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INNOVATION

Thriving Beyond Surviving

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Germany's Innovation Ecosystem and it's learning for India

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Introduction

BusinessDirectory simplistically defines innovation as - *The process of translating an idea or invention into a good or service that creates value or for which customers will pay.*

In a socioeconomic environment however, innovation requires a mindset, processes, and resources in order to successfully keep creating newer goods and services. Innovation can get into the fabric of a society, DNA of an economy, and define the destiny of a nation - provided an ecosystem is created which understands, appreciates and nurtures innovation. Germany has done exactly that. It does not happen overnight. It takes decades, or even centuries to create the mindset which values innovation, and build the institutions which carry an innovative society.

Global Competitiveness Report 2019 published by **World Economic Forum** (WEF) puts Germany in 1st place for Innovation Capability. And hence, it would be interesting to understand – how the capacity has been built, what ecosystem it has created – which keep it amongst the top industrialized nations despite high labour costs and negative demographic development, despite American might and Chinese aggression.

Industrial History

Germans have a history of being scientifically minded. The list of German inventions is very long. Gutenberg developed first printing press in Germany in 15th century. 19th century was again dominated by German scientists and inventors. German inventions range from aspirin to x-ray, drilling machine to electrical elevator, diesel engine to automobile, relativity theory to quantum mechanics. Rationality and scientific spirit are in German blood. Lifelong education and incremental improvements are ingrained in the society. As the famous American astro-physicist **Neil deGrasse Tyson** says – *"Once you have an innovation culture, even those who are not scientists or engineers - poets, actors, journalists - they, as communities, embrace the meaning of what it is to be scientifically literate. They embrace the concept of an innovation culture. They vote in ways that promote it. They don't fight science and they don't fight technology."*

How is German innovation culture different than the others?

Harvard Business Review (HBR) assigns it to three factors:

·German innovation results in **productivity gains that are widespread** than concentrated in high-tech sector. German innovation infuses **existing industries** with new ideas. And that is the reason even old industries survive and thrive in Germany

Table 1

Pillars of Innovation Capability	Germany	India
Overall rank	1	35
Interaction and Diversity (workforce diversity, cluster development, collaboration)	4	52
R&D (scientific publications, R&D spend, patent application)	2	26
Commercialization (buyer sophistication, trademark applications)	5	76
Entrepreneurial culture (risk-taking, innovative companies, disruptive ideas)	9	41
Administrative requirements (Cost & time to start a business, insolvency recovery)	3	89

in the face of the onslaught from Asian Tiger economies by end of 20th century, and China – now. German manufacturing's contribution to GDP is close to 1/4th. And that of other "highly-industrialized" nations like the USA, the UK, and France is barely 10-15%, and falling.

Germany has a network of research institutions that help companies improve their ideas. Due to close collaboration between industry and such institutes, Germany is able to **move ideas to marketplace rapidly**. Innovation does not end with invention, but is able to close the gap between research and daily grind of the small and medium-sized enterprises. Better, safer, more productive solutions for daily use.

·**Continuous education**. In other countries it often is a lip-service. But German workforce is continuously trained to deal with the changes taking place in their own trade – new standards, new tools, new processes. Skills development and relearning, if required, is lifelong endeavor there. This empowers workers and improve their productivity.

HBR underlines that **purpose of innovation** should not be to produce widely popular internet services or to eliminate the need of *human* resources, but to sustain productivity and employment growth.

Back to the **Global Competitiveness Report of WEF**

The report comments that "*Germany is matchless in the process of developing ideas into products*." It says - those countries which can go from idea generation to the successful commercialization of a product the most quickly, within a fertile **'innovation ecosystem'** of various factors, will have the greatest productivity.

A comparison between the ranking of five pillars of Innovation Capability between Germany and India can highlight the areas where we need to focus, and the "long way to go" for us. ***(Table 1)***

Presently, Germany is focusing on the soft factor of **work-force diversity** for getting better at innovation. There are no or minimal tuition fees at German universities. This increased the influx of foreign students – also including from India. 12% of all university students in Germany are foreign students. They are bound to add to the work-force diversity sooner than later.

Innovation starts at the top

Germany has a Minister for Research.

Anja Karliczek is a cabinet-level minister for education and research in the team of Chancellor Angela Merkel. Germany has an innovation strategy, and priorities are decided. German government is clearly and explicitly prioritizing innovation. It spends, or rather invests, big money systematically based on its "**High-Tech Strategy 2025**". While launching the strategy, Anja Karliczek remarked that - it is for **providing orientation** to the people, **pointing out new perspectives** and raising **confidence** and **curiosity** in the future, and to bring substantial improvement in **the living quality of all citizens**. What really matters to Germans is not the technology itself, but how it is embedded in the society. Innovation strategy is driven by the well-being of "all citizens".

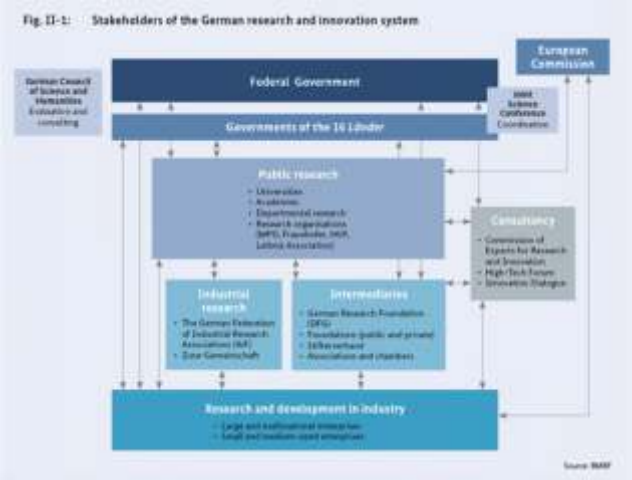
In 2017 alone, Germany spent 2.99% of its GDP (equivalent 100 billion EUR) on R&D. It targets to spend 3.5% by 2025. (India's R&D spend is 0.9%)

Germany has more than 1000 public and privately funded institutes of science, and almost 600 research and innovation networks and clusters.

German research funding focuses on **future** and **inclusiveness**. It has various programmes especially **focused on SMEs** and on **structurally weak regions**. These programmes also focus on **inspiring young** people to choose a career in technology and natural sciences, and securing an

adequate supply of skilled workers for the future.

Funding is also focused on technology areas such as **energy**, **information and communications technology**, the **maritime** economy, **mobility** and **aerospace**. Not surprising that a number of MoUs signed between Indian and German government during Chancellor Merkel's October 2019 India visit were on the above topics.



Culture of innovation

80 German scientists have won Nobel prize so far – which is a clear indication of how the research culture has deep-rooted in the society.

German Centres for Research and Innovation

Land der Ideen

DWIH (German Centre for Research and Innovation) proudly presents following statistics :

Germany's **most innovative company: Bosch.**

In 2018 alone the Stuttgart-based company registered 4230 patents. Bosch has 69500 employees working in its R&D.

Germany's **most innovative universities: TU9**

The alliance of the nine leading universities of technology is educating innovative minds of the future. In Aachen, Berlin, Braunschweig, Darmstadt, Dresden, Hanover, Karlsruhe, Munich and Stuttgart almost 300,000 students are currently studying the foundations of the engineering sciences.

The **most innovative research centre: DFKI**

The German Research Center for Artificial Intelligence (DFKI) was founded 30 years ago in Kaiserslautern. This far-sighted decision has paid off. Today, at the height of interest in artificial intelligence, the DFKI is an international beacon.

The **most innovative research institute: Fraunhofer Society**

More than 26,600 employees at 72 locations of the Fraunhofer Society are working to transform research results into marketable products and services. The successful inventions range from the airbag to mp3 technology, from white LED to natural rubber from dandelions.

Patent Registration

Germany has a tradition of patents registration. In 2017, a total of 128921 patents were registered with the German Patent and Trade Mark Office (DPMA). As the DPMA explains: "*Protecting innovative companies makes the individual firms – and Germany as a location for industry – more competitive. Consumers also profit from innovative products.*"

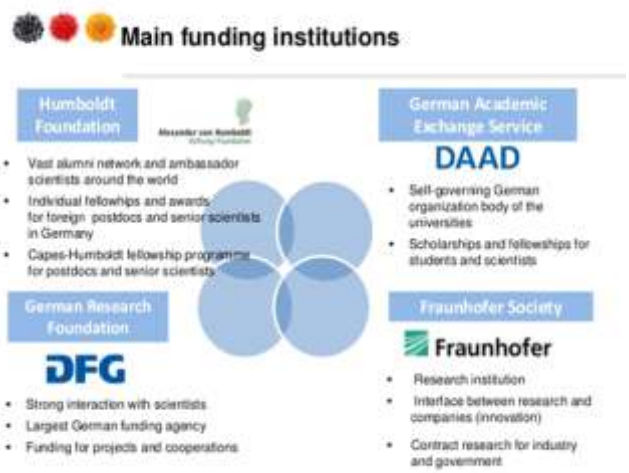
The publicly-accessible DPMA databases are a **gigantic repository of information** about technical developments, allowing one to research data – in German and English – relating to all German innovations as well as 80 million patent publications from all over the world.

Institutes of Research and Innovation

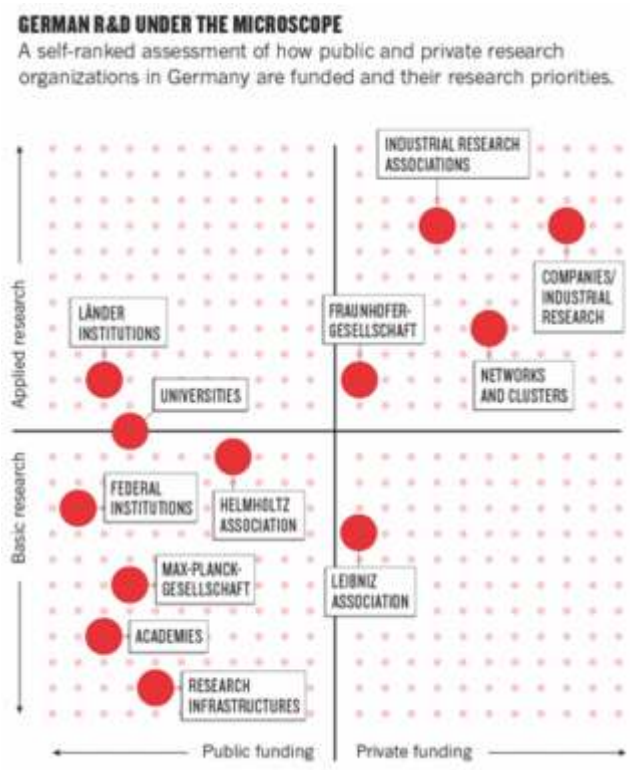
Research in Germany is characterized by an excellent infrastructure, well-equipped labs, and highly qualified research scientists. Germany has a variety of research institutes – universities, non-university institutes, companies, and state/federal-run institutes.

Top-level research is conducted at the institutes run by the **Max Planck** Society, **Fraunhofer** Society, **Helmholtz** Association, and **Leibniz** Association.

Industry-based and -financed investments account for more than two thirds of all R&D funding in Germany.



Apart from this, there are a number of associations/institutes focused on promoting innovation in a particular industry of for a particular sector – like the SMEs.



The art of collaboration

Author **Steven Johnson** says – "*If you look at history, innovation doesn't come just from giving people incentives; it comes from creating environment where their ideas can connect.*"

Industry, universities and research organiosations collaborate in many areas. Germany has developed an excellent system and process for **sharing of costs** and reaping the benefits. Protection of **Intellectual Property** (IP) is sacrosanct. Hence exchanging of knowledge and information happens seamlessly. There are numerous joint programmes and research projects involving companies as well as research organisations.

According to DWIH following forms of cooperation are quite common:

- Contract research for industry carried out by universities and non-university research institutions
- Joint staffing and funding of research projects
- Industry-funded research groups
- Donations and sponsorship for specific R&D institutes
- Establishment of endowed professorships by companies
- Jointly funded research structures or institutes
- New collaborative models in networks, clusters or public-private partnerships/research campuses

Many companies and research institutions work together in regionally or **industry-specific clusters** and networks in order to create the best possible value chains and improve their competitiveness and innovation capabilities.

Small and Medium-sized Enterprises and Innovation

German SMEs – popularly known as the **Mittelstand** – are the backbone of German society. These SMEs provide jobs to 60% Germans and train 81% of its young apprentices. Some of them are global champions in their focused niches. It is not easy for the SMEs to finance fundamental or large research projects. A special organization is set-up that ensures that cutting-edge research can also be realised in small businesses. German Federation of Industrial Research Associations (**AiF**) promotes R&D in all industrial sectors on behalf of SMEs. The AiF is particularly involved in increasing the competitive strength of SMEs by way of promoting R&D for SMEs in several ways:

- Organisation of joint industrial research for the benefit of entire sectors
- Administration of programmes for governmental R&D support measures
- Promotion of R&D through open innovation processes
- Networking within and between industrial sectors and policymakers

India

India is spending just 0.9% of the GDP on R&D. And whatever efforts are made are still uncoordinated. We also invest little on registering patents and protecting our IP. Scientific temperament, by and large, is missing in India. Innovative products and services are difficult to come under such circumstances. And yet, indigenous applications often come due to our entrepreneurial spirit and hidden rural talent.

Information technology (IT) focused Indians may make the mistake that innovation is applicable only to manufacturing. Well, **Bill Gates** famously said "***Software innovation***, *like almost every other kind of innovation, requires the ability to collaborate and share ideas with other people, and to sit down and talk with customers and get their feedback and understand their needs.*"

We have excellent institutes of research and dedicated scientists. However, in order to improve our rank of innovativeness, we need to enhance scientific temperament, improve the status of education and research within the society, fund research and innovation, bring industry and academia together, especially support our SMEs, improve IP protection, make science (not only IT) interesting and inspiring for the youth, and develop an all-encompassing strategy for research and innovation. To start with, we must move away from our jugaad-culture and start doing some real innovation.

(Sources: Deutschland.de, Harvard Business Review, DWIH, research-in-germany.org, nature.com, BMBF, BMWi)

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