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# The Sustainable Green Growth Perspective of Pakistan: In the Context of Environment Friendly Technologies


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**C O N T E N T S**



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**ABSTRACT**

Policy-makers advocate a fundamental shift towards "Green Growth" as the new qualitatively different growth paradigm. This paper illustrates the green growth perspective of Pakistan to address the question of achieving sustainable green growth in the context of green/environmental technology to maintain and restore the environmental quality and ecological integrity, while meeting the needs of all people with the lowest possible environmental impacts. Pakistan needs both development and access to green technologies that will facilitate the transition to less carbon intensive economy to address the green growth. At this stage it is very important to understand the Pakistan existing level of organisations/institutions to understand their coping strategies. Therefore, the primarily objective of this study is sustainable development in the preamble of green growth/economy perspective of Pakistan. The focused area would be Intellectual Property Rights (IPRs), Research and Development (R&D), and Environmental Taxations. We will survey all the related organisations in Pakistan, which are directly or indirectly related to the green growth developmental agenda induced by IPRs, R&D, and Environmental Taxation.

*Keywords:* Intellectual Property Rights, Innovation, Sustainable Development

## INTRODUCTION

Green Growth is a strategy to achieve the sustainable development [United Nations General Assembly (2009); Sung Jin Kang (2012); OECD, World Bank and United Nations (2012)]. United Nations Economic Social Commission for Asia and Pacific (UNESCAP) defines green growth as, "Green growth advocates growth in GDP that maintains or restore environment quality and ecological integrity, while meeting the needs of all people with the lowest possible environment impacts. It is a strategy that seeks to maximise economic output while minimising the ecological burdens".[1] It is a growth that is efficient in its use of natural resources and that minimises pollution and environmental impacts [World Bank (2012a); OECD Ministerial Council Meeting (2011); Michael and Toman (2011)]. Similarly, green growth policy is based on five tracks such as, (1) green tax and budget reform, (2) development of sustainable infrastructure, (3) promotion of sustainable consumption and production (demand-side management), (4) greening business and market, and (5) eco-efficiency indicators [UNESCAP (2011); World Bank (2012); Nicoletti (2010); OECD (2010)].

One of the important green growth strategies is the development of green technologies through appropriate innovation policies [BIAC (2010); IEA (2010); OECD (2011)]. To achieve green growth, it is important to ensure the low-carbon green technologies [BIAC (2010); Stewart (2011); Popp (2011)]. These green technologies are the application of the environmental science to conserve the natural environment and resources, and to reduce the negative impacts of human activities [Kuan-Yeow Show (2010); UNEP (2010); Rajvanshi (2011)]. Introducing green technologies, green patents have been one of the important factors for attaining the green economy/growth [Commoner (1997); Bronwyn and Helmers (2010)].

Green growth in the context of Pakistan means efficient, appropriate and affordable use of our natural resources and reduces the vulnerabilities of climate change [Khan (2002); UNEP, ESCAP, ADB (2010)]. Pakistan is one of the most resilient nation in the world, and living in a red zone area and a dire need of inculcating the green economy concept into the policies [IUCN (2011)]. Planning Commission of Pakistan (2012), "Time has come to revisit policies and

[1]UNESCAP (2011), "Green growth approach: experiences in mainstreaming disaster risk reduction and climate change adaptation".

rethink discourse according to green economy concept". He urged, "It was to think holistically about the economy and productivity in creative and focused manner while exploring the linkages between growth and the green economy".

We are considering green environmental technologies one of the main strategies to achieve green growth. Therefore, the primary objective of this study is to achieve green technologies the focused area would be intellectual property rights (IPRs), research and development (R&D) expenditures, and environmental taxations.

## ORGANISATION OF THE PAPER

This paper presents the green growth perspective of Pakistan based on three areas IPRs, R&D expenditure, and environmental taxes. Next section describes a methodology and is followed by a section presenting the results of three analyses as mention above. Final section makes discussion and draws important policy implications

## METHODOLOGOY

Required information was collected using secondary sources from all the related organisation in Pakistan, which are directly or indirectly related to the green growth developmental agenda induced by IPRs, R&D, and Environmental Taxation. Figure 1 indicates the information of intellectual property rights of various countries and the data is collected from the IPR index from Ginarate and Park (2005). Ginarate and Park constructed IPRs index for 110 countries in the sample having data range from 1960-2005. It ranges in values from zero to five. Higher values of the index indicate stronger level of protection.

Information on the research and development (R&D) expenditure is taken from OECD statistics catalogues as indicated in Figure (2) and elsewhere in the text. A considerable research and development expenditures are needed to develop the base for green patents, the granting of the green patents reflects the importance of the competitiveness in green sector. Sector wise number of major R&D institution in Pakistan is also illustrating in the Figure (4).

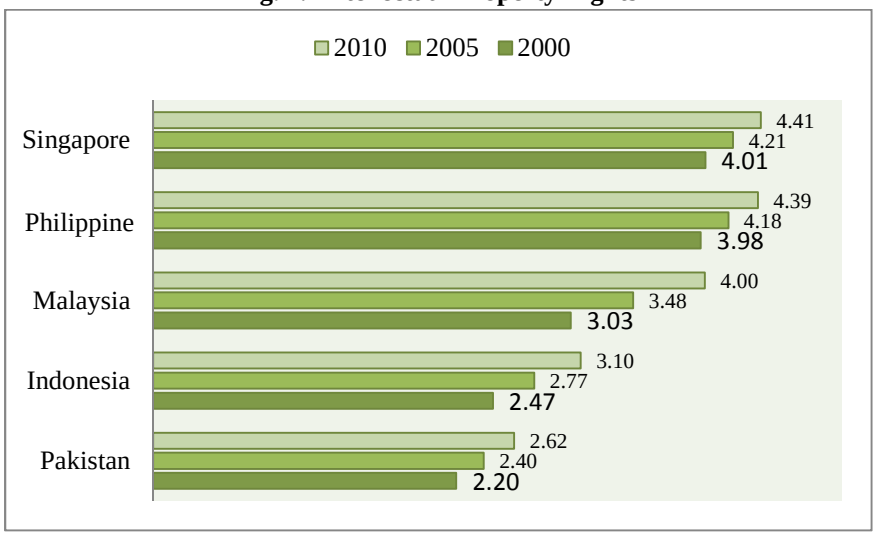
In this paper, broadly considers the three categories of the patents, namely per million population, per billion $ of GDP and number of patent fillings per billion $ of research and development expenditure. With the help of this analysis we can easily see the different countries conditions and economic activity. It's not mean that one country is more intensive or more efficient than other when there is difference in patent fillings per population, GDP and research and development expenditure.

### Environmental Innovations and Intellectual Property Rights

The enforcement of intellectual property rights (IPRs) has been considered as an engine of economic growth in high, middle and low income

countries. IPRs play positive and significant role in the transfer of emission-reducing technologies from develop to developing countries [United Nation (2011); Mani (2011)]. In this way, poorer nations will be a little hope to bring the advance climate change technologies. Relationship of IPRs and transfer of climate related technology would be helpful to increase the awareness and understanding [ICTSD (2008)]. IPRs regimes also bring efficiency, new innovations and the progress in research and development which contribute into the development of environment technologies in the economy [World Bank (2002)]. Despite of this, the level of protection of IPRs in Pakistan is very low [Mahmood (2011)]. Due to weaker protection of IPRs, very few inventions are produce in Pakistan and most of industries rely on pirated technologies [Sattar (2011)]. It might be the case that the corrupt practices of owing to the poor governance would not allow the locally produced technologies. The following graph shows the situation of Intellectual property rights in ASEAN countries and Pakistan.

**Fig. 1. Intellectual Property Rights**




*Source:* IPRs from Ginarate and Park (2010).

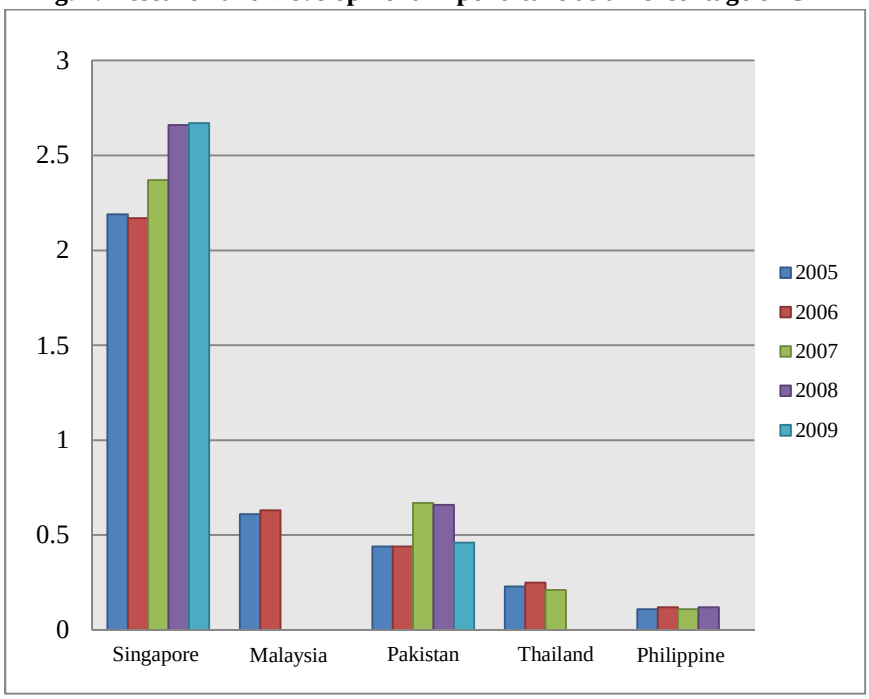
In this graph clearly seems that the enforcement of intellectual property rights is very weak in Pakistan as compared to others countries. That's why; there are very few inventions and no incentives of advance technologies in Pakistan and this situation given many challenges to achieve green growth for Pakistan.

**Environmental Innovation and Research and Development Expenditure**

Research and Development (R&D) expenditures plays positive and increasingly significant role in patenting of green technologies. The emphasis of

R&D expenditures generally and green R&D expenditures specifically are important for environmental friendly technologies [OECD (2009)]. Pakistan has a very limited R&D base and a low level of innovative capabilities as compared to others countries [Khattak (2010); UNESCA (2012)]. Pakistan has not yet developed an effective innovation system to facilitate the development of environmental friendly technologies and even research and development capabilities [Bajwa, *et al.* (2009); UNCTAD (2005); OECD (2011)]. The following graph shows the R&D Expenditure as a percentage of GDP.

**Fig. 2. Research and Development Expenditure as a Percentage of GDP**



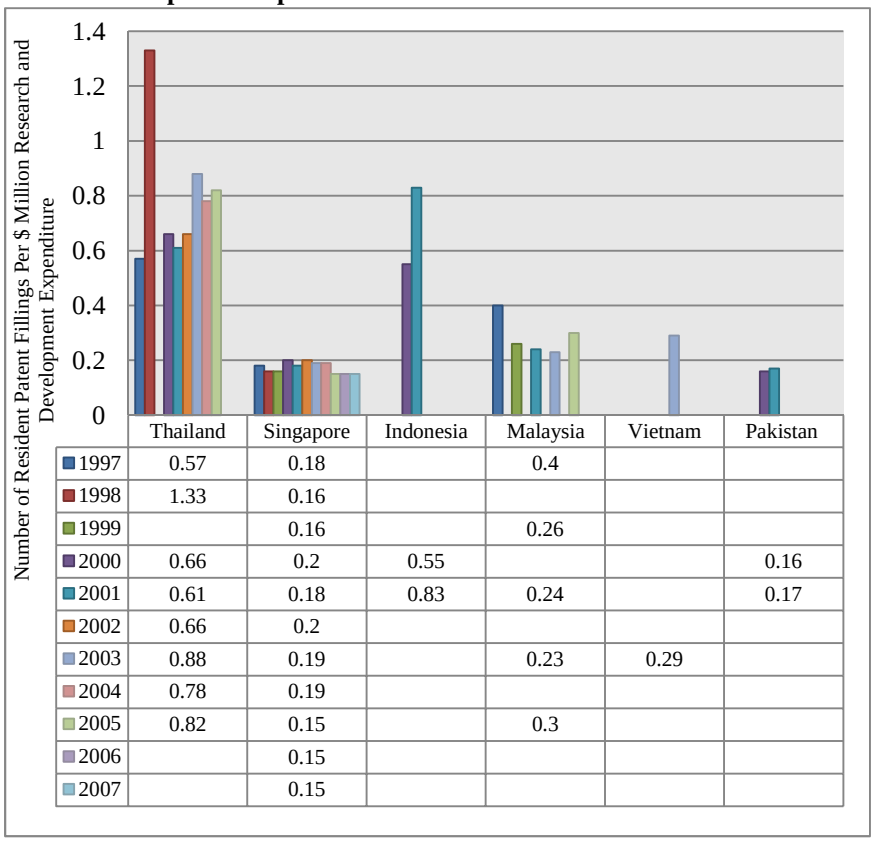

*Source:* World Development Indicator (2012).

The above graph clearly indicates that Pakistan had a higher rate of Research and Development Expenditure as a percentage of GDP than Thailand and Philippine but slightly lower than Malaysia and much lower than Singapore by 2005-09. For developing the green technologies and fostering the innovation the developing countries needs to promote and sustain their green economy sectors. It is now becoming well thought fact that competitiveness in green sector depends on green innovations and green innovations eventually depend on green technologies which ultimately results of green patents.

So, it is clear that R&D expenditure and patent applications have a positive and significant role to foster the innovation because a patent is taken

for preventing information theft. Patent is a protection given to an invention and number of patent application showing the innovation performance of countries, regions, enterprises and technology centers. In the below figure compares the patent filings with research and development expenditure and total research and development is measured in constant year 2000 US dollars at purchasing power parity. This is to make meaningful cross-country comparisons by weighting the number of patents by different measures of country size and economic activity.

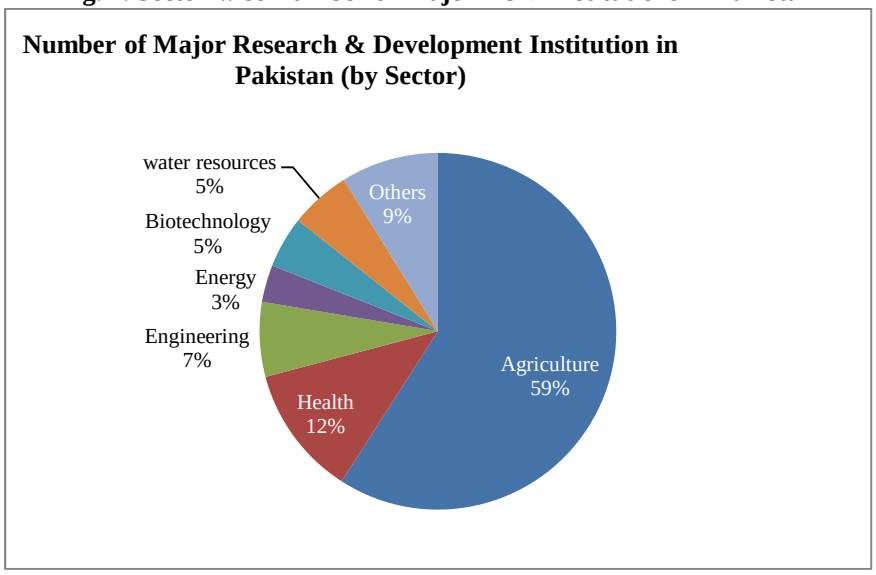
**Fig. 3. Number of Residents Patent Fillings per $ Millions of Research and Development Expenditure**




| | Thailand | Singapore | Indonesia | Malaysia | Vietnam | Pakistan |
|---|---|---|---|---|---|---|
| 1997 | 0.57 | 0.18 | | 0.4 | | |
| 1998 | 1.33 | 0.16 | | | | |
| 1999 | | 0.16 | | 0.26 | | |
| 2000 | 0.66 | 0.2 | 0.55 | | | 0.16 |
| 2001 | 0.61 | 0.18 | 0.83 | 0.24 | | 0.17 |
| 2002 | 0.66 | 0.2 | | | | |
| 2003 | 0.88 | 0.19 | | 0.23 | 0.29 | |
| 2004 | 0.78 | 0.19 | | | | |
| 2005 | 0.82 | 0.15 | | 0.3 | | |
| 2006 | | 0.15 | | | | |
| 2007 | | 0.15 | | | | |

The above chart shows the number of resident patent applications field per million dollars of R&D expenditure measured in constant year 2000 US dollars at purchasing power parity (PPP). The differences in patent fillings between countries are less pronounced when weighted by research and development expenditure. Sector-wise R&D institutions are defined in the following chart.

**Fig. 4. Sector-wise Number of Major R&D Institutions in Pakistan**




The above chart shows that the majority of R&D institutions in Pakistan are in agriculture and health; only 8 institutions are engaged in the energy sector. While, the development of energy resources are contributed in the nation's economic growth and well-being [AGECC (2010); OECD (2011)]. The extensive R&D in energy sector, introduce the clean coal technologies, advance nuclear power technologies and renewable energy technologies. Green growth must be underpinned by the use of sustainable energy sources [UNIDO (2012); OECD (2011)]. Because energy sector is the single largest source of GHG emissions in Pakistan and its contribution to total emissions is nearly 51 percent [Pakistan (2010)]. So, there is a dire need of R&D in green projects, particularly in sustainable energy sources and clean technologies.

**Environmental Innovation and Environmental Taxes**

The environmental taxation has a positive impact on green innovations because the government imposes the taxes on the polluters to reduce the level of emissions and provide the clean environment to the people [Rabia and Samad (2011); OECD (2011, 2010)]. Due to the tax regimes emissions are decreases and taxes are the base of new technologies and innovations that should make monitoring easier and must cost effective [Andersen (2009); OECD (2011)]. Environmental taxes are the key policy instruments for providing clear and sustain incentives to reduce the environmental damage [OECD (2012); UNEP (2004)]. OECD analysis shows that if all industrialised countries were to cut their emissions by 20 percent by 2020 relative to the 1990 levels, via taxes or emission trading systems with full permit auctioning, proceeds generated in

2020 could be as high as 2.5 percent of GDP across countries.[2] Environmentally related taxes are increasingly being used in OECD economies and can provide significant incentives for innovation, as firms and consumers seek new, cleaner solutions in response to the price put on pollution [OECD (2011)]. These incentives also make it commercially attractive to invest in R&D activities to develop technologies [UNEP (2011)].

Pakistan faces a very tough competition in the international market. Green tax would undermine the competitiveness of the domestic industry. When green tax is imposed on the industries it will add to the cost of the subject paying tax. The adding of cost to a producer within one country or region, which is not imposed on producers outside that country or region, may of course impact on the competitiveness of the local producer. Developing economies like Pakistan are not in a position to increase its cost of production as it will badly affect its exports to other countries. Pakistan and the other developing nations are not having high environmental standards so in the present conditions green tax is not applicable. Still its importance cannot be ignored in terms of revenue gain and reducing pollution [Anjum (2008)].

In 1993, the government of Pakistan introduced the National Environmental Quality Standards about the industrial emissions, municipal and liquid effluents and motor vehicle exhaust. In this regard the government started the consultations with the industrial's owners through the Federation of Pakistan Chambers of Commerce and Industry (FPCCI). With the collaboration of FPCCI the government of Pakistan agreed to reduce the 10 percent custom duty on the import of "equipment and machinery". Necessary notification to this effect was issued by the Central Board of Revenues of the Ministry of Finance vide SRO.221(I)/97 dated 28 March, 1997. But at the end this tariff concession policy could not be carried out. However, in the "Pakistan Tax Policy report" by the government of Pakistan and the World Bank, it is proposed that employ the excise duty as green tax and simplify the rate structure for petroleum products because, petroleum products are the major source of the carbon emissions. In this regard, government takes an initiative and tries to promote the CNG vehicle rather than petroleum vehicle. Because, according to environmentalists CNG is a lead-free fuel with no sulphure and release 1/10th level of carbon monoxide emissions as compared to petrol. Latest's statistics indicates that more than 275 CNG stations are operation in Pakistan and over 275,000 cars have been converted into CNG. It is expected that in the long run, Pakistan may introducing the green taxes as a part of the excise duties.

**Environmental Innovations and Size of the Economy**

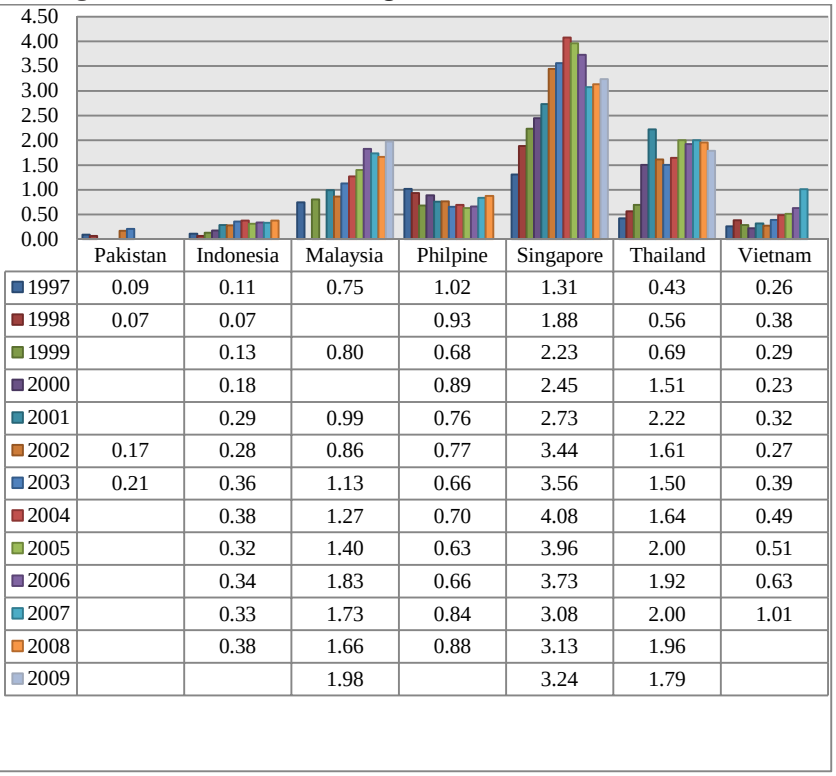
The positive dynamics in expansion in market size (GDP) is believed to expand the innovative activities in the economies. One possible reason for this

[2]OECD (2010) "Green Growth Strategy Interim Report: Implementing our Commitment for a Sustainable Future".

expansion is industrial growth, which leads to invention and innovations mostly by achieving economies of scale. But still direct role of market size in innovations are not clear from the theory, whether it help in increase in R&D, reduction in taxes, provision of other incentives etc. Contrary, to the conventional economic growth phenomenon, we are replicating it into green growth phenomenon. The demand for the green products in the green markets size may contribute in green R&D, imposition of green taxes, structure change at the level of industries. This eventually may leads to environmental innovations and green technologies are automatically increased.

The below section indicate the resident patent fillings with gross domestic products. To make cross-country comparison more meaningful, use the GDP in constant year 2000 US dollars adjusted for purchasing power parity. The constant year 2000 figure corrects for the effect of inflation on measures of GDP. The purchasing power parity adjustment takes into consideration the different price levels in different countries that may not be reflected in simple exchange rate differences.

**Fig. 5. Resident Patent Fillings with Gross Domestic Products**




| | Pakistan | Indonesia | Malaysia | Philpine | Singapore | Thailand | Vietnam |
|---|---|---|---|---|---|---|---|
| 1997 | 0.09 | 0.11 | 0.75 | 1.02 | 1.31 | 0.43 | 0.26 |
| 1998 | 0.07 | 0.07 | | 0.93 | 1.88 | 0.56 | 0.38 |
| 1999 | | 0.13 | 0.80 | 0.68 | 2.23 | 0.69 | 0.29 |
| 2000 | | 0.18 | | 0.89 | 2.45 | 1.51 | 0.23 |
| 2001 | | 0.29 | 0.99 | 0.76 | 2.73 | 2.22 | 0.32 |
| 2002 | 0.17 | 0.28 | 0.86 | 0.77 | 3.44 | 1.61 | 0.27 |
| 2003 | 0.21 | 0.36 | 1.13 | 0.66 | 3.56 | 1.50 | 0.39 |
| 2004 | | 0.38 | 1.27 | 0.70 | 4.08 | 1.64 | 0.49 |
| 2005 | | 0.32 | 1.40 | 0.63 | 3.96 | 2.00 | 0.51 |
| 2006 | | 0.34 | 1.83 | 0.66 | 3.73 | 1.92 | 0.63 |
| 2007 | | 0.33 | 1.73 | 0.84 | 3.08 | 2.00 | 1.01 |
| 2008 | | 0.38 | 1.66 | 0.88 | 3.13 | 1.96 | |
| 2009 | | | 1.98 | | 3.24 | 1.79 | |

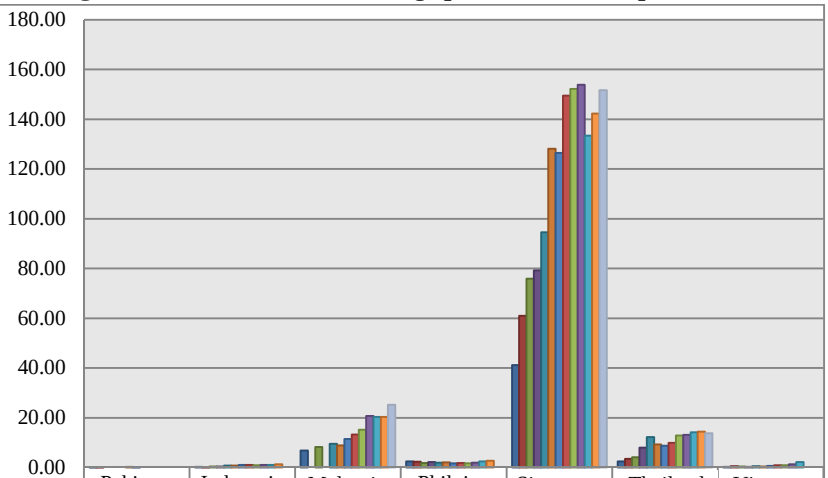
*Source:* WIPO Statistics Database and World Bank (World Development Indicators), June 2009.

The above chart shows that the number of rest patent applications fields per billion dollars of GDP, where GDP is measured in constant year 2000 US dollars at purchasing power parity. Singapore, Thailand and Malaysia have the highest rate of resident patent applications per GDP, while Pakistan has the very lowest rate as compared to the others countries.

**Number of Residents Patent Fillings Per Million Populations**

This section compares the patent filling with another indicator of population. The total resident population of each countries is given in the below graph.

**Figure 6: Resident Patent Fillings per Million of Population**




| | Pakistan | Indonesia | Malaysia | Philpine | Singapore | Thailand | Vietnam |
|---|---|---|---|---|---|---|---|
| 1997 | 0.17 | 0.32 | 6.85 | 2.46 | 41.14 | 2.52 | 0.32 |
| 1998 | 0.13 | 0.2 | | 2.33 | 61.02 | 3.49 | 0.5 |
| 1999 | | 0.4 | 8.26 | 1.75 | 75.87 | 4.18 | 0.4 |
| 2000 | | 0.46 | | 2.23 | 79.19 | 8.05 | 0.33 |
| 2001 | | 0.75 | 9.58 | 1.93 | 94.48 | 12.28 | 0.48 |
| 2002 | 0.33 | 0.76 | 8.85 | 2.02 | 128.11 | 9.25 | 0.44 |
| 2003 | 0.14 | 1 | 11.4 | 1.73 | 126.39 | 8.73 | 0.66 |
| 2004 | | 1.08 | 13.27 | 1.87 | 149.43 | 9.97 | 0.87 |
| 2005 | | 0.94 | 15.21 | 1.74 | 152.13 | 12.91 | 0.96 |
| 2006 | | 1.04 | 20.72 | 1.91 | 153.84 | 13.09 | 1.26 |
| 2007 | | 1.06 | 20.35 | 2.48 | 133.39 | 14.14 | 2.17 |
| 2008 | | 1.26 | 20.33 | 2.68 | 142.23 | 14.42 | |
| 2009 | | | 25.24 | | 151.68 | 13.74 | |

*Source:* WIPO Statistics Database and World Bank (World Development Indicators), June 2009.

The above chart illustrate that Singapore and Malaysia have the highest rate of rest patent application and comparatively Pakistan have a very lowest rate.

## CONCLUSION

This study aims to identify the importance of patenting of green/pollution control technologies in the context of the Pakistan and also compared the Pakistan with ASEAN countries. This study concludes that IPRs has a positive relationship with the patenting of the green technologies. Intellectual Property Rights is an integral tool to achieve the climate change technology for developing countries like as Pakistan [Latif (2012); ICTSD (2012)]. Because basic technologies are still lacking in Pakistan and its' own technologies, will not be able to compete, and need to import the technologies. Therefore, an effective and efficient IPR regime provides incentives to take risks and encourages the creation and adoption of new technologies. The enforcement of IPRs in developing countries brings the more export, more foreign investment, technology transfer and innovative products [Samad (2010)]. Strengthen of intellectual property rights accelerate the diffusion of innovation and new mechanism that enhance the technology transfer to developing countries [OECD (2012)]. This mechanism is benefited of all the developers and users of green technologies and especially for the access of green technologies for developing countries [BIAC (2012)]. This study shows that the level of protection of IPRs in Pakistan is very low [Mahmood (2011)]. The enforcement of intellectual property rights is very weak in Pakistan as compared to others countries. That's why; there are very few inventions and no incentives of advance technologies in Pakistan and this situation given many challenges to achieve green growth for Pakistan.

As regards Research and Development (R&D) expenditures plays positive and increasingly significant role in patenting of green technologies. The emphasis of R&D expenditures generally and green R&D expenditures specifically are important for environmental friendly technologies [OECD (2009)]. R&D expenditures are necessary for the development of environmental technologies. R&D expenditure would help in commercialisation of new technologies, create new business and reduce the environment degradation. In this result, the production of environment friendly goods increase that ensures sustainable development. Such products also are helpful in minimising pollution. This study indicates that Pakistan has a very limited R&D base and a low level of innovative capabilities as compared to others countries [Khattak (2010); UNESCA (2012)]. Pakistan has not yet developed an effective innovation system to facilitate the development of environmental friendly technologies and even research and development capabilities [Bajwa (2009); UNCTAD (2005); OECD (2011)].

Finally, as regards the environmental taxation plays a key role in introducing and developing the green technologies. Unlike the other instruments such as tradable permits, cap-and-trade, is costly than the accepting the imposition of the environmental taxation. Environment related taxes introduce the full range of innovation, new products and new production techniques. The possibility for the government is to generate huge income from the environmental taxation, which can be utilised in exercising public private partnership, or use it for green R&D expenditures.

In nutshell, Pakistan has not yet developed an effective innovation system to facilitate the development of environmental friendly technologies.

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