

## Executive summary

The purpose of this study is to assess the French research and innovation system (SFRI). The missions of the SFRI are to mobilise research and innovation in order to support economic growth and help meet the key environmental and social challenges. To do so, it must produce excellence and relevance. The SFRI is the result of a trajectory marked by proven successes since the post-war period, such as the construction of a sophisticated scientific system and a number of technological achievements resulting from major programmes (aeronautics, TGV high-speed train, nuclear energy). That said, conditions have changed, and the SFRI needs to adapt. It started morphing more than a decade ago and must continue on this path. The current climate for research and innovation calls for openness, flexibility and adaptability – all qualities that are not sufficiently developed within the SFRI.

The French economy has experienced a lack of growth for a number of years, linked to weaker price and non-price competitiveness. The framework conditions for economic activity in France are not particularly favourable to innovation: the labour market and the product markets lack openness and flexibility, the taxation of businesses and investments is high and complex. These conditions detract from corporate ability to finance investments and mobilise the human resources (HR) required for innovation. French industry spends less on research and development (R&D) than its main competitors, especially Germany. The direct cause of this is France's sectoral structure, particularly the small size of its manufacturing industry, which has declined steeply over the past 20 years. France is fairly competitive, however, in less R&D-intensive sectors (construction, luxury goods, agri-foods, etc.).

France's HR are characterised by their duality: on the one hand, a minority of very well trained specialist and generalist personnel, able to develop and implement innovations; on the other, a large population segment with little or poor training, distanced from innovation. This stems from the inadequacy of general university training. Improving the quality and relevance of academic studies entails providing appropriate incentives for universities and professors-researchers, as well as rethinking the missions of the various stakeholders and pathways that make up French higher education. The teaching mission must be strengthened, especially in universities that are under-equipped for conducting research. Higher education must also endeavour to develop more specifically attitudes and skills that will promote innovation.

France's international scientific performance (measured by publications, citations or the European Research Council) is quite average: it is better than the performance of countries in southern Europe, but below that of northern Europe, the United Kingdom and Germany. French public sector research centres on public research organisations (PROs), which traditionally undertake the combined roles of strategic management, funding, performance and assessment of research. This model complicates meeting objectives and carrying out the missions entrusted to public research in a new context entailing the excellence and relevance of research to public objectives. The reforms initiated since the

end of the 1970s aimed to assign separate functions to different stakeholders: strategic management to the State (national strategies, “Investments for the Future Programme” [PIA]); (project) funding to the French National Research Agency (ANR); assessment to an (independent) specialist agency; and performance of research to universities. To this end, universities have been given greater autonomy and have been encouraged to group together into consortia, the idea being to foster the emergence of a few major, globally competitive research universities. PIA funding, allocated on the basis of excellence and relevance to public objectives, should help accelerate this step change. The French public research system is currently a hybrid of the traditional model based on the PROs (which themselves have evolved) and institutions newly created over the past ten years. This mixed situation is a source of pointless complexity and excessive operating costs, all of which calls for persevering with the reforms.

Knowledge transfers between public research and businesses have been a key theme of French policy for the past 15 years or so. Many measures have been introduced as a result: research partnerships, co-operative research, the commercialisation of intellectual property, business creation, employee mobility. A transfer culture has developed, driven by the growing number of stakeholders and specialist institutions. However, the results are fairly modest, and the rare available indicators do not show major progress over the period. The main barriers to developing transfers are integral to public research itself, which does not offer researchers the necessary incentives to engage in such transfers and choose research fields likely to have social or economic impacts. The policies implemented have lacked overall consistency, adding cumulative measures without always clarifying their respective fields of application. Lastly, the transfer process has often followed an administrative approach (filing patents, entrepreneurship) rather than an economic approach (exploiting patents, expanding businesses).

The State has many measures at its disposal to support corporate research and innovation. The French research tax credit is practically the most generous in the world – yet its positive impact on corporate R&D probably does not match its cost to the State. The multiplicity of programmes and public bodies results in strong public intervention in industrial innovation, with notable success in a number of areas (e.g. the competitiveness clusters). Small businesses on the one hand, and large companies on the other, benefit from these programmes, whereas intermediate-sized enterprises are less well supported. Competitive support methods (based on open calls for tender) are a growing practice. In all, public intervention is very granular, sometimes inconsistent and lacking strategic direction.

Innovative entrepreneurship in France has developed to a level comparable to that of other countries. Businesses have a high survival rate, but few of them grow. Capital funding is abundant in the upstream (growth) phases, but scarcer in the downstream (seed) phases. The plentiful upstream funding stems from public capital and seems linked to the eviction of private capital, which is then invested abroad. Expanding and boosting innovative entrepreneurship has gradually become a central objective of French innovation policy. Public intervention is considerable at every level of the chain (business creation, taxation, funding, etc.) and seems to be making a real impact (e.g. through OSEO grants). This intervention is stronger than in other countries, although France’s performance does not appear to reflect the difference, raising the issue of its effectiveness. In particular, the question of the low selectivity – and the duration – of a number of public grants bears asking. A company may carry the “young innovative enterprise” label for seven years, even though its project is not progressing. The excessive survival rate of under-

performing businesses detracts from the growth of others, by competing with them for access to funding, skilled labour and contracts.

Governance designates the overall mechanisms ensuring the management and consistency of a country's research and innovation. It implies co-ordination among stakeholders with responsibilities at different levels of the system. Co-ordination among ministries, especially the ministry in charge of research and the ministry in charge of the economy, is necessary to the smooth functioning of the system, including the formulation of research and innovation strategies. Significant progress has been made with vertical co-ordination (management of research bodies by the ministries) and potentially powerful instruments have been established (PIA, ANR). The assessment function, long a weak point of the SFRI, has improved and new mechanisms have been introduced to enable independent assessment of stakeholders and policies; full use should be made of these mechanisms.





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