it can help to the host country. On the other hand, foreign investment in order to persistence presence in the host country requires protecting the intellectual property rights of host countries[14]. The gaps in the intellectual property systems between developing and developed countries are the main factor explaining the gap in the flow of foreign direct investment[15]. However, there is no doubt that the calm and stable political situation is the necessary condition to attract foreign direct investment. According to table 5, during years 1995 to 2007, first, second and third places of net inflow of foreign direct investment among G 15 countries belong to Brazil, Mexico and India, and the final rankings is of the Zimbabwe and Senegal. It should also be noted that, the average net inflow of foreign direct investment from Asian, American and African countries of group 15 in 2007, were equal to 13/4, 3/8 and 24/5 billion dollars, respectively. As previously noted, the three countries, in the field of patent programs, are also in the top three, so it can be said that protection of property rights in the three countries has provided motivation of attracting foreign direct investment.(See Appendix .E).

However, net inflows of foreign direct investment in Iran is 3/12 billion dollars in 2007 which is lower than the average net inflow of foreign direct investment of Asian countries of G15. In other words, the Islamic Republic of Iran with an average net inflow of foreign direct investment of one billion dollars during the period under review has not been successful in attracting foreign investment and always the twelfth to eighteenth ranks are allocated to it. Although, understanding the importance of the subject, institution-building, strengthening and directing research centers, accelerate privatization and outsourcing of the government, improve the business climate, strong macroeconomic management and more protection of intellectual property are considered as important factors in attracting foreign direct investments.

3.5 Expenditure on Research and Development

In literature, strengthening the protection of intellectual property rights encourages investment in research and development and increase the competitiveness and development of exports and especially high-tech exports. Based on table 1, during years 1995 to 2007, the top three ranks in research and development (R & D) accumulation among the G-15 belongs to Brazil, India and Mexico, and the last places belongs to Senegal and Kenya (regardless Venezuela and Zimbabwe due the lack of data and information). It should also be mentioned that the average R & D in Asian, American and African countries of group 15 in 2007 were 1/65, 1/87 and 0/11, respectively, while this number is 1/12 billion dollars in the Islamic Republic of Iran that is lower than the average R & D accumulation of Asia countries G15 members. In other words, the Islamic Republic of Iran, with an average R & D accumulation about 0/61 billion dollars during the understudying period, have promoted its rank within the group from the eleventh and twelfth places to the fourth one. Meanwhile, the eleventh and ninth rank of Iran in patent programs have been raised to fourth place at the end of the course. This has led to encourage investment in research and development and improving the position of the Islamic Republic of Iran in this field. This situation can be fertile ground for the rise in exports, especially exports of high technology products in the future.

4. Conclusions

In order to study the effect of protection of property rights on exports, patent applications index were used. The figures and stats in the tables show that in top countries in terms of patents, necessary fields to increase exports, especially high-tech exports, foreign direct investment will be provided, but what is striking in this respect will be that further support of property rights will be affective directly or through other variables if appropriate conditions for the application of this patent would be provided. If the patent has only the nominal aspect (what is seen in most developing countries) it can lead to increased exports. More protection of intellectual rights by creating an incentive for new ideas increases the success in international trade. Also it is worth noting that, in order to optimal allocation of resources such innovations should be more supported that can boost exports capabilities and thereby improve the country's trade balance, otherwise, the increase in patent applications on its own will not lead to an increase in exports. It should also be noted that the purpose of the various groups is to increase economic interactions among member countries, but now the main weight of economic interactions of the Group of 15 is with developed countries. So, in order to increase economic interactions of G-15 countries, it is essential to consider the needs of trading partners as well as the potential and the actual abilities of members regarding export. Another
interest interesting point is that, further support of property rights among members will provide fertile ground for confidence and security increase in order to provide more foreign direct investment. In addition, member states to maintain their advantage in the field of the business should protect intellectual property in areas where there is commercial advantage in accordance with the needs of other members to increase research and development costs and thereby improve their competitiveness.

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(Appendix A)Table1. Exports of goods and services and Exports of high-tech goods of countries of G15 (Billion dollars at constant prices on 2000).

| Country | Exports of goods and services | Exports of high-tech goods |
|---------|-------------------------------|---------------------------|
|         | 1995  | 2000  | 2005  | 2006  | 2007  | 1995  | 2000  | 2005  | 2006  | 2007  | 1995  | 2000  | 2005  | 2006  | 2007  |
| Argentina | 22.84 (7) | 30.94 (7) | 42.62 (7) | 45.75 (6) | 49.91 (6) | 0.239 (6) | 0.776 (6) | 1.385 (6) | 1.635 (6) | 1.611 (6) | | | |
| Algeria | 17.29 (9) | 22.56 (11) | 27.42 (11) | 26.76 (11) | 26.60 (11) | 0.002 (14) | 0.021 (17) | 0.006 (17) | 0.006 (17) | 0.004 (15) | | | |
| Indonesia | 60.81 (3) | 67.62 (3) | 94.23 (5) | 103.10 (5) | 111.90 (5) | 1.308 (3) | 5.698 (4) | 4.779 (4) | 3.549 (4) | 2.820 (5) | | | |
| Iran | 20.56 (8) | 23.00 (10) | 28.80 (10) | 30.27 (10) | 31.11 (9) | --- | 0.038 (11) | 0.088 (10) | 0.237 (9) | --- | | | |
| Brazil | 46.49 (4) | 64.33 (4) | 105.82 (4) | 111.16 (4) | 118.63 (4) | 0.909 (5) | 5.936 (3) | 6.717 (3) | 5.949 (3) | 5.570 (3) | | | |
| Peru | 5.64 (13) | 8.53 (14) | 13.81 (13) | 13.92 (13) | 14.79 (13) | 0.015 (11) | 0.042 (10) | 0.053 (12) | 0.043 (12) | 0.049 (11) | | | |
| Jamaica | 1.80 (16) | 2.66 (17) | 1.89 (15) | --- | --- | 0.001 (15) | 0.001 (17) | 0.001 (18) | 0.001 (18) | 0.002 (16) | | | |
| Zimbabwe | 4.43 (14) | 6.37 (15) | --- | --- | --- | 0.010 (12) | 0.009 (15) | 0.013 (15) | --- | --- | | | |
| Sri Lanka | 1.28 (17) | 1.31 (18) | 1.51 (16) | 1.57 (15) | 1.69 (15) | --- | --- | 0.080 (11) | 0.053 (11) | 0.076 (9) | | | |
| Senegal | 22.84 (7) | 30.94 (7) | 42.62 (6) | 45.75 (6) | 49.91 (6) | 0.060 (9) | 0.100 (8) | 0.268 (8) | 0.264 (8) | 0.276 (7) | | | |
| Chile | 16.11 (10) | 23.76 (9) | 32.58 (8) | 34.24 (8) | 36.85 (8) | 0.225 (7) | 0.328 (7) | 0.285 (7) | 0.262 (8) | 0.214 (8) | | | |
| Colombia | 11.98 (12) | 16.35 (12) | 19.27 (12) | 20.81 (12) | 23.18 (12) | 0.022 (10) | 0.013 (14) | 0.025 (14) | 0.028 (13) | 0.052 (10) | | | |
| Kenya | 2.79 (15) | 2.74 (16) | 4.01 (14) | 4.11 (14) | 4.35 (14) | 0.012 (10) | 0.013 (14) | 0.025 (14) | 0.028 (13) | 0.052 (10) | | | |
| Malaysia | 73.89 (2) | 112.37 (2) | 145.86 (2) | 156.03 (2) | 162.53 (2) | 21.220 (1) | 46.999 (1) | 49.405 (1) | 50.698 (1) | 45.999 (1) | | | |
| Egypt | 14.72 (11) | 16.17 (13) | 30.27 (9) | 36.71 (7) | 45.25 (7) | 0.008 (13) | 0.005 (16) | 0.012 (16) | 0.018 (15) | 0.005 (13) | | | |

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### Table 2
The ratio of exports of goods and services and high-tech goods to GDP of G15 (Percent)

| Country       | The ratio of exports of goods and services to GDP | The ratio of Exports of high-tech goods to GDP |
|---------------|--------------------------------------------------|---------------------------------------------|
|               | 1995     | 2000     | 2006     | 2007    | 1995     | 2000     | 2005     | 2006     | 2007 |
| Argentina     | 0.091    | 0.109    | 0.136    | 0.134   | 0.135    | 0.0010   | 0.0027   | 0.0044   | 0.0044  |
| Algeria       | 0.368    | 0.412    | 0.394    | 0.377   | 0.364    | 0.0000   | 0.0004   | 0.0001   | 0.0001  |
| Indonesia     | 0.382    | 0.340    | 0.453    | 0.470   | 0.480    | 0.0082   | 0.0345   | 0.0230   | 0.0121  |
| Iran          | 0.247    | 0.227    | 0.217    | 0.215   | 0.205    | ---      | 0.0004   | 0.0007   | 0.0000  |
| Brazil        | 0.080    | 0.100    | 0.143    | 0.145   | 0.146    | 0.0016   | 0.0092   | 0.0091   | 0.0069  |
| Peru          | 0.120    | 0.160    | 0.211    | 0.197   | 0.193    | 0.0003   | 0.0008   | 0.0008   | 0.0006  |
| Jamaica       | ---      | 0.320    | ---      | ---     | ---      | ---      | 0.0001   | 0.0001   | 0.0001  |
| Zimbabwe      | 0.252    | 0.359    | 0.336    | ---     | ---      | 0.0014   | 0.0012   | 0.0023   | ---    |
| Sri Lanka     | 0.347    | 0.397    | ---      | ---     | ---      | ---      | 0.0041   | 0.0025   | 0.0033  |
| Senegal       | 0.334    | 0.279    | 0.256    | 0.260   | 0.267    | ---      | 0.0030   | 0.0086   | 0.0019  |
| Chile         | 0.263    | 0.316    | 0.353    | 0.354   | 0.364    | 0.0010   | 0.0013   | 0.0029   | 0.0027  |
| Colombia      | 0.133    | 0.174    | 0.169    | 0.171   | 0.177    | 0.0025   | 0.0035   | 0.0025   | 0.0016  |
| Kenya         | 0.245    | 0.216    | 0.264    | 0.255   | 0.252    | 0.0020   | 0.0100   | 0.0017   | 0.0017  |
| Malaysia      | 0.996    | 1.198    | 1.234    | 1.248   | 1.222    | 0.2859   | 0.5011   | 0.4179   | 0.4054  |
| Egypt         | 0.190    | 0.162    | 0.255    | 0.289   | 0.333    | 0.0001   | 0.0001   | 0.0001   | 0.0000  |
| Mexico        | 0.210    | 0.309    | 0.338    | 0.357   | 0.367    | 0.0324   | 0.0535   | 0.0381   | 0.0377  |
| Nigeria       | ---      | 0.540    | ---      | ---     | ---      | ---      | 0.0000   | 0.0004   | 0.0001  |
| India         | 0.106    | 0.132    | 0.189    | 0.205   | 0.202    | 0.0028   | 0.0034   | 0.0042   | 0.0044  |
| Venezuela     | 0.366    | 0.297    | 0.257    | 0.222   | 0.194    | 0.0090   | 0.0007   | 0.0008   | 0.0004  |
| Average of Asian’s countries of G15 | 0.416 | 0.471 | 0.419 | 0.428 | 0.422 | 0.059 | 0.108 | 0.090 | 0.086 |
| Average of American’s countries of G15 | 0.158 | 0.183 | 0.201 | 0.198 | 0.197 | 0.005 | 0.009 | 0.007 | 0.006 |
| Average of African’s countries of G15 | 0.211 | 0.338 | 0.250 | 0.230 | 0.237 | 0.001 | 0.001 | 0.001 | 0.001 |
| Total Average of countries of G15 | 0.249 | 0.305 | 0.274 | 0.272 | 0.272 | 0.018 | 0.032 | 0.027 | 0.023 |

### Table 3
Patent programs issued by The Bureau Of Patent office

| Country      | 1995 | 2000 | 2005 | 2006 | 2007 |
|--------------|------|------|------|------|------|
| Argentina    |      |      | 5266 (5) |      |      |
| Algeria      | 162 (12) | 159 (13) | 524 (12) | 669 (10) | 849 (9) |
| Indonesia    | 2874 (5) | 3889 (5) | 4303 (7) | 4606 (6) |      |
| Iran         | 407 (9) | 616 (11) | 4949 (6) | 6527 (4) |      |
| Brazil       | 7448 (1) | 17376 (1) | 20005 (2) | 24074 (2) | 21825 (2) |
| Peru         |      | 1078 (10) | 1020 (11) | 1271 (9) | 1359 (8) |
| Jamaica      | 61 (13) | 101 (14) | 69 (14) | 153 (12) |      |
| Zimbabwe     | 180 (11) |      |      |      |      |
| Sri Lanka    | 189 (10) | 321 (12) | 360 (13) | 423 (11) | 430 (10) |
| Country      | 1995 | 2000 | 2005 | 2006 | 2007 | 1995 | 2000 | 2005 | 2006 | 2007 |
|--------------|------|------|------|------|------|------|------|------|------|------|
| Argentina    | 656  | 837  | 1100 | 1169 | 1263 | 250  | 284  | 313  | 240  | 369  |
| Algeria      | 611  | 739  | 834  | 802  | 785  | 46   | 54   | 69   | 70   | 73   |
| Indonesia    | 317  | 329  | 429  | 46   | 498  | 159  | 165  | 165  | 207  | 219  |
| Iran         | 348  | 359  | 416  | 431  | 438  | 83   | 101  | 132  | 140  | 151  |
| Brazil       | 287  | 369  | 568  | 590  | 623  | 583  | 644  | 738  | 768  | 812  |
| Peru         | 235  | 328  | 496  | 494  | 518  | 47   | 53   | 65   | 70   | 76   |
| Jamaica      | 0    | 0    | 0    | 0    | 0    | 9    | 9    | 9    | 10   | 10   |
| Zimbabwe     | 153  | 213  | 151  | 0    | 0    | 7    | 7    | 5    | 10   | 10   |
| Sri Lanka    | 245  | 340  | 0    | 0    | 0    | 12   | 16   | 19   | 21   | 22   |
| Senegal      | 147  | 132  | 133  | 135  | 142  | 5    | 4    | 5    | 6    | 6    |
| Chile        | 1117 | 1540 | 1999 | 2079 | 2215 | 61   | 75   | 92   | 96   | 101  |
| Colombia     | 328  | 411  | 447  | 476  | 522  | 89   | 94   | 113  | 121  | 131  |
| Kenya        | 101  | 87   | 111  | 111  | 115  | 11   | 12   | 15   | 16   | 17   |
| Malaysia     | 3587 | 4828 | 5690 | 5979 | 6120 | 74   | 93   | 118  | 125  | 132  |
| Egypt        | 230  | 230  | 392  | 467  | 565  | 77   | 99   | 118  | 126  | 135  |
| Mexico       | 1028 | 1836 | 2085 | 2286 | 2403 | 445  | 581  | 636  | 667  | 688  |
| Nigeria      | 0    | 198  | 0    | 0    | 0    | 39   | 64   | 26   | 66   | 70   |
| India        | 39   | 59   | 111  | 130  | 138  | 346  | 460  | 644  | 707  | 771  |

(Appendix) Table 4. The ratio of exports of goods and services to population and the process of GDP for G15

| country      | Average of American’s countries of G15 | Average of Asian’s countries of G15 | Total Average of countries of G15 |
|--------------|----------------------------------------|------------------------------------|----------------------------------|
| Argentina    | 250 (4)                                | 583 (1)                            | 833 (1)                          |
| Algeria      | 46 (13)                                | 47 (12)                            | 47 (12)                          |
| Indonesia    | 159 (5)                                | 47 (12)                            | 159 (5)                          |
| Iran         | 83 (8)                                 | 47 (12)                            | 83 (8)                           |
| Brazil       | 583 (1)                                | 583 (1)                            | 583 (1)                          |
| Peru         | 47 (12)                                | 47 (12)                            | 47 (12)                          |
| Jamaica      | 9 (16)                                 | 9 (16)                             | 9 (16)                           |
| Zimbabwe     | 7 (17)                                 | 7 (17)                             | 7 (17)                           |
| Sri Lanka    | 12 (14)                                | 12 (14)                            | 12 (14)                          |
| Senegal      | 5 (18)                                 | 5 (18)                             | 5 (18)                           |
| Chile        | 61 (11)                                | 61 (11)                            | 61 (11)                          |
| Colombia     | 89 (7)                                 | 89 (7)                             | 89 (7)                           |
| Kenya        | 11 (15)                                | 11 (15)                            | 11 (15)                          |
| Malaysia     | 74 (10)                                | 74 (10)                            | 74 (10)                          |
| Egypt        | 77 (9)                                 | 77 (9)                             | 77 (9)                           |
| Mexico       | 445 (2)                                | 445 (2)                            | 445 (2)                          |
| Nigeria      | 39 (13)                                | 39 (13)                            | 39 (13)                          |
| India        | 346 (3)                                | 346 (3)                            | 346 (3)                          |
### Table 5. Net inflows of foreign direct investment and the average R & D expenditures for G15

| Country          | 1995 (Billion dollars at constant prices on 2000) | 2000 (Billion dollars at constant prices on 2000) | 2005 (Billion dollars at constant prices on 2000) | 2006 (Billion dollars at constant prices on 2000) | 2007 (Billion dollars at constant prices on 2000) | The average R & D expenditures for G15 (Billion dollars at constant prices on 2000) |
|------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------|
| **Argentina**    | 5.78 (3)                                      | 10.42 (3)                                     | 3.08 (11)                                     | 3.48 (11)                                     | 4.60 (11)                                     | 1.05 (4)                                                                           |
| **Algeria**      | 0.00 (19)                                     | 0.44 (13)                                     | 1.59 (13)                                     | 2.95 (12)                                     | 3.10 (13)                                     | 0.09 (9)                                                                           |
| **Indonesia**    | 5.51 (4)                                      | -4.55 (19)                                    | 11.46 (4)                                     | 8.17 (8)                                      | 12.84 (7)                                     | 0.80 (10)                                                                          |
| **Iran**         | 0.02 (18)                                     | 0.04 (17)                                     | 1.33 (14)                                     | 0.50 (15)                                     | 3.12 (12)                                     | 0.04 (11)                                                                          |
| **Brazil**       | 6.40 (1)                                      | 32.79 (1)                                     | 18.01 (2)                                     | 26.60 (2)                                     | 56.75 (1)                                     | 4.18 (1)                                                                           |
| **Peru**         | 2.91 (7)                                      | 0.81 (11)                                     | 3.13 (10)                                     | 4.54 (10)                                     | 7.48 (10)                                     | 0.04 (12)                                                                          |
| **Jamaica**      | 0.09 (14)                                     | 0.47 (12)                                     | 0.77 (15)                                     | 1.04 (16)                                     | 1.08 (16)                                     | 0.005 (15)                                                                         |
| **Zimbabwe**     | 0.12 (12)                                     | 0.02 (18)                                     | 0.06 (18)                                     | ---                                           | ---                                           | ---                                                                               |
| **Sri Lanka**    | 0.06 (15)                                     | 0.17 (14)                                     | 0.34 (16)                                     | 0.64 (14)                                     | 0.86 (17)                                     | 0.02 (13)                                                                          |
| **Senegal**      | 0.04 (16)                                     | 0.06 (16)                                     | 0.07 (17)                                     | 0.34 (16)                                     | 0.53 (18)                                     | 0.002 (17)                                                                         |
| **Chile**        | 3.44 (4)                                      | 4.86 (4)                                      | 8.94 (5)                                      | 11.08 (4)                                     | 20.37 (5)                                     | 0.32 (5)                                                                           |
| **Colombia**     | 1.00 (9)                                      | 2.39 (8)                                      | 13.80 (3)                                     | 0.86 (6)                                      | 14.34 (5)                                     | 0.27 (6)                                                                           |
| **Kenya**        | 0.03 (17)                                     | 0.11 (15)                                     | 0.03 (19)                                     | 0.07 (17)                                     | 1.14 (15)                                     | 0.003 (16)                                                                         |
| **Malaysia**     | 5.00 (5)                                      | 3.79 (6)                                      | 4.63 (8)                                      | 7.60 (9)                                      | 11.87 (8)                                     | 0.21 (8)                                                                           |
| **Egypt**        | 0.46 (12)                                     | 1.24 (9)                                      | 4.06 (7)                                      | 8.51 (9)                                      | 11.12 (9)                                     | 0.01 (7)                                                                           |
| **Mexico**       | 6.13 (2)                                      | 17.94 (2)                                     | 29.23 (1)                                     | 27.62 (1)                                     | 40.88 (2)                                     | 1.38 (3)                                                                           |
| **Nigeria**      | 0.77 (10)                                     | 1.14 (10)                                     | 9.03 (6)                                      | 19.71 (4)                                     | 14.30 (6)                                     | 0.02 (14)                                                                          |
| **India**        | 2.20 (8)                                      | 3.58 (7)                                      | 9.56 (5)                                      | 26.31 (3)                                     | 38.95 (3)                                     | 2.24 (2)                                                                           |
| **Venezuela**    | 0.65 (11)                                     | 4.70 (5)                                      | 2.85 (12)                                     | 0.64 (14)                                     | 1.45 (2)                                      | ---                                                                               |

#### Average

- **Average of Asian’s countries of G15**: 2.56
- **Average of American’s countries of G15**: 0.18
- **Average of African’s countries of G15**: 4.40

**Total Average of countries of G15**: 2.71