



Research Office  
Legislative Council Secretariat

## Fact Sheet

# Development of innovation and technology in Germany

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## 1. Introduction

1.1 Germany is one of the most innovative countries in Europe. In 2014, the country was ranked the third after Sweden and Denmark in terms of the Innovation Union Scoreboard developed by the European Commission.<sup>1</sup> The high ranking was attributable to, among other things, its hefty gross expenditure on research and development ("R&D") that increased markedly from €54.5 billion (HK\$491 billion) in 2003 to €79.4 billion (HK\$716 billion) in 2012.

1.2 The German economy is strong in its technology sectors, as evidenced in its export success in automobiles, machinery and chemicals. Since 2006, the German government has put in place a national strategy – High-Tech Strategy – to foster the advancement of new technologies and develop a coherent innovation policy across the country. The purpose of this fact sheet is to provide information on Germany's public and private investment in R&D activities, technology strengths, and the national policy on research and innovation.

## 2. Public and private investment in research and development

2.1 In order to uphold its international competitiveness, Germany has invested heavily in its innovation and technology industry over the past years. In 2012, the country's gross expenditure on R&D accounted for 2.98% of Gross Domestic Product ("GDP"), the fourth highest in Europe after Finland (3.55%), Sweden (3.41%) and Denmark (2.99%).

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<sup>1</sup> The European Commission is the executive body of the European Union. It had developed the Innovation Union Scoreboard as an annual comparative assessment of the research and innovation performance of the member countries of the European Union.

2.2 Public expenditure accounts for about one third of the overall R&D expenditure in Germany. At the national level, it is incurred primarily by the Federal Ministry of Education and Research and the Federal Ministry for Economic Affairs and Energy on promoting and funding research and innovation activities. The private sector accounts for the two-thirds of the R&D expenditure with the presence of about 32 000 companies engaging in various kinds of R&D activities.

### **3. Technology strengths**

3.1 Germany's technology strengths lie in the automotive sector, mechanical and electrical engineering industry, as well as the chemical industry. It is a world leader in the exports of these high-tech goods. In 2012, the value of high-tech exports amounted to €143 billion (HK\$1.29 trillion).

3.2 In recent years, the advent of green technologies in Germany has fostered the development of local green-tech industry, which is made up of various market segments ranging from renewable energy and resources, energy-efficient production and process, to waste and water management. In 2013, the green-tech industry contributed to about 13% of GDP and its market was estimated at €344 billion (HK\$3.1 trillion).

### **4. National policy on research and innovation**

4.1 With the inspiration to become an innovation leader in Europe and the world, the German government launched for the first time a national innovation strategy – the High-Tech Strategy – in 2006 to strengthen economic growth and prosperity. The Strategy was developed by the Federal Ministry of Education and Research, in cooperation with the Federal Ministry for Economic Affairs and Energy and other Federal ministries. The Strategy was subsequently updated in 2010 and in 2014 respectively.

4.2 The High-Tech Strategy adopted in 2014 focuses on six priority tasks of the future that are particularly relevant in terms of economic growth and prosperity in Germany, i.e. (a) the digital economy and society,

(b) the sustainable economy and energy, (c) the innovation workplace, (d) healthy living, (e) intelligent mobility, and (f) civil security. The Strategy also focuses on the transfer of scientific findings to accelerate marketable products, processes and services and to improve the environment for innovations.

4.3 In addition, the new High-Tech Strategy has expanded the concept of innovation to include not only technological innovation but also social innovation. The latter is achieved by strengthening the involvement of the society through greater public participation and better transparency in research funding.

4.4 Based on the High-Tech Strategy, the German government has put in place various support initiatives to promote innovation of businesses, start-up investment and public-private collaboration. Funding of research and innovation activities is mainly provided through (a) the Federal Ministry of Education and Research and (b) the Federal Ministry for Economic Affairs and Energy.

### *Support to businesses*

4.5 The German government provides subsidies to R&D projects carried out by businesses that focus on innovative products, processes and services. The beneficiaries are mainly small- to medium-sized enterprises ("SMEs"), which constitute 99.6% of companies in Germany.<sup>2</sup> One of the leading programmes is the "Central Innovation Programme for SMEs", which funds individual or cooperative projects undertaken by SMEs and is open to all technology sectors.

4.6 The German government has also set up a high-tech start-up fund, namely High-Tech Gründerfonds, with a capital injection of €563 million (HK\$5.07 billion). The fund supports newly high-tech start-ups by means of equity investment and loans. Over 250 companies in Germany have been supported by the fund.

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<sup>2</sup> See Germany Trade & Invest (2014).

### *Encouragement of private investment in high-tech start-ups*

4.7 The venture capital market in Germany is regarded as less developed as compared with its competing counterparts such as France and the United Kingdom. To encourage investment in start-ups, the German government has introduced a programme, "INVEST-Subsidy for Venture Capital", under which the government offers refunds to business angels who invest in start-ups and young companies. The refund amounts to 20% of the invested amount, subject to a ceiling. To make Germany more attractive as a centre for venture capital investments, the German government also offers tax exemptions on the refunds.

### *Facilitation of collaboration and technology transfer*

4.8 In Germany, there are numerous cooperative clusters formed by companies, research institutes and universities. They work together to invent new products, services and processes and facilitate efficient transfer of R&D results for commercial application. The German government provides various measures to help these clusters. For instance, it has introduced the "go cluster" programme, which offer clusters support services, access to project funding, and networking opportunities with international innovation clusters.

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