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Most innovative and sustainable automotive manufacturers

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Summary

The automotive industry faces significant restructuring pressures, highlighted by Volkswagen's recent decision to close several plants.

A recent study evaluated the innovation capabilities of the world's top 20 automotive manufacturers, using Intracom's automated patent valuation methodology. This assessment, based on revenue and patent portfolio analysis, examined companies across indicators including Assignee, Environment, Technology, and Legal considerations. The analysis not only evaluated general patent value but also focused on sustainability-related patents that align with the UN Agenda 2030, highlighting each company's role in green innovation.

Key findings from the study revealed distinct rankings and strategic insights. Toyota led in total patent value, underscoring its strong commitment to R&D, followed by Honda, Ford, and Nissan. Volkswagen and BMW held mid-tier positions, while Mercedes-Benz, despite its historic role in combustion technology, ranked lower as the industry shifts toward sustainable technologies. Tesla emerged as a leader in average patent value, especially in green technology patents, though its high production volume somewhat diluted its per-car patent value share. Kia, BMW, Honda, and Toyota topped the rankings for patent value share, indicating a strategic focus on high-impact, valuable innovations. In contrast, Tesla's lower ranking here reflected its high production volumes rather than a lack of innovation.

Further analysis compared patent value to total assets and market capitalization, uncovering potentially undervalued stocks in terms of innovation.

These insights provide a nuanced view of the automotive industry's innovation landscape, illustrating how companies leverage patents, balance production scale, and pursue sustainable technology in an evolving market.

Background

Volkswagen's management recently announced significant restructuring measures, including plans to close at least three production plants in Germany, cut tens of thousands of jobs, and implement a 10% pay reduction for remaining employees. This decision underscores the challenges facing traditional automotive giants as they navigate an increasingly competitive and rapidly evolving market.

The industry as a whole is under pressure to adapt, prompting broader questions about which automotive companies have the resilience and innovation capacity to thrive in the coming decades. As electric vehicles (EVs), autonomous driving technology, and sustainability become central to the industry's future, the ability to innovate is becoming a critical differentiator.

To shed light on this, the latest study evaluates the innovation capabilities of the top 20 global automotive manufacturers. This research aims to assess each company's commitment to research and development, sustainability initiatives, technological advancements, and agility in adapting to market trends. These factors will play a decisive role in shaping the future of the automotive industry, revealing which players are best positioned to lead in a rapidly transforming landscape.

Description of the basic idea

The top 20 global automotive manufacturers, identified by revenue, were evaluated based on an in-depth analysis of their patent portfolios using Intracom's advanced, indicator-based patent valuation methodology. This approach provides a comprehensive assessment by analyzing both patents and utility models through a range of predefined indicators. Mathematical algorithms and interdependencies are applied to generate a precise and objective valuation.

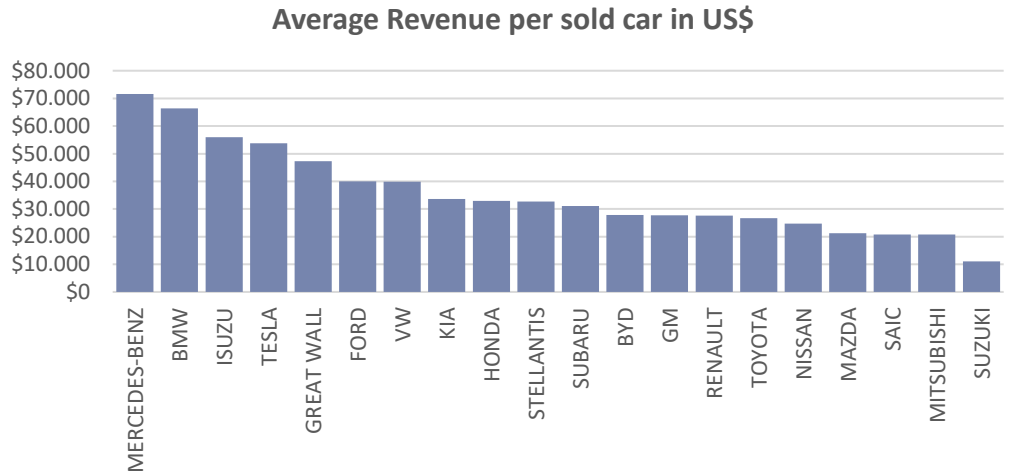
Intracom's methodology incorporates up to 26 indicators, enabling a fully automated patent valuation process (referred to as "Autorating")[1]. These indicators span four critical areas: Assignee, Environment, Technology, and Legal aspects of each intellectual property asset. The core of the valuation is a market analogy approach, which uses reference values derived from previously traded patents that exhibit similar indicator patterns. This produces an external market-oriented view of the patent portfolio, offering insights into the perceived market value of each patent. It's important to note that these valuations do not necessarily correlate with the revenue potential or internal income values of the patents.

Beyond general patent valuation, this methodology allows for a specialized analysis focused on sustainability-oriented patents. By isolating patents that align with sustainable technologies, the portfolio can be assessed for its contribution to green innovation. This component provides an estimated market value for patents addressing sustainability objectives outlined in the United Nations Agenda 2030. Such a focus highlights each company's commitment to sustainability and its potential role in driving environmentally friendly advancements in the automotive industry.

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

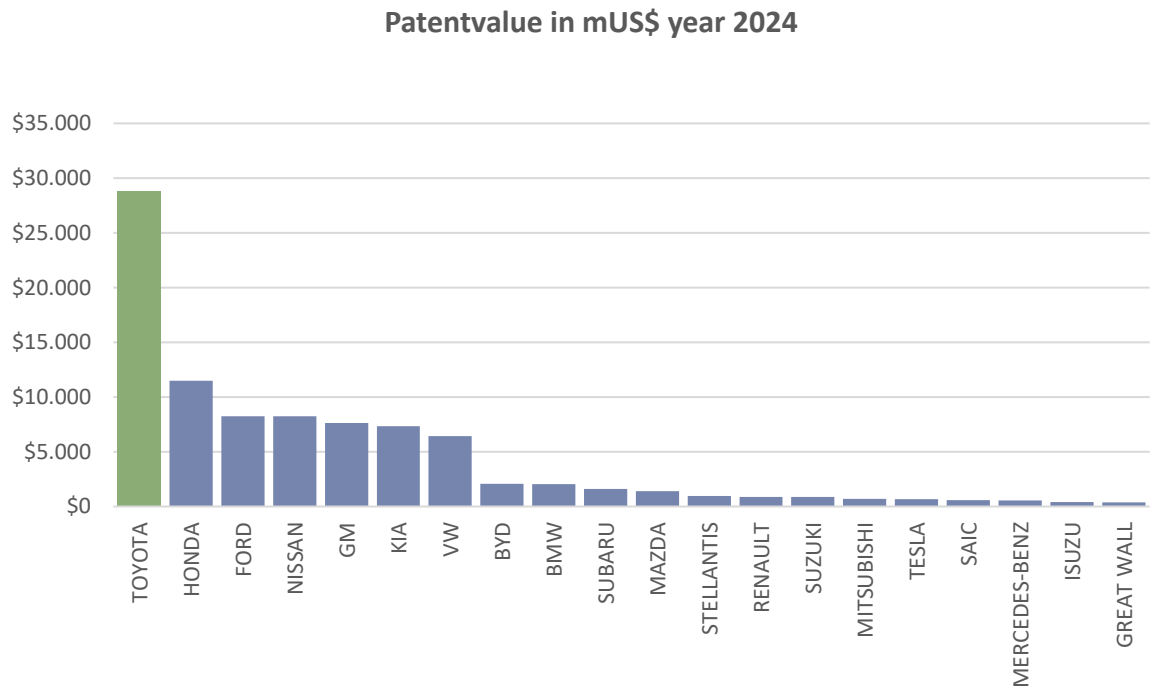
Results

The selected automotive manufacturers operate across various market segments, producing vehicles that span a wide range of price points, as illustrated in the following graph:



Graph1: Average Revenue per sold car in US$ for the year 2023

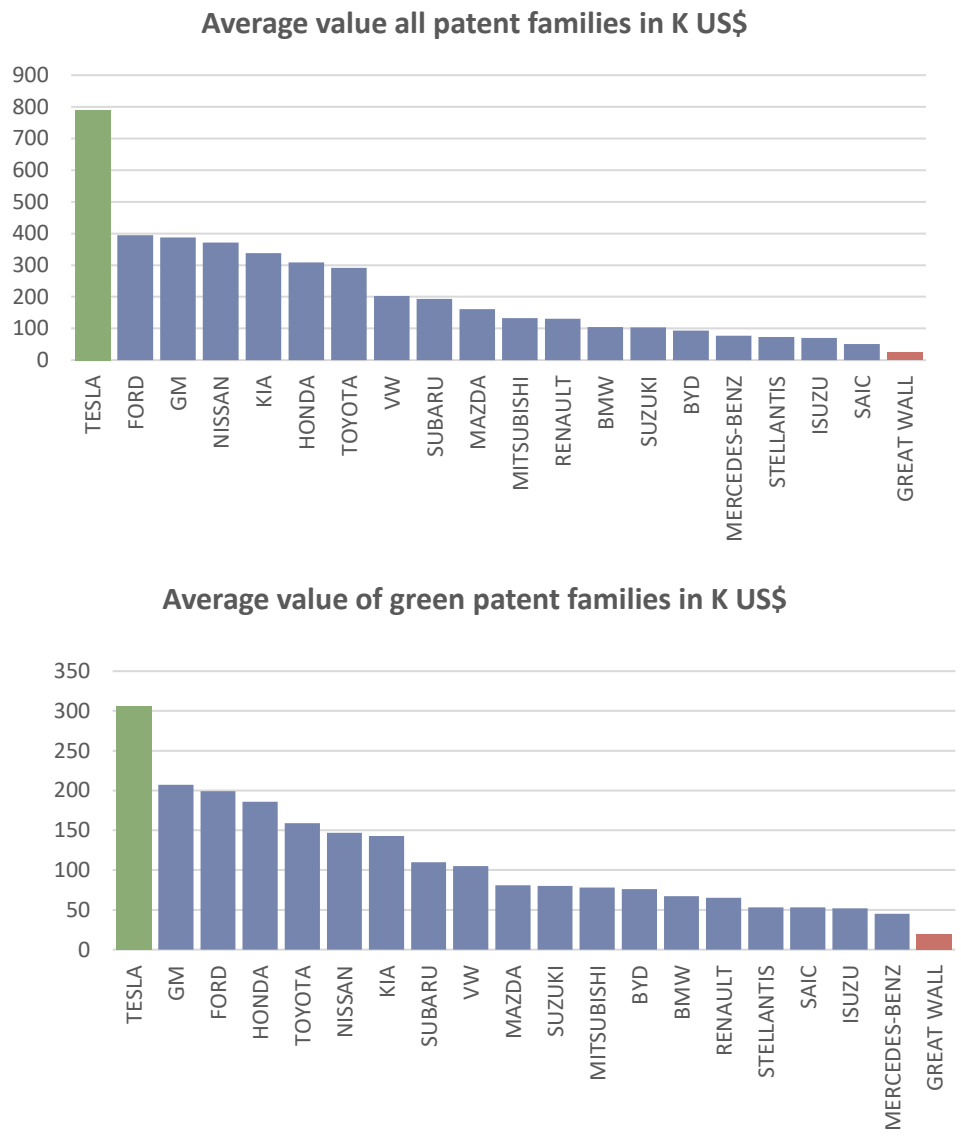
The patent portfolio value for each automotive manufacturer has been meticulously calculated, revealing distinct rankings across the industry.



Graph2: Patentportfolio value in mUS$ for the year 2024

Toyota leads with the highest patent portfolio value, showcasing its extensive commitment to innovation and intellectual property investment. Following Toyota are Honda, Ford, and Nissan, each holding significant patent values that reflect their strategic focus on technological advancements.
Volkswagen and BMW occupy the middle tier in the patent value ranking, representing a balanced approach in innovation investment and portfolio development.

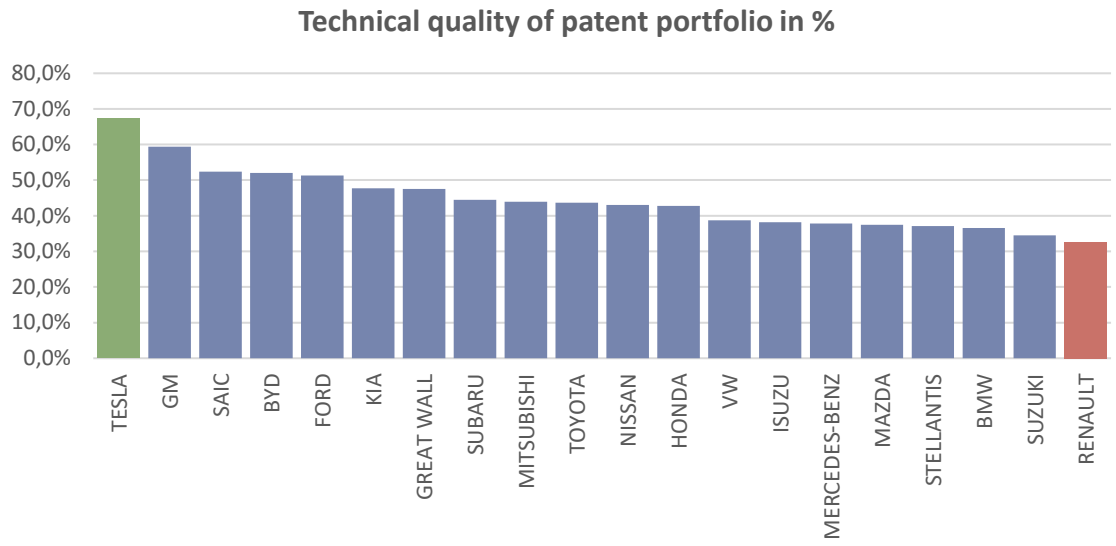
Surprisingly, Mercedes-Benz — the pioneering inventor of the combustion engine[2] — appears in the lower range of the ranking. This positioning highlights a shift in focus, where historical strengths in traditional automotive technologies are now giving way to newer, sustainability-focused innovation as the industry transitions toward electric and hybrid vehicles.



Graph3: Average value of all and sustainable patent families in K US$

The analysis of the average patent portfolio value reveals a surprising outcome: Tesla emerges as the holder of the most valuable patents on average. This distinction underscores Tesla's strategic focus on high-impact, high-value innovations, particularly in the fields of electric vehicles and sustainable technology. Tesla also leads in the value of patents specifically related to green technologies, reinforcing its position as a frontrunner in sustainable automotive advancements. In contrast, BYD, a significant player in the electric vehicle market, shows a disappointingly low number of valuable green technology patents, which may suggest a different strategic approach or lower investment in pioneering sustainable innovations.

[2] Carl Benz applied for a patent for his "vehicle powered by a gas engine" in the year 1886, the three-wheeled Benz Patent Motor Car.

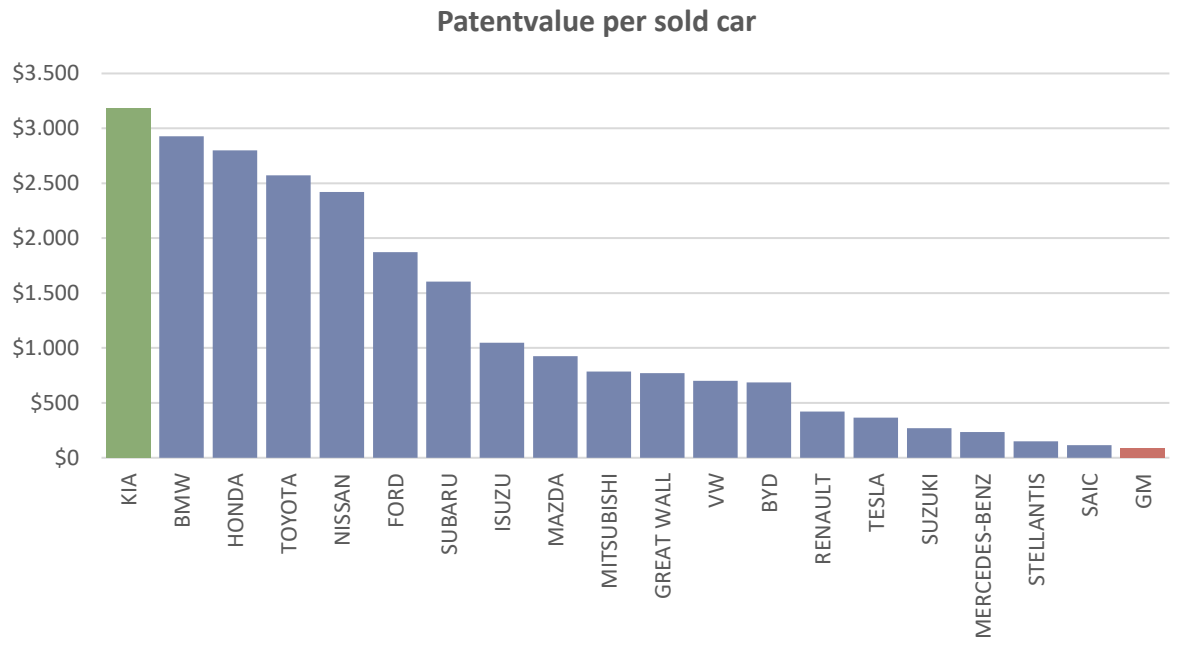


Graph4: Technical quality of patent portfolio in %

From a technical quality perspective, Tesla's patents not only stand out in value but also exhibit superior quality. This technical strength highlights Tesla's commitment to advancing cutting-edge technologies with robust intellectual property protection. Surprisingly, German automotive manufacturers—historically known for their engineering prowess and innovation—rank lower in patent quality. This could indicate a need for these traditional players to accelerate their innovation efforts and strengthen their patent portfolios, particularly in high-tech and environmentally focused areas.

The initial objective of this study was to identify which automotive manufacturer holds the highest share of patent value, an indicator that directly reflects the impact and potential influence of its innovations. The findings, displayed in the following graph, delivered a surprising result for the study's author, challenging preconceived notions about which brands are leading in impactful technological advancements.

This high patent value share is indicative of a company's focus on pioneering technologies that drive industry transformation, from electric mobility and autonomous driving to sustainability initiatives. The results reveal unexpected leaders and laggards, reshaping our understanding of which automotive brands are truly at the forefront of innovation in today's competitive landscape. The following graph illustrates these insights, shedding light on which manufacturers have successfully leveraged their patent portfolios to create substantial market influence and innovation impact.

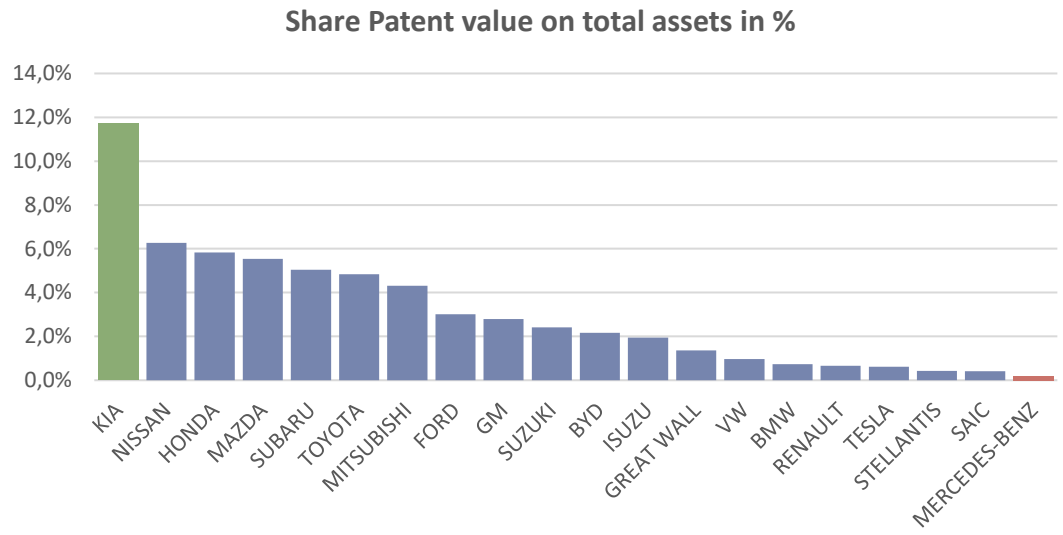


Graph5: Patentvalue per sold car

Kia emerges as the leading manufacturer in terms of patent value share, followed closely by BMW, Honda, and Toyota. This positioning highlights Kia's strategic emphasis on valuable, high-impact innovations, despite its traditionally lower market visibility compared to some of its competitors. BMW, Honda, and Toyota also rank highly, reinforcing their reputations as brands that prioritize technological advancement and intellectual property investment.

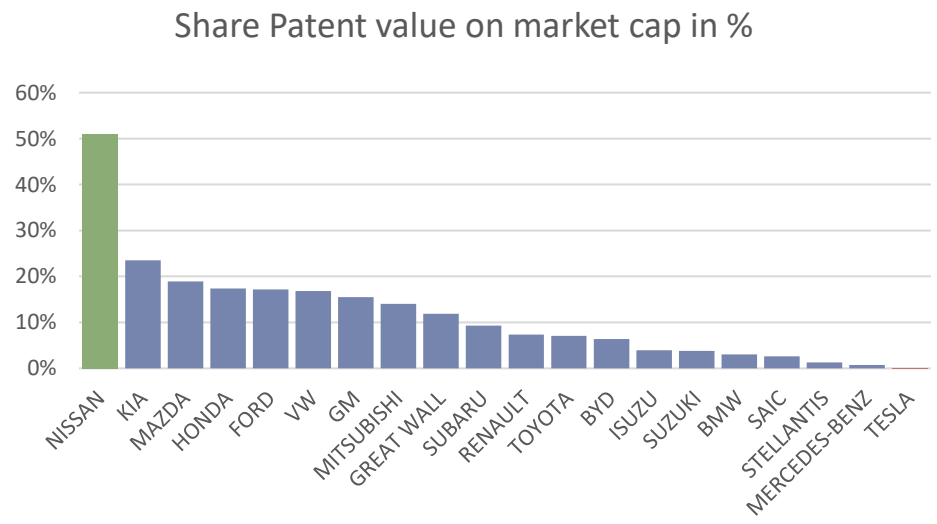
Interestingly, Tesla ranks at the lower end of the scale. This positioning can be attributed to its relatively high volume of sold vehicles compared to the total value of its patent portfolio. While Tesla is known for groundbreaking advancements in electric vehicles and sustainable technology, the sheer scale of its production affects the average patent value share. This unique situation reflects Tesla's dual focus on mass production and pioneering technology, where its high production volumes somewhat dilute the per-car patent value share.

These findings provide insight into the diverse strategies automotive manufacturers employ to balance innovation with production scale. The following chart illustrates this dynamic, offering a clearer view of each manufacturer's standing in the context of patent value and market influence.



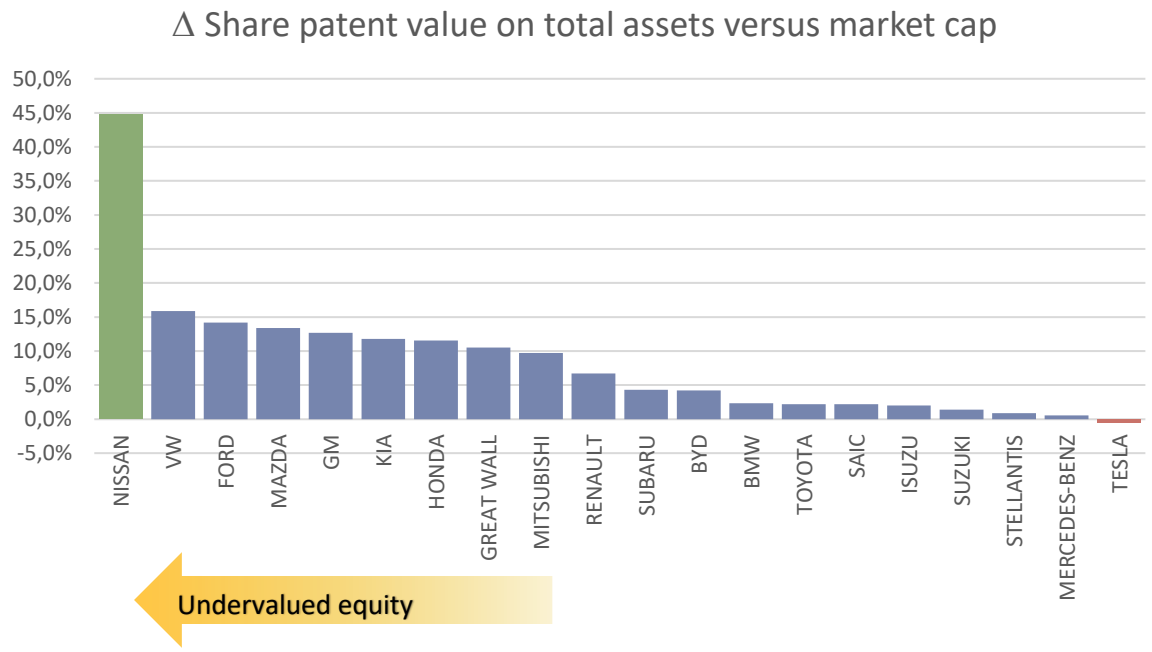
Graph6: Share Patent value on total assets in %

The ratio of patent value to total asset value provides insights into how integral patents are to a company's business model, signaling the strategic importance of intellectual property within its overall operations. In contrast, the ratio of patent value to market capitalization reveals the extent to which innovation value is reflected in the company's stock price. This measure can highlight how much of a company's innovation impact investors perceive as contributing to its market valuation.



Graph7: Share Patent value on market cap in %

Analyzing the gap between these two ratios—patent value relative to total assets and patent value relative to market cap—offers a unique perspective on which stocks may be undervalued from an innovation standpoint. Companies such as Nissan, Volkswagen, Ford, Mazda, and General Motors (GM) appear to be undervalued by the market relative to their potential innovation impact, suggesting that their intellectual property assets are not fully reflected in their stock prices.



Graph8: Difference share patent value on total assets versus market cap

Volkswagen stands out particularly in this analysis. With an above-average EBITDA of 15.39%, compared to the group average of 12.38%, Volkswagen demonstrates strong profitability and operational efficiency. This, coupled with its undervalued patent-to-market cap ratio, positions Volkswagen as an intriguing long-term investment opportunity. The company's robust EBITDA underscores its financial health, while the undervaluation in patent terms suggests untapped.

About the Author

Andreas Zagos 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 was guest professor at the Technical University of Cluj-Napoca in the field of innovation management and internationally recognized patent valuation expert for the World intellectual property organization (WIPO), University of Strasbourg, CFA institute or Amavi.

He is one of the board members of IP Business Information B.V. in Netherlands and advisor to IPR Strategies Ltd. in Ireland.

InTraCoM Group is a patent valuation boutique with a long list of patent valuation customers. InTraCoM Group is performing patent valuations for M&A, patent transactions, licensing value determination, internal balancing purposes, sale and lease back, transfer pricing and many more valuation scopes. Their customers are international big blue chip companies, governmental organisations, fund management, SMEs, Universities and big research organisations.

InTraCoM Group is supported by different international partners offering patent valuation - specific data and business information. Within these partnerships also software and patent valuation-specific data can be offered based the InTraCoM-patent valuation methodology. With all these approaches, patent values can be determined within unbeatable precision, time and cost.

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