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Correlation between R&D expenses and patent value - An analysis based on STOXX600 Index

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1. Methodology

Intracom used for the current analysis the patent search and analysis tool “Orbis Intellectual Property” from Bureau van Dijk¹ which combines company and patent information for intellectual property management and strategy. Orbis IP links 115 million patents on about 300 million companies.

The data selected for analysing the equities listed in the DJ STOXX 600 was

- Patent values
- Total assets
- R&D expenses

for the year 2017. The 2 factors which are calculated are:

$$R\&D \text{ expenses factor} = \frac{R\&D \text{ expenses}}{Total \text{ assets}}$$

$$IP \text{ relevance factor} = \frac{IP \text{ value}}{Total \text{ assets}}$$

The valuation was performed by applying the indicator based market analogy method from InTraCoM. Here all patents and utility models are analysed by taking different fixed indicators into account, applying mathematical algorithms and interdependencies. Within the method there are up to 26 indicators used for a full automated patent valuation (Autorating). The indicators cover the fields of Assignee, Environment, Technology and Legals of each IP. Basis for the value calculation are reference values of traded patents in the past (market analogy approach) having a similar indicator pattern to the patent that is valued (reference values)². The calculated values are an external market view on the patent portfolio. **This means that they do not necessarily have to correspond to income values.**

The market analogy approach also takes the maturity of a patent strongly into account. Patents being close to their end of life (i.e. if the remaining utilization period is only 12 months or less) are decreasing in value disproportionately. This takes into account that a patent that is intended to be sold needs a certain time of being transferred and finally utilized by a potential buyer.

2. Aim of the study

The aim of the study is to determine if there is a correlation between the patent values deployed by a company and the expenses for research and development (R&D).

¹ <https://www.bvdinfo.com/en-gb/our-products/data/international/orbis-intellectual-property>

² Kiehne, D.-O.: Automated patent valuation: background and main questions; Stuttgart, 02.2016;
http://www.media.intracomgroup.de/WP-Patentvaluation_with_indicators.pdf

3. Results

The top 25 with highest R&D expenses related to their total assets in the STOXX600 index are:

Ranking	R&D expenses factor	Company name
1		NEMETSCHEK SE
2		MORPHOSYS AG
3		GALAPAGOS N.V.
4		GENMAB A/S
5		ROCHE HOLDING AG
6		TELEFONAKTIEBOLAGET LM ERICSSON
7		BTG PLC
8		H. LUNDBECK A/S
9		FERRARI N.V.
10		STMICROELECTRONICS N.V.
11		NOVO NORDISK A/S
12		NOKIA OYJ
13		HELLA GMBH & CO. KGAA
14		UCB S.A.
15		BIOMERIEUX SA
16		ASTRAZENECA PLC
17		CARL ZEISS MEDITEC AG
18		ARGENX SE
19		OSRAM LICHT AG
20		ORION OYJ
21		IPSEN SA
22		CONTINENTAL AG
23		SWEDISH ORPHAN BIOVITRUM AB
24		LOGITECH INTERNATIONAL SA
25		NOVOZYMES A/S

The TOP 25 in patent value related to their total assets (=IP relevance) in the STOXX600 index are:

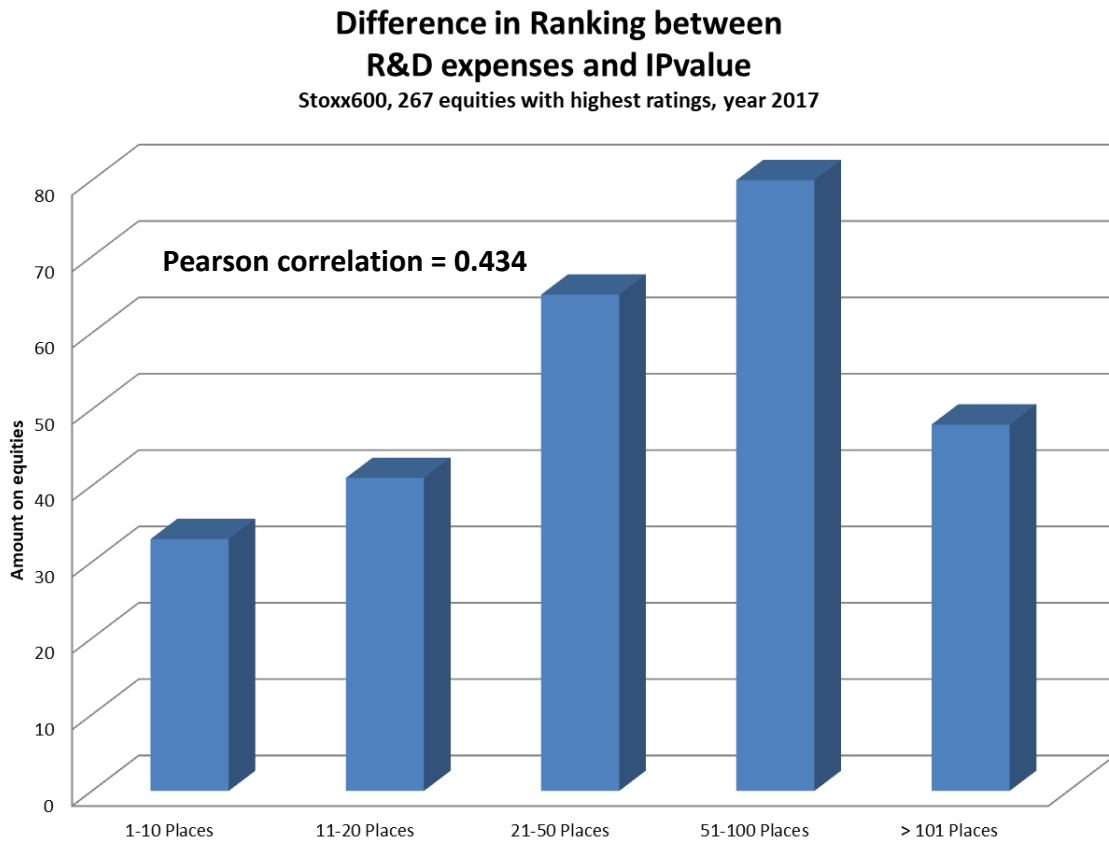
Ranking IP relevance	Company name
1	KONINKLIJKE PHILIPS N.V.
2	OSRAM LICHT AG
3	NOKIA OYJ
4	INFINEON TECHNOLOGIES AG
5	TELEFONAKTIEBOLAGET LM ERICSSON
6	NOVOZYMES A/S
7	SILTRONIC AG
8	STMICROELECTRONICS N.V.
9	CARL ZEISS MEDITEC AG
11	COLOPLAST A/S
12	KONINKLIJKE DSM N.V.
13	ASML HOLDING N.V.
14	EVONIK INDUSTRIES AG
15	BASF SE
16	OC OERLIKON CORPORATION AG
17	MORPHOSYS AG
18	ARKEMA
19	SMITH & NEPHEW PLC
20	COVESTRO AG
21	ALSTOM S.A.
22	MERCK KGAA
23	ASM INTERNATIONAL NV
24	BTG PLC
25	JOHNSON MATTHEY PLC

Comparison of Rankings in R&D Expenses and IP relevance) for the STOXX600 index is:

Ranking R&D expenses factor	Ranking IP relevance	Company name
1	141	NEMETSCHEK SE
2	17	MORPHOSYS AG
3	67	GALAPAGOS N.V.
4	50	GENMAB A/S
5	112	ROCHE HOLDING AG
6	5	TELEFONAKTIEBOLAGET LM ERICSSON
7	24	BTG PLC
8	35	H. LUNDBECK A/S
9	177	FERRARI N.V.
10	8	STMICROELECTRONICS N.V.
11	95	NOVO NORDISK A/S
12	3	NOKIA OYJ
13	139	HELLA GMBH & CO. KGAA
14	84	UCB S.A.
15	64	BIOMERIEUX SA
16	100	ASTRAZENECA PLC
17	9	CARL ZEISS MEDITEC AG
18	96	ARGENX SE
19	2	OSRAM LICHT AG
20	30	ORION OYJ
21	82	IPSEN SA
22	39	CONTINENTAL AG
23	119	SWEDISH ORPHAN BIOVITRUM AB
24	62	LOGITECH INTERNATIONAL SA
25	6	NOVOZYMES A/S

Ranking IP relevance	Ranking R&D expenses factor	Company name
1	29	KONINKLIJKE PHILIPS N.V.
2	19	OSRAM LICHT AG
3	12	NOKIA OYJ
4	27	INFINEON TECHNOLOGIES AG
5	6	TELEFONAKTIEBOLAGET LM ERICSSON
6	25	NOVOZYMES A/S
7	62	SILTRONIC AG
8	10	STMICROELECTRONICS N.V.
9	17	CARL ZEISS MEDITEC AG
11	43	COLOPLAST A/S
12	104	KONINKLIJKE DSM N.V.
13	39	ASML HOLDING N.V.
14	117	EVONIK INDUSTRIES AG
15	112	BASF SE
16	137	OC OERLIKON CORPORATION AG
17	2	MORPHOSYS AG
18	109	ARKEMA
19	84	SMITH & NEPHEW PLC
20	107	COVESTRO AG
21	173	ALSTOM S.A.
22	36	MERCK KGAA
23	67	ASM INTERNATIONAL NV
24	7	BTG PLC
25	69	JOHNSON MATTHEY PLC

The difference in the rankings from IP relevance to R&D expenses factor are shown in the next graph:



The Pearson correlation coefficient was calculated to 0.434 which expresses no significance and maximum a very light correlation.

4. Conclusion

Based on the analysis of the DJ STOXX600 index with a representative amount on 263 equities which have a patent value we could not determine a significance, or maximum a very light correlation between the patent value and R&D expenses. The Pearson correlation coefficient expresses in other words that for 18% of the equities there might be a correlation, for 82% there is no correlation at all.

5. About the Author



Prof. Dipl.-Ing. Andreas Zagors is founder and management Partner of the Bonn based InTraCoM Group (Germany). He was participating in the first standard for patent valuation and is doing research in patent valuation for more than 24 years.

He is guest professor at the Technical University of Cluj-Napoca in the field of innovation management and internationally recognized patent valuation expert.

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