

## China's 13th Five Year Plan on Science and Innovation

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### Summary

**China's 13<sup>th</sup> Five Year Plan sets out policies and targets for its social and economic development for 2016-2020. The Plan recognises the country's economy has entered a new normal that will be slower but aim to be greener, more innovative, balanced, inclusive and open. 'China's future development must be based on innovation.' The Plan has made unprecedented emphasis on innovation with revolutionary attempts such as 'mass innovation and entrepreneurship'.**

### Overall Targets

1. GDP and per capita income in 2020 to double those of 2010 based on balanced, inclusive and sustainable development mainly through upgrading agricultural modernization, integrating of industry and information technology, advanced manufacturing, strategic emerging industries and higher share of service industry.
2. China to become a country strong in innovation and talents with important breakthroughs made in key technologies and indigenous innovation capacity improved at a large scale.
3. Consumption to make a larger contribution to economic growth; performance in investment and business to be improved; urbanization rate to increase with improved quality; regional development to be more balanced and optimised; further opening up.
4. The quality of the people's life enhanced with better employment, education, cultural and sports facilities, healthcare, housing and social insurance systems.
5. Ecological environment improved with green, low carbon production and life style, cutting pollution and carbon emissions as well as use of energy, water, land and mineral resources.

### Innovation Driven Development

The first objective (Part Two) of the Plan sets out innovation driven development strategy which treats science innovation as the key to future development. Inclusive and disruptive innovation is much encouraged.

1. Exerting the leading role of science and technology innovation to provide lasting impetus for development: strengthening basic research, original innovation, and re-innovation of

existing and imported technologies; prioritizing the capacity building for indigenous innovation.

*a.) Prioritizing breakthroughs for technology innovation with strategic importance*

Priority will be given to basic research and key generic technologies with strategic importance to overall development, underlining original and disruptive innovations. Carry out major national science programmes and set up a number of national laboratories. Accelerate breakthroughs for core technologies such as next generation IT and communications, new energy, new material, aerospace, biological medicine and intelligent manufacturing. Provide systematic technology solutions to alleviate bottle necks in the areas such as modern agriculture, urbanisation, environment protection, health care and public services. Take initiative in big science programme and big science engineering. Set up a number of international innovation cooperation platforms.

*b.) Optimise innovation eco-systems*

Build an innovation network that synergises government, industry and academia. Industry should play a leading role and be encouraged to conduct basic research and cutting edge innovation. The programme of Top 100 Innovative Enterprises will be implemented to foster innovation leaders with international competitiveness while supporting the healthy development of small and medium sized technology companies. Universities, vocational schools and scientific research institutions should be an active part of the country's innovation network. Set up industry innovation alliances, develop market oriented R&D institutes and promote coordination for cross-sector interdisciplinary innovations.

*c.) Improve infrastructure for innovation*

Accelerate the infrastructure building for the research on energy, life science, Earth system, environment, materials, particle physics, nuclear physics, aerospace, engineering and interdisciplinary research. This includes national laboratories, centres of excellence and technology innovation centres which will be opened up to researchers and businesses. Encourage enterprises to set up technology centres.

*d.) Build regional innovation strengths*

Set up cross-regional innovation network. Innovative cities, provinces and regional innovation centres will be based in the places where gather universities, research institutes, national indigenous innovation demo zones and high tech industry development zones. Build research and innovation hubs of global impacts in Beijing and Shanghai.

2. Make mass innovation and entrepreneurship (MIE) the new economic engine. The top leadership wants to see maximum impacts of the research work on the economy and have been trying to inspire the whole population to participate in innovation and business.

*a.) Build public service platforms for innovation and entrepreneurship*

Roll out MIE demo projects and cities. Make patent information and research centres accessible for enterprises. Large enterprises are encouraged to set up technology transfer and service platforms and provide technology support to start-ups. Build low cost, convenient and open service platforms with optimum integration with finance as well as online and offline resources.

*b.) Fully roll out group help, crowd funding and democratisation of innovation and outsourcing*

Expand partnering channels for market resources, demands and IE through internet. Facilitate internet platforms and inclusive innovation within enterprises so that the innovation resources can be shared at maximum. Popularise outsourcing of R&D ideas, manufacturing maintenance, knowledge and life services; encourage everyone to take up production and logistic work through internet. Group help to be participated by more people, better shared and supported by mutual aid. Regulate and develop right-based and equity-based crowd funding as well as online loans.

3. Make institutional change to incentivise innovation.

*a.) Deepen S&T management reform*

- Shift government functions from research and development management to provide services to enable innovation.
- Reform the research funding management system.
- Set up a unified national research management platform to improve reporting of research work, surveying of innovation projects, opening and sharing of resources.
- Improve the national decision making and consulting system for research, in which the entrepreneurs will be given more voice.
- The industry should take the lead for the market-oriented research projects. Universities and research institutes will have more decision making power. Their performance will be appraised in medium and long terms with more importance attached to the quality of research, value of original innovation and actual contributions.
- Leading innovators will be provided with more power to allocate human and finance resources and decide technology pathway.
- Support self-motivated exploration and individual innovative ideas.
- Stronger intellectual property protection.

*b.) Improve the system for commercialisation and revenue allocation of research findings*

Implement the Action Plan for Commercialisation of Research Findings. Decentralise the power for the use and revenue allocation of research findings. Increase the share of the revenue for the researchers. Allocation will be based on the increased value of the knowledge. Support researchers to leave the job to commercialise their findings or do so concurrently.

Stronger technology and knowledge equity exchange platforms and finance schemes supporting full innovation cycle from the laboratories, production trials to facilitate capitalizing and commercializing technologies.

*c.) Build the policy framework for inclusive innovation*

Foster an enabling market environment to incentivise innovation, clearing out policy, regulatory and unnecessary standard barriers. Enforce the industrial strategy for technology and supervision of standard compliances. Increase the fiscal S&T funding with a priority on basic, cutting edge, and generic research or that of public interest. Encourage the enterprises to increase investment in R&D. Scale up venture capital investment.

#### 4. Talent development strategy.

##### a.) *Build large scale talent pool and implement the Mega Talent Programme*

- Innovative talent scheme: set up scientist studios for leading research subjects; develop young and middle aged innovation leaders; build innovation teams for important research subjects; roll out innovative talent training demonstrations.
- Young talent development scheme: support outstanding young talent on key research subjects; set up national young talent training demonstration projects in the top tier universities and research institutes; send outstanding high school and university graduates to study in the best international universities.
- Advanced training programme for business managers: train 10000 entrepreneurs with global vision and strategic thinking. They should be good business managers who are good at strategic planning, capital operation, quality management, human resources management and expertise specialised in areas such as accounting and legal affairs.
- Upgraded Thousand Talent Programme: Employ 10000 scientists and leading researchers from overseas who can conduct original innovation, make breakthroughs in key technologies, develop high tech industry and lead on the research on emerging subjects. Support another 10000 senior researchers on urgent demand.
- Knowledge advancement programme for skilled technologists: Set up the national further education centres in universities, research institutes and large enterprises. Train 1 million highly skilled, urgently needed technologists every year.
- National Highly Skilled Talents Rejuvenation Programme: set up skill master studios and 1200 highly skilled talents training centres to train 10 million talents.

##### b.) *Enabling career development and mobility*

Enable talents to move easily between organisations and regions. Improve the performance appraisal and service systems with better payment, health care, professional certification and pension package. Ensure the talents can obtain revenue allocation based on their knowledge, skills and management capacity and be rewarded with market value. Provide easier permanent residence for international talents and smoother employment for returned Chinese scholars.

5. Extending new room for a stronger economic driver: This aims to enhance the quality and efficiency of the supply while opening up effective demands and establish a good interaction between consumption and investment.

##### a.) *Upgrade consumption structure*

Priority will be given to service consumption to leverage upgrading of the whole consumption structure. Support green consumption and new trends including fashion, quality and information.

##### b.) *Enlarge effective investment*

This will be based on effective demands. Boost investment returns by optimising supply structure. Private investment will be encouraged to play a leading role in investment. A major investment scheme with strategic impacts to overall development will be launched.

##### c.) *Foster new advantages for exports*

This will be centred on technology, standards, quality and service. Promote the exports of high end equipment. Increase the technology and added value for the export products.

### **Innovation-driven priorities:**

Technology innovation is featured as a key enabler for most of the priorities spelt out in the Plan which has altogether 20 parts (80 chapters). This is a very brief sum-up.

*a.) Part Three: Set up new development policy and management systems*

Internet Plus is key to ensure the transparency, fairness and efficiency of the public services or those provided by government. Internet, cloud computing and big data will enable best supervision, policy research as well as macro-economic controls.

*b.) Part Four: Agricultural modernisation*

Agritech is key to increase agricultural productivity with minimum input which ensures the sustainability of the sector. Priority will be given to research and technologies such as breeding, agricultural machinery, internet plus and food safety. Agriculture will integrate with modern industries and services such as infrastructure for irrigation, energy, transport, waste management and drinking water as well as tourism, finance, logistics and indoor decoration.

*c.) Part Five: Optimizing the modern industrial system*

This will be centred on implementing Made in China 2025 Strategy and supporting strategic emerging industries with an emphasis on professional services. A national fund for strategic industry development will be set up. Manufacturing innovation centres and new industry demonstration centres will be built. Priority will be given to high end and intelligent equipment manufacturing including aerospace and aviation, deep sea exploration and high end shipping, high speed rail, high performance digital control machine tool, robotics, modern agricultural machinery, medical equipment and devices, and chemical equipment such as coal to gas and water pollution treatment. Manufacturing will be supported by advanced internet infrastructure and value added service chain, aiming to be green, precise and of certified quality.

*d.) Part Six: Boost the internet economy*

A national strategy on internet development will be implemented. Optical fibre broadband of over 1000MB /second will cover all urban areas and 98% of administrative villages. Wireless 4G network will roll out nationwide, piloting free access at popular public places. Private investment will be allowed in telecom infrastructure and competitive business. Telecom services will be provided with higher speed but lower charge. 'Internet+' Action Plan aims to revolutionize many industries and bring in innovation in business /service /management models. Big data will be developed as fundamental strategic resources to be applied in many sectors. Breakthroughs will be made for information security technologies and equipment.

*e.) Part Seven: Modernise infrastructure network*

Transport, delivery, energy and water infrastructure will be intelligent, low carbon, safe and well connected. High speed rail will cover over 80% of the big cities (population over 500,000) reaching 30,000km. 30,000km of national highway will be built or rebuilt. Over 50 new civil airports will be under construction shaping up international airport cluster that covers major economic regions including Beijing-Tianjin-Hebei, Yangtze and Pearl River Deltas and important cities such as Chengdu, Chongqing, Kunming, Xi'An, Harbin, Wulumuqi and Shenzhen.

An 'Energy Revolution' will roll out to optimise the energy mix with priority in energy storage, clean coal, renewable, nuclear and nonconventional oil and gas.

Science will play a key role in the development of water infrastructure for water transfer, resources management, flood /drought control and pollution treatment. 434 large irrigation areas will be equipped with water saving facilities covering over 1 billion mu (about 67 million hectares) of farm land. 3000 km<sup>2</sup> of 244 rivers will be reinforced and cleaned up.

*f.) Part Eight: New urbanisation*

New urbanisation will focus more on the people and eco capacity. Urban planning will be more scientific. More advanced building technologies will be applied. Intelligent cities will be based on modern IT, big data and Internet of Things. Cities will provide better opportunities to start new business and effective innovation. Hukou system will be reformed and public services for education, employment, healthcare will improved both in urban and rural areas. Advanced infrastructure for transport, energy and water will be better integrated between urban and rural as well.

*g.) Part Nine: Balanced regional development*

One Belt One Road, Beijing-Tianjin-Hebei, Yangtze and Pearl River Deltas will be the backbone of the regional development. Innovation will play a vital role in implementing key national strategies including Northeast Revival, Central for industrial relocation and East for global advanced manufacturing base.

*h.) Part Ten: Improve the ecological system*

Conservation, recycling and intensification of energy, water, land and mineral resources will be scaled up. Research and monitoring of environment and resources will be strengthened. Ecological capacity warning and supervision systems will be set up. Action plan for pollution control and remediation of air, water and land will be implemented. Big data will enable unified real time online environment monitoring system nationwide. Incentives will be given to R&D, demonstration and commercialisation of environmentally friendly products, equipment and engineering technologies with the aim to develop a robust industry for environment protection.

Mitigation and adaptation of climate change will be given equal importance. A Near Zero Emission Demonstration Programme and an Action Plan for Climate Change Adaptation will be implemented. Low carbon technologies and products will be promoted with greater reinforcement. Research and observation of climate systems will be stepped up.

*i.) Part Fourteen: Improved Education and Healthcare for All People*

Vocational education will be more integrated with industry with a stronger focus on enabling doers and talents with skills. Interaction between schools and businesses will be encouraged. New knowledge and new technologies will be included in curriculums. Education will have more emphasis on real practice. Students will be provided with better training for innovative ideas and entrepreneurship. Capacity building for universities will be promoted, with a focus on innovation. IT will better support teaching. Online teaching and distance learning will be rolled out.

Better quality and safety of health care rely much on research and education. New medicine will be considered for inclusion in the priority list for medical insurance.

Database for Chinese medical literature will be set up. Chinese medicine will be encouraged to offer services overseas. A comprehensive strategy for chronic disease control will be implemented. Priority will be also given to capacity building for infectious disease control and prevention of birth defects. Health monitoring system for youth will be improved.

*j.) Part Nineteen: Integrated economic and national defence development*

R&D, equipment and logistics for national defence will be strengthened with a focus on combined operational capacity supported by information technologies. National defence should factor in civilian needs especially for technology, education, infrastructure and social services; Economic development should provide appropriate support for national defence especially in terms of R&D, talents, finance and information. Research findings for national defence will be transformed into use more rapidly including civilian use for which a facilitation scheme for commercialisation and marketing will be set up.

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