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## **R&D AS ONE OF INVESTMENT IN INNOVATIVE BUSINESS**

Research and Development plays a critical role in the innovation process. It's essentially an investment in technology and future capabilities which is transformed into new products, processes, and services. In industry and technology sectors R&D is a crucial component of innovation and a key factor in developing new competitive advantages.

In a competitive environment, firms are forced to adopt strategies in order to confront competition, increase profitability and market share. R&D investment has an essential role in these strategies, although it has distinguished characteristics from other investments. Since more than half of the investments are associated with salaries of skilled – expert workers and scientists, the degree of uncertainty associated with its output may influence the investment rate over time (Hall, 2000). R&D investment generates profits with a time lag (Aboody and Lev, 2001; Jefferson, 2006), and hence should be sustained at a certain level (Hall 2002).

R&D and other investments in innovation are a key input for innovation, which may lead to greater sales in innovative products and services, and to revenues generated by the trading of intellectual assets (e.g. by providing others with licensing opportunities). They are particularly important for innovative companies, where knowledge is a key asset and an exclusive process that cannot be codified.

R&D investments can also contribute to improving firms' absorptive capacity i.e. the "ability to recognize the value of new information, assimilate it, and apply it to commercial ends" (Cohen and Levinthal, 1990). For instance, R&D investments can improve the ability of firms to learn about advances in leading edge technologies and to understand and assimilate the discoveries of others, thereby increasing the return on current R&D investment. Thus, new ventures can be disadvantaged when competing with established firms that have a longer history of R&D investment and a larger knowledge-based capital stock.

The effects of innovative investments on innovation outputs depend on multiple firm characteristics, such as size, domain expertise, scope and organizational structure (Ahuja et al., 2008; Cohen, 2010). However, the effects of firm size are unclear. Moreover, innovative SMEs and start-ups are key players and drivers of innovation,

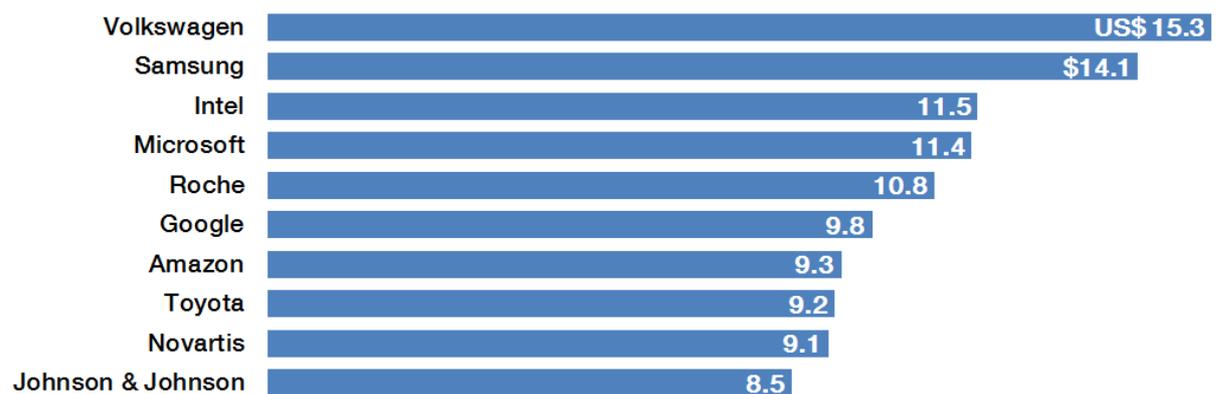
especially in certain high-tech sectors (e.g. semiconductors, biotechnology), emerging sectors (green industries) and creative industries (e.g. film production, publishing, etc.), largely based on their combination of intangibles, new technologies and design skills. Even in traditional sectors, SMEs in OECD countries represent between 33-50% of innovative firms (OECD, 2011c).

Billions of dollars and untold hours of research and development go into producing the next must-have products – be it the latest iPhone or a disease-fighting drug.

A report by professional services firm PriceWaterhouseCoopers charts the 20 publicly traded companies worldwide that spent the most on R&D in each of the years from 2005 to 2015. Perhaps unsurprisingly, motor manufacturers, tech firms and pharmaceutical companies continued to dominate PWC's Global Innovation 1,000 top R&D spenders list for 2015.

## Which companies are spending most on R&D?

Billion US Dollars, 2015



Source: PwC

Unlike most business terms, it's not too hard to work out what R&D is all about – it essentially refers to the investigative work a company conducts to improve what it does. This relates to either enhancing existing products and procedures, or it may lead to the development of new endeavours. Without significant R&D investment, many high-tech and scientifically-advanced products that benefit millions of consumers would not exist today, or continue to evolve.

The management of R&D projects follows basically the principles and methods of project management. There is, however, one significant caveat in relation to normal engineering projects: R&D projects are risky, and it is difficult to develop an accurate budget, in terms of technical milestones, costs, and time to completion of the various tasks. Therefore, R&D budgets should be considered initially as tentative, and should be gradually refined as more information becomes available as a result of preliminary work and the learning process.