

THOMSON REUTERS INNOVATION AWARD RESEARCH BRIEF

THE USE OF PATENT ANALYTICS IN MEASURING
INNOVATION



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INTRODUCTION

The use of patent analytics to measure innovation is an established practice which is used by governments, academia and industry to inform policy decisions, track trends and for technological and commercial intelligence purposes. This use of patents to measure innovation is built on a number of research findings. For example, it has been shown that a positive correlation exists between the number of applications for patents and R&D expenditure by industry¹ and by country/region².

This research briefing describes the techniques used to measure certain aspects of patenting activity by Small and Medium-sized Enterprises (SMEs) headquartered in India. The techniques are used to identify the most innovative SMEs in India in order to determine the winners of the Innovation Award 2009 from the Scientific business of Thomson Reuters to be awarded at InfoVision 2009, Bangalore.

KEY ANALYSIS TECHNIQUES

There are six different factors which can be used to assess the inventiveness of an organization and to determine how efficiently they apply invention resources to innovate effectively:

- Volume of patents
- Impact of patents
- Efficiency and Effectiveness of research
- Productivity of research
- Domestic focus
- International scope

Each of these techniques is described below and illustrated by applying them to patent analysis of SMEs headquartered in India.

PATENT VOLUMES

The basic measure of innovation of entities is to measure the volume of patents to each entity and rank them according to these volumes. It is a provision of patenting that an individual invention can be registered in many countries for patent protection so that one invention can give rise to many patents. Counting patent documents would give rise to much double counting and is not useful for measuring the true volume of innovation. In order to provide a true comparison of innovation, it

¹ "Study on the Trend of Research and Development from Patent Application," *NISTEP*, Report No. 9.

² "Patents and R&D expenditure", *Bernard FÉLIX*, Statistics in focus - Science and technology, 16/2006.

is necessary to count the number of inventions per entity, rather than the number of individual patents. The Derwent World Patents Index (DWPI) produced by Thomson Reuters provides one descriptive record for each invention from inventors around the world and can therefore be used to measure the number of inventions as required.

The DWPI database was searched for recent inventions originating from India (PR=IN) and published from 2006 to date (PY=2006:2008) which gave a total of 17290 results as of November 2008. These records were ranked according to assignee and used to identify the top SME companies in two technology areas – Life Sciences and Corporate Services.

Table 1

Organization	# of inventions 2006-date
Life Science A	134
Life Science B	127
Life Science C	78
Life Science D	71
Life Science E	54
Life Science F	53
Life Science G	53
Life Science H	43
Life Science I	43
Corporate services A	70
Corporate services B	60
Corporate services C	59
Corporate services D	42

IMPACT OF PATENTS

An assessment of the impact of an organization's innovation can be made by considering later published inventions which cite the earlier work of the organization being assessed. Since those organizations with a greater number of published inventions have a greater likelihood of being cited, the number of citations is divided by the total number of inventions to produce a normalized measure of citation impact.

A search of each candidate identified above was made to identify the number of later published inventions citing their work which was normalized as described and the numbers ranked as given in Table 2.

There are six different factors which can be used to assess the inventiveness of an organization and to determine how efficiently they apply invention resources to innovate effectively:

- Volume of patents
- Impact of patents
- Efficiency & Effectiveness of research
- Productivity of research
- Domestic focus
- International scope

Table 2

Organization	# of citing inventions	Citations per invention
Life Science B	24	0.101
Life Science A	38	0.255
Life Science D	20	0.145
Life Science G	20	0.108
Life Science H	3	0.038
Life Science E	10	0.088
Life Science C	69	0.343
Life Science F	18	0.194
Life Science I	0	0.000
Corp services A	11	0.260
Corp services B	62	1.050
Corp services C	18	0.300
Corp services D	1	0.010

EFFICIENCY AND EFFECTIVENESS OF RESEARCH

To assess the efficiency of research, a suitable approach is to determine the R&D expenditure for the latest financial period and together with the number of inventions patented by the organization to determine the ratio of inventions per million Rupees - the larger the ratio the more efficient the use of R&D expenditure in producing innovation.

Determining the effectiveness of research is a matter of analyzing the patent portfolio of an organization to identify the main areas of technology in which the organization is focusing efforts, and then to compare the number of patents the organization has in a particular technology area with the total number of patents in that technology area to assess how important their holdings are in that area. Adjusting for R&D expenditure produces a normalized measure of effectiveness that can be used to rank organizations for this facet of innovation.

Efficiency

Table 3

Organization	R&D (10 ⁶ rupees)	Efficiency
Life Science B	354.0	0.672
Life Science A	432.6	0.548
Life Science D	433.9	0.318
Life Science G	971.6	0.191
Life Science H	429.2	0.182
Life Science E	708.6	0.161
Life Science C	2037.5	0.099
Life Science F	1064.1	0.087
Life Science I	n/a	n/a
Corp services C	57.8	1.021
Corp services D	47.5	0.884
Corp services A	236.0	0.326
Corp services B	n/a	n/a

Effectiveness

As an example of determining the effectiveness measure, the calculation for one of the Life Sciences candidates is given in Table 4.

Table 4

Org	Top IPCs	# of records in IPC	% of total IPC count	% adjusted for R&D spend (x1000)
Life Science B	A61P003100	60	0.32%	0.9%
	A61P003104	51	0.40%	1.1%
	C07D045504	36	9.02%	25.5%
	A61K000920	32	0.29%	0.8%
	C07D045500	30	2.90%	8.2%

Efficiency and effectiveness of innovation are measured by considering R&D expenditure and the main areas of focus of R&D compared to total innovation in those technologies

The score for Life Sciences B is the sum of the adjusted percentage which equals 36.5%

On this basis, the ranking for effectiveness of research for each candidate organization is given in Table 5.

Table 5

Organization	Total adjusted IPC %
Life Science B	36.5%
Life Science A	33.3%
Life Science G	17.1%
Life Science F	13.9%
Life Science D	8.9%
Life Science E	5.3%
Life Science H	4.3%
Life Science C	2.4%
Life Science I	n/a
Corporate services C	931.9%
Corporate services D	53.9%
Corporate services A	17.3%
Corporate services B	n/a

PRODUCTIVITY OF RESEARCH

An effective measure of productivity of R&D is to consider the total number of inventions patented by an organization compared to the number of employees in the organization producing that innovation.

The ranking of research productivity as measured by the ratio of inventions per thousand employees is given in Table 6.

Table 6

Organization	Inventions per thousand employees
Life Science I	100.0
Life Science B	68.0
Life Science C	67.0
Life Science D	65.4
Life Science A	57.8
Life Science F	46.5
Life Science G	33.7
Life Science E	32.6
Life Science H	15.4
Corporate services D	56.0
Corporate services C	39.3
Corporate services A	19.1
Corporate services B	13.1

DOMESTIC FOCUS

Domestic focus of innovation can be assessed by considering the number of national patents in an organization's portfolio as a ratio of the total number of patents. In this way, a measure of how much an organization focuses on the national compared to the international market can be determined.

Table 7

Organization	% National patents in portfolio
Life Science C	18%
Life Science G	19%
Life Science I	21%
Life Science E	21%
Life Science A	23%
Life Science F	25%
Life Science B	31%
Life Science D	32%
Life Science H	46%
Corporate services D	33%
Corporate services B	64%
Corporate services C	72%
Corporate services A	80%

INTERNATIONAL SCOPE

The international scope of an organization's innovation can be assessed by considering the number of different countries in which their innovation has been filed. This provides a measure of the international competitiveness of the organization.

Table 8

Organization	# of countries filed in
Life Science C	32
Life Science G	28
Life Science A	24
Life Science B	23
Life Science D	21
Life Science F	20
Life Science E	18
Life Science I	15
Life Science H	9
Corporate services C	18
Corporate services B	11
Corporate services A	9
Corporate services D	6

AGGREGATE RANKINGS

To arrive at a final determination of the most innovative SME organization in each sector, a score is allocated for each element assessed in the analysis and the scores totaled to arrive at a final score which is used to rank the candidates and identify the winner in each category.

Table 9 - Life Sciences

Org	Vol	Prod	Imp't	Eff'cy	Eff'nss	Dom foc	Int'l scope	Total score	Rank
A	1	5	2	2	2	5	3	20	1
B	2	2	6	1	1	7	4	23	2
C	3	3	1	7	8	1	1	24	3
G	7	7	5	4	3	2	2	30	4
D	4	4	4	3	5	8	5	33	5
F	6	6	3	8	4	6	6	39	6
E	5	8	7	6	6	3	7	42	7
I	9	1	9	9	9	4	8	49	8
H	8	9	8	5	7	9	9	55	9

For the Life Sciences category, Company A is determined to be the most innovative Indian SME and winner of the Thomson Reuters Innovation Award 2009 – Life Sciences.

Table 10 – Corporate Services

Org	Vol	Prod	Imp't	Eff'cy	Eff'nss	Dom foc	Int'l scope	Total score	Rank
C	3	2	1	1	1	3	1	12	1
D	4	1	3	2	2	1	4	17	2
B	2	4	2	4	4	2	2	20	3
A	1	3	4	3	3	4	3	21	4

For the Corporate Services category, Company C is determined to be the most innovative Indian SME and winner of the Thomson Reuters Innovation Award 2009 – Corporate Services.

ABOUT THE ANALYSES

All analyses performed in this report used data from Thomson Innovation, the premier IP research and analysis solution from the Scientific business of Thomson Reuters. Thomson Innovation is a single, integrated solution that combines intellectual property, scientific literature, business data and news with analytic, collaboration and alerting tools in a robust platform.

ABOUT THE INNOVATION AWARD

The Scientific business of Thomson Reuters, a leading provider of intelligent information to the worldwide research and business communities, is pleased to sponsor the Thomson Innovation Award at InfoVision 2009.

This award is designed to recognize innovation and entrepreneurship in India and will be awarded to the organization that in the judgment of Thomson Scientific most represents the new spirit of innovation in India.

Potential award winners are selected from small and medium-sized enterprises headquartered in India. The award winner is decided by analyzing their innovation through patented technology as recorded in Scientific patent information services. Criteria for award include the number of patents, the efficiency of innovation and the impact of innovation as measured by patent citations.

Previous award winners are omitted from this analysis.

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