

**Title of the Project:** Mapping Innovation: A Comparative Study of US Patents Assigned to India and select countries - 2003-2008

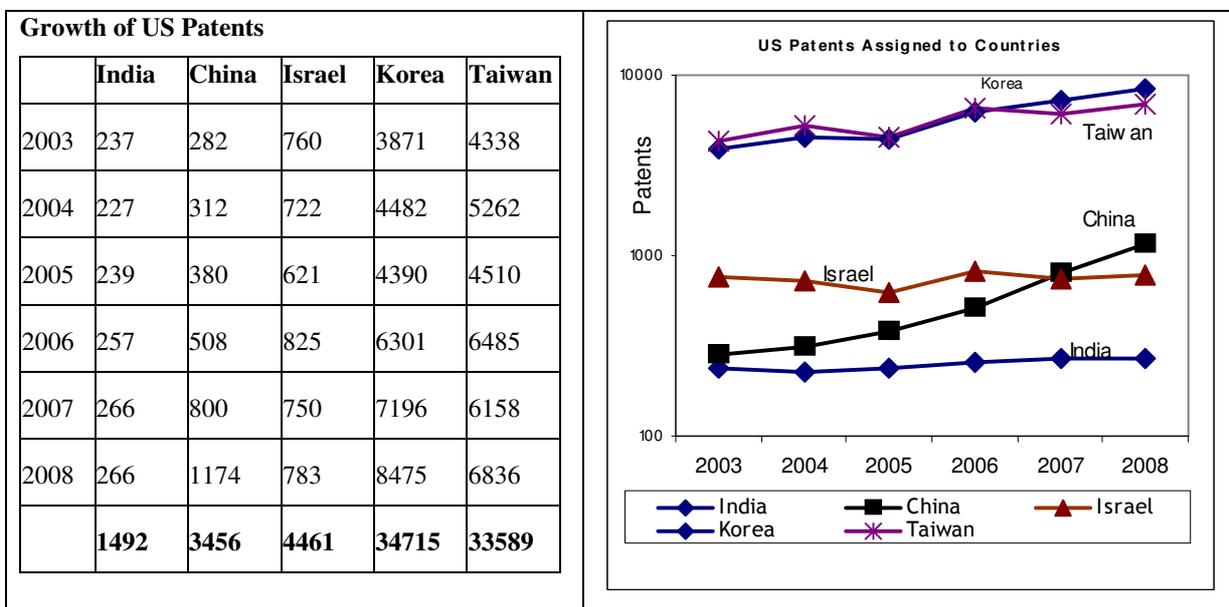
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This study examines innovation as reflected in the US patents granted to five countries: South Korea, Taiwan, Israel, China and India during 2003-2008. The objectives of the study were to identify core areas of innovation activities of the select countries and their patenting trends; examine the technology mix of the patents; spot the active components of national innovation system. The analysis also explored the possible strategies adopted by these countries for enhancing their technological innovations. An attempt enlisting the possible learning from the experience of select countries has been made.

The study considered all the patents assigned by the USPTO during the years 2003-2008 to the selected countries. All the patents were examined individually and the same were categorized as appropriate in the context. The variables considered include, assignees, innovators, subject focus, and broad grouping of the patents on technology level, apart from growth trends of patents during the period. Technology levels of the patents were broadly classified into high, medium and low.



The analysis shows that the countries, other than India in the context, have invested substantially in R&D. They have also broad based innovation, both in terms of number of innovators and institutions and firms working on the same. Invariably industry has dominated patenting. These countries have exercised

technological choices and have focused on a set of them to gain comparative advantage. Incremental innovation has been the model followed by Korea and Taiwan. This has not only facilitated them in obtaining a large number of patents, but also in ensuring minimal time in their grant by the USPTO. China's patents are largely soft innovations such as ornamental designs of the products and the like. Israel has focused on niche technologies like software, medical instrumentation and the like.

**Summary table of R&D and US patent data**

	<b>Taiwan</b>	<b>Korea</b>	<b>Israel</b>	<b>China</b>	<b>India</b>
Unique Assignees [2003-2008]	3,461	2,063	1,317	1,190	259
Unique Inventors [2003-2008]	26,531	35,000	5,931	4,760	3,100
Main subject Classes [2003-2008]	350	353	314	300	181
R&D workforce FTE/1000 [2008]	8.0	6.6	7.0	1.1	0.2*
R&D Exp. Percapita [2008]	483.7	695.2	1,333.6	50.1	8.0

\*2004

Four levels of innovation strategy are recognized. These are: **Reactive** – where the innovation is entirely incremental; **Active** - wherein the innovation, though is not first to market, but are well prepared to follow; **proactive** - in which the innovation is mainly radical in nature; and **passive** - in which case the product improvements take place only on customer requirement.

Proactive innovations are usually science-based and could be both basic and applied research. Proactive innovators maintain an in-house R&D establishment and it may also collaborate with leaders.

Active innovation is mainly applied R&D in nature and is carried out as in-house R&D and may also have collaboration with leaders in the field.

One of the outcomes of the active and proactive innovation is the patents and is less so when the innovation strategy is reactive. China's innovations though range from being '*reactive*' to '*proactive*'. But they are skewed towards '*reactive*' to a large extent, which is reflected in their innovation strategy, in minor improvements of old products and designs. The country is involved in, what could be called, an '*active*' innovation strategy in several medium technologies. China is also involved in science based inventions – particularly the ones emanating from its universities. The key to the rapid growth of patent graph is that much of the low technology products, nominal design improvements that are normally not widely appropriated as IPRs have been converted as patents. Protectability of many of them could be an issue, and its intrinsic worth in the market is debatable, apart from addition to the patent count.

Israel's strategy is in the continuum of active to pro-active in inventions. In the select core technologies such as software, medical instrumentation, biotechnology and drug development the country is proactive and engaged in cutting edge research. In several other areas the invention is pursued at a level that could be

adopted in industry. Active venture capital, risk taking behaviour of the inventors / entrepreneurs has served the intellectual property generation very well for the country.

Taiwan and Korea's innovation strategy is largely in the active mode and engage in cutting edge technologies. In most of the technologies pursued by these countries the innovations are oriented to product improvement and in that patents are incremental in nature. They very closely follow the respective technology leaders, if not ahead of them. In some select technologies such as LCD etc., these countries are pro-active and lead the table. Every improvement in products and processes, including fabrication techniques, and apparatus in fabrication are patented. In select technologies such as nanotech, drugs and pharma, etc. both these countries are on par with the technology leaders and could be characterized as pro-active. As the innovations are oriented to product improvement in the fast changing field of IC and semiconductors, despite the large number of patents, there is a tendency of the patents getting dated before long.

Indian patents reflect an active to pro-active R&D strategy, though the bouquet is small.

The US Patents assigned to India plateau around 250 annually in the past six years. India has been patenting innovations coming out of laboratory intensive research, which are slow to come by and are also observed to take longer time for granting rights by the USPTO. We need to adopt short and long term strategies to showcase our innovation capability and also to protect our market within and outside the country. Technology forecast studies to understand the existing gaps, enthusing industries to adopt innovation mode through policy options, incentivising the process and strengthening institutional mechanisms are among the suggestions offered to catch up in the innovation game.