CHINA SCIENCE AND TECHNOLOGY INDICATORS

中国科学技术指标

1992

国家科学技术委员会

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CHINA

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内 容 简 介

本书是由国家科学技术委员会发布的"中国科学技术指标"系列报告的首卷（科学技术黄皮书第 1 号）。主要以我国 1988-1991 年的科技、经济和社会统计数据为基础，对我国科技发展的环境与基础、科技资源、科技活动、科技产出及影响，以及公众的科学素养与公众对科技的态度等进行了系统分析和综合论述。书中提供的大量反映科技活动的统计数据和图表对定性和定量分析我国的科学技术事业的发展具有重要的参考价值。

本书可供各级党政部门、科技管理部门、高等学校和科学研究机构、以及科技工作者和高等院校相关专业师生阅读参考。

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前　言

《中国科学技术指标》(1992) 是我国第一部以科技指标的形式描述和分析我国科学技术的活动、发展及作用的公开出版物，是中国科技指标系列报告的首卷，即科学技术黄皮书第 1 号。

随着社会的进步，科学技术在经济、社会发展中的作用越来越重要，如何评价科技活动就显得十分迫切。科技指标就是描述、分析和评价科技活动的一种手段。《中国科学技术指标》(1992) 不仅为读者了解中国科技活动的现状及变化、研究中国科技发展的态势、分析和评价我国科技政策，提供全面系统的资料，而且在国内外大量数据对比的基础上，对我国科学技术的基础、实力和在国际科技活动中的地位，以及发展趋势作了系统分析和综合论述，为我国今后的科技发展和决策提供了可靠依据。

《中国科学技术指标》(1992) 主要是依据我国 1988–1991 年的科技统计数据 (暂不包括港、澳、台地区的数据)，以及相关的社会、经济数据，从多个侧面对我国科技发展的基础与环境、科技活动的规模与结构、科技的投入与产出、科技对经济发展的作用与影响，以及公众的科学素养与对科技的态度，进行了定量分析和政策评估。本期《中国科学技术指标》数据翔实，图文并茂，在指标体系中既体现了中国科技活动的特征，又能与目前国际科技统计指标衔接。

《中国科学技术指标》(1992) 共分五篇十八章。第一篇中国科技发展的环境与基础。本篇从当代科技发展的趋势与特点、中国的科技体制与政策、中国的科学技术活动机构以及中国科学技术发展的国内基础等方面从宏观的角度分析和论述了中国科技发展的社会经济环境。第二篇中国的科技资源，描述了我国科技人力、物力、财力资源的总量和配置，通过国际规范化的指标进行了国际对比。第三篇中国的科技活动。本篇重点从我国的科技计划、科技活动的几大执行部门和国际科技合作与交流等方面作了详细的分析和论述。第四篇中国的科技产出及影响。这一篇从专利、科技成果、科技论文、国内国际技术贸易及高技术产品进出口等指标，定量分析了我国的科技产出；从科技与经济增长的贡献、生活质量与水平，环境与生态的关系等方面评价了科技对社会、经济的促进与影响。第五篇中国公众的科学素养和对科学技术的态度。本篇是在对全国 29 个省、自治区、直辖市抽样调查的基础上，就我国公众对科学技术的理解程度、公众对科学技术发展的观点与态度等作了定量与定性分析，并在主要指标上与国际同类指标进行了对比。

在《中国科学技术指标》(1992) 的研究与编写过程中，得到了国家科委、国家计委、国家教委、财政部、国家统计局、国家自然科学基金委、中国科学院和中国科协等单位的领导、专家学者的热情帮助和具体指导。在这里我们致以衷心感谢，并恳请广大读者提出批评、建议。

《中国科学技术指标》(1992)
编辑委员会

1993.3

综　　述

当代的科学技术，已成为经济竞争和军事对抗的焦点。科学技术是第一生产力，是促进经济发展和推动社会进步的决定因素，已成为人们的共识。科学技术的飞速进步、科学与技术的日益综合、科学技术与经济的一体化以及科学技术的国际化趋势，已构成当代科技发展的主要特征。随着世界格局的重大变化，各国对重新配置自己的科技资源，调整自己的科技发展战略与政策，以谋取在新格局中的有利地位，这给中国的科技发展带来了机遇，同时也面临着严峻的挑战。

1978 年以来，我国科技工作进入了全面振兴时期。1982 年，党中央、国务院遵循当代经济和科技发展的客观规律，制定了"经济建设必须依靠科学技术，科学技术工作必须面向经济建设"的科技工作方针。几年来，广大科技工作者高举科技是第一生产力的旗帜，积极投身于科技体制改革和科技进步的大潮，大胆试验，勇于开拓，开创了科技工作的新局面。1988–1991 年间，科技事业又有了新的进展。

一、科技体制改革

1985 年 3 月，中共中央作出了《关于科学技术体制改革的决定》，我国科技战线进入了全面改革开放的新时期。几年来，围绕着科技与经济相结合这一基本任务，通过继续推进技术成果商品化、改革科技拨款制度等改革措施的实施，我国科技工作的面貌发生了新的变化。

(一) 科技拨款制度改革增强了科研机构为经济建设服务的活力和动力

科技拨款制度改革，对从事基础研究、应用研究、技术开发和社会公益等不同类型的科技活动，分别实行了科学基金制、技术合同制和包干制等分类管理。通过技术合同、成果转让、技术入股、联办企业、各类科技基金以及科技贷款等多种形式，改变了科研机构单纯依靠政府拨款的运行机制，开辟了科技经费多渠道的广泛来源，既促进了科技成果的商品化、产业化，也使科技经费有了较大的增长。1991 年，全国县以上独立科研机构(自然科学和工程技术领域，下同) 经费收入总额为 225.8 亿元，比 1988 年增长 62.1%，年平均增长率为 17.5%；在经费收入总额中，政府拨款 87.9 亿元，比 1988 年增长 25.8%，占经费收入总额的 38.9%；横向收入 108.2 亿元，比 1988 年增长 97.8%，占经费收入总额的 47.9%；银行贷款 17.7 亿元，比 1988 年增长了 1.53 倍，占经费收入总额 7.8%。四年中，政府拨款在经费收入总额中的比重下降了 11.2 个百分点，而横向收入上升了 8.6 个百分点，已经成为科研机构最主要的经费来源。全国技术开发类机构减拨事业费已基本到位，初步实现了运行机制的转轨。

(二) 技术市场迅速发展，有力地促进了技术成果的商品化

1985 年以来，通过实施《技术合同法》、《专利法》和开拓、培育技术市场，确立了技术成果的商品地位，建立了按价值规律、以合同形式有偿转让的市场调节机制，为科学技术成果的研究开发、应用推广注入了新的活力，我国技术市场从无到有，从小到大，迅速、健康地发展，成为连接科技与经济的一座金桥。1991 年，全国技术市场成交合同

20.8 万项，成交金额 94.8 亿元，比 1988 年增长 30.8%，年平均增长率为 9.4%。技术市场管理体系逐步建立健全，全国已设立技术市场管理机构 989 个，设立技术合同认定点 1019 个。1991 年专营或兼营的技术贸易机构已发展到 2.1 万个，从事技贸活动的固定人员从 1987 年的 26.8 万人，增加到 1991 年的 53.1 万人，增长 1 倍。

（三）科技工作领域拓宽，科技与经济结合形式多样化

在技术成果商品化和拨款制度改革的推动下，全国主要科技力量转向为经济建设主战场服务，科研机构、高等学校和企业的科技人员在实践中创造了科技与经济相结合的多种多样的形式。1991 年全国 30%以上的民口独立科研机构与企业或经济实体建立了较为稳定的联系，其中 279 个科研机构进入了企业或企业集团；247 个机构领办或承包了中小企业；265 个机构参加或成为行业的技术开发中心；98 个机构与企业联合成立了技术设备成套公司；797 个机构与企业联合开发技术。此外，1991 年，全国有 6582 个国营工业企业与科研机构和高等学校进行了对口交流，共向企业转让了 4965 项科技成果，并设立了 4864 个联合研究开发项目。通过多种形式的结合，充分发挥组合优势，有力地促进了经济的发展。

二、科技资源

（一）科技人力资源

1991 年底，全国全民所有制企事业单位共有各类专业技术人员（包括工程、农业、卫生、科研、教学等技术职务（称）系列）1717 万人，比 1988 年增长 12%以上。

1990 年，全国共有 61.71 万人从事科学研究与试验发展(R&D)活动，比 1988 年增长 29.1%；其中科学家和工程师为 40.78 万人，比 1988 年增长 38.1%。在这些科学家和工程师中，科研机构为 20.50 万人，占 50.3%；企业为 5.65 万人，占 13.9%；高等学校为 11.82 万人，占 29.0%；其它部门为 2.81 万人，占 6.8%。每百万人口拥有从事研究与发展活动的科学家和工程师为 357 人。

与国际相比，我国从事研究与发展活动的科学家工程师的绝对数仅次于前苏联、美国和日本，位居世界第四位，但每百万人口的科学家和工程师数远远落后于发达国家（据联合国教科文组织估计，80 年代，每百万人口中从事研究与发展活动的科学家和工程师数，发达国家平均约为 3000 人，发展中国家平均约为 130 人），相当于发展中国家的中上水平。

（二）科技财力资源

1991 年，全国科技财力资源的总额为 474.3 亿元，比 1988 年增长了 67.7%。在这些财力资源中，政府拨款 156.2 亿元，比 1988 年增长 32.4%，占总额的 32.9%；企业投入 181.1 亿元，比 1988 年增长 78.1%，占总额的 38.2%；银行贷款 75.5 亿元，比 1988 年增长 54.5%，占总额的 15.9%。

1991 年，全国用于科学研究与试验发展(R&D)活动的经费支出为 142.30 亿元，比 1988 年增长 59.0%。这些经费按来源分别为：政府拨款约占 54.9%，企业投入约占 23.4%，银行贷款约占 7.7%，其它来源约占 14.0%。按执行部门分分别为：科研机构约占 50.1%，企业约占 27.4%，高等学校约占 12.1%，其它部门约占 10.4%。研究与发展经费占国民生产总值的比重(R&D／GNP)为 0.72%。

与发达国家相比，我国用于研究与发展活动经费的绝对数和相对数(R&D／GNP)均相差悬殊，也低于韩国、新加坡、台湾等新兴的工业化国家和地区。据联合国教科文组织的估计，80年代，研究与发展经费占国民生产总值的比重，发达国家平均约为2.2%，发展中国家平均约为0.45%。显然，目前我国研究与发展经费投入强度还相当低，仅为发展中国家的中上水平。

三、科技发展计划

在科技体制改革的推动下，根据世界科技、经济发展的趋势和中国的国情，我国科技发展逐步形成了面向经济建设的主战场、发展高新技术及其产业、加强基础性研究三个层次的战略部署，并且形成了一批相应的科技发展计划。

(一) 面向经济建设主战场

在这一层次上，主要组织实施了"国家科技攻关计划"、"国家重点工业性试验项目计划"、"星火计划"和"国家科技成果重点推广计划"等。

1. 国家科技攻关计划

1988—1990年主要实施了"七五"科技攻关计划。"七五"科技攻关计划共安排了76个项目，349个课题，签订了4696个专题合同。"七五"期间共投入了67.5亿元，其中国家拨款31.9亿元，占47.3%；平均每年约有10.8万人参加科技攻关项目，其中科学家、工程师占81.2%。"七五"科技攻关计划共取得专题成果（包括子专题）10462项。

1991年开始实施的"八五"科技攻关计划共安排了170多个项目。

2. 国家重点工业性试验项目计划

国家重点工业性试验项目计划的安排与上游阶段的科技攻关、研究、技术开发计划相衔接，以年度计划滚动安排。1984年以来，共安排国家级项目126项，其中工业性示范生产线80条，工业性试验基地37个。到1991年底已鉴定验收59项。

3. 星火计划

1988—1991年，星火计划累计安排项目25118项，其中国家级项目1713项，占6.8%；省级项目8997项，占35.8%；投入资金180.3亿元，其中各级政府拨款9.8亿元，占5.4%，银行贷款70.2亿元，占38.9%，自筹资金100.3亿元，占55.7%。全国建立星火培训基地67个，四年累计培训各类人员623万人次。到1991年底全国累计完成星火计划项目18175项。这些项目累计新增产值459亿元，新增利税超过106亿元。

4. 国家科技成果重点推广计划

1989年试行国家科技成果重点推广计划，共推广37项科技成果。1990年正式推出该项计划，共安排92个大项目，包括485项科技成果。两年累计投入推广计划的资金总额为8.2亿元，主要依靠贷款。

(二) 发展高新技术及其产业

为跟踪国际高技术发展前沿，促进高新技术产业的发展，先后组织实施了高技术研究发展(863)计划和火炬计划。

1. 高技术研究发展（863）计划

"863"计划选择了生物技术、航天技术、信息技术、激光技术、自动化技术、能源技术和新材料技术等七个领域的15个主题项目作为发展高技术的重点，并于1987年底正式

实施。“863”计划全部由国家财政提供专项拨款。1987–1991 年，民口的五个领域投入经费总额 8.56 亿元，平均每年约有 1 万人投入项目研究。到 1990 年底，在民口五个领域取得成果 400 多项。

2. 火炬计划

1988 年开始实施的火炬计划，以项目为龙头，以高技术产业开发为基地。1988–1991 年，火炬计划安排项目 2897 项，其中国家级项目 880 项；总投资 43.6 亿元，其中贷款 25.4 亿元，占 58.3%。这些项目投产后，预计新增产值 194.3 亿元，新增利税 52.5 亿元。1991 年，经国务院批准在全国组建了 27 个国家级高新技术产业开发区，共认定高新技术企业 2587 家，当年创造产值 71.2 亿元，技术贸易总收入 87.3 亿元，利润总额 8.3 亿元。

（三）加强基础性研究

在稳定和加强基础性研究方面，国家自然科学基金项目是重要的组成部分，同时还实施了国家重点实验室建设计划和攀登计划。这些项目和计划基本上由国家财政拨款支持。

1. 国家自然科学基金项目

1988–1991 年，国家自然科学基金从 1.2 亿元，增加到 1.8 亿元，增长了 48.9%，每年持续资助着约 6 万名科研人员和 2 万多名研究生。科学基金中量大面广的是由科学家自由选题的项目，其资助经费占总金额的 70%左右，1988–1991 年共资助各类项目 1.3 万项，资助金额 4.4 亿元，平均每个项目资助金额为 3.5 万元。

2. 国家重点实验室建设计划

1984 年开始实施的国家重点实验室计划已批准在国家教委、中国科学院、农业部、卫生部等部门所属的大学和研究所建立 74 个国家重点实验室，到 1991 年，实际累计筹集人民币 5.4 亿元，外汇额度 0.83 亿美元。建设经费累计支出 5.0 亿美元，外汇额度累计使用 0.77 亿美元。到目前为止，平均每个实验室的固定资产原值达 997 万元，是建设前的 4.6 倍。

3. 攀登计划

1991 年启动的攀登计划选择了基础性研究的 10 个重大项目，国家拨款 1200 万元予以支持，平均每个项目资助强度达 120 万元。

四、科技活动的主要产出和影响

经过几年的发展，科技工作取得了令人瞩目的成果，科技实力和整体水平有了较大提高。

1. 科技成果和奖励

1988–1991 年，全国共取得省部和国家级重大科技成果 9.6 万项，其中 1991 年达 3.3 万项，四年间平均年增长率为 25.4%；获得国家发明奖项目 800 项；获得国家科技进步奖项目 2033 项；获得国家星火奖项目 455 项；获得国家自然科学奖项目 112 项。

2. 专利

1988–1991 年，受理国内外三种专利（发明、实用新型、外观设计）申请 15.8 万件，其中国内申请 13.8 万件，占 87.3%；四年中，专利申请量平均每年增长 13.7%。授权国内外三种专利 7.6 万件，其中发明专利 1.1 万件，占授权总数的 14.8%；实用新型专

利 5.8 万件，占 76.0%；外观设计专利 0.7 万件，占 9.2%；在这些授权专利中，国内专利为 6.7 万件，占总数的 88.2%。

3. 科技论文

1988–1991 年，国际著名的四大检索系统(《科学引文索引(SCI)》、《科学评论索引(ISR)》、《科学技术会议录索引(ISTP)》、《美国工程索引(EI)》) 收录的我国科技论文总数为 4.9 万篇，约占四大检索系统收录论文总数的 1.3%。按论文数量排序，1988 年我国在世界处于第 14 位，1989 年以后一直保持在第 15 位。

据对国内 1200 种科技期刊的统计，1988–1991 年共发表科技论文 35.5 万篇，自 1988 年以来，每年发表的论文篇数稳定增长，四年中年平均增长率为 3.3%。

4. 高技术产品出口

1988 年以来，我国高技术产品出口额有了大幅度增长，出口额从 1988 年的 12.9 亿美元，增长到 1991 年的 28.8 亿美元，四年中增长了 1.2 倍，年平均增长速度为 30.8%。高技术产品在出口总额中的比重，从 1988 年的 2.7%增长到 1991 年的 4.0%。

90 年代，是全国经济和科技发展的关键时期。党的十四大所确定的社会主义市场经济体制和国民经济发展速度的调整，为科技进步创造了有利的环境，也对科技工作提出了更高、更为紧迫的要求。我们必须加快科技体制改革的步伐，加速科技发展，使科技工作跃上新的台阶。

Overview

In today's world, science and technology is becoming the focus of economic competition and military confrontation. It is of the common understanding of people that science and technology is the prime productive force and decisive factor for economic development and social progress. Science and technology development of today is characterized by its accelerated pace of progress, its growing synthesization, its integration with economic growth and its trend towards internationalization. With drastic change in the development pattern of the world, every country is trying to reallocate its S&T resources and readjust its strategies and policies for S&T development in an attempt to gain a favorable position in the new pattern. In such a situation there exist both opportunities and big challenges for China's science and technology development.

Ever since 1978, S&T in China has been experiencing a period of vigorous growth. Following the laws that govern the economic development and S&T advances the Party's Central Committee and the State Council of PRC formulated a guiding principle in 1982. It reads, "economic growth must rely on science and technology whereas the latter must serve the former". Over the last few years, the broad masses of scientists and engineers, with deep belief that science and technology is the prime productive force, have thrown themselves into the surging wave of management system reform and continued advancement of S&T. Fearless in blazing a new trail, they succeeded in bringing about a new situation in science and technology development. From 1988 to 1991 tremendous successes have been achieved.

A. S&T Management System Reform

In March 1985, "The Decision on the S&T Management System Reform" was issued by the Central Committee of the Communist Party. From then on science and technology started a new period of reform and opening up to the outside world. Working towards the goal of integrating science and technology with economic development through accelerating commercialization process of R&D results and restructuring fund appropriation system, marked changes have taken place in China's science and technology.

1. The Reform in R&D Funding Appropriation System Motivated Research Institutions to Serve Economic Development Better

In the reform of R&D funding appropriation system, science foundation system was practiced to support basic research; research contract system was introduced to fund applied research and government grant was provided to those institutions engaged in research and development for public utilities. The introduction and practice of contract system, technology transfer, technology being valued at shares, joint running of enterprises, various foundation system and bank loans have replaced the outdated funding mechanism in which R& D institutions depended solely on government grant. Such a change not only helped the commercialization and industrialization of R&D results, but also increased, by big margin, the size of financial support for science and technology.

In 1991, the total revenue of all the R&D institutions (in natural sciences and engineering) under the jurisdiction of government organizations at and above the county level amounted to 22.58 billion yuan RMB, up 62.1% over 1988, an average increase rate of 17.5% per year. Of the total revenue, 8.79 billion yuan RMB, 38.9% of the total, was from government through fund appropriation, increased by 25.8% over 1988. Revenue from contracted research and development reached 10.82 billion yuan RMB, 47.9% of the total, an increase of 97.8% over 1988; bank loans totalled 1.77 billion yuan RMB, 7.8% of the total, raised by 1.53 times over 1988. In the 4 years from 1988 to 1991, the portion of government funding in the total was decreased by 11.2 percent point while the portion of revenue from contracted research and development was raised by 8.6 percent point. The revenue from contracted research and development has become the bulk of financial support for R&D institutions. The deduction of operation expenses for technology development institutions has in the main been completed, thus realizing the initial transformation of operation mechanism.

2. Rapid Expansion of Technology Market Accelerated the Commercialization of Technology Product

Ever since 1985, the size of technology market has expanded rapidly on a sound basis, bridging science and technology with economic development. Through the enforcement of "The Technical Contract Law" and "The Patent Law" and development of technology market, technology product was identified as a commodity, market mechanism was built to administer compensatory transfer of technology in the form of contract based on the law of value, thus invigorating the whole system of research and development, application and extension of technology achievements. In 1991, a total of 208,000 technology transfer contracts, valued at 9.48 billion yuan RMB, were concluded through technology market, up 30.8% over 1988, by average, increased by 9.4% per year. The management system of technology market was gradully built and improved. 989 technology market management organizations and 1,019 agencies for technology contract

approval have been established. By the end of 1991, the total of full-time or part-time technology trade business agencies numbered 21,000, employing 531,000 staff on full time basis, 100% increase over 1987.

3. Areas of Science and Technology Development Expanded and Form of Integration of Science and Technology with Economic Development Diversified

Spurred by the measures to commercialize technology product and to restructure the fund appropriation system, the majority of scientists, engineers and other technical people threw themselves into the mainstream of economic development. In the course of practice, scientists, engineers and other technical people from research institutions, colleges and universities, and enterprises, created various forms to link science and technology with economic growth. In 1991, over 30% of the R&D institutions under government jurisdiction established relatively stable cooperative relations with industrial enterprises or economic entities, and among them 279 research institutes merged into enterprises or industrial groups; 247 research institutes concluded contract to run small and medium-sized enterprises, or took leadership position in enterprises; 265 research institutions participated in or turned into industrial technology development centers; 98 research institutions joined efforts with enterprises to form companies producing complete set of equipments; and 797 research institutions cooperated with enterprises in technology development. In addition, by the end of 1991, research institutions and universities and colleges have transferred 4,965 items of technology to 6,582 state- owned industrial enterprises and 4,864 joint research and development projects have been established after technical exchanges taken place between research institutions and enterprises. Giving full play to the advantages of combined efforts, the diversified forms of linkage helped to push the economic development forward.

B. Science and Technology Resources

1. S&T Human Resources

By the end of 1991, the technical professionals employed by state-owned units (including professionals in engineering, agriculture, medicine and public health, science, and teaching), totalled 17.17 million, 12% increase over 1988.

In 1990, people engaged in R&D numbered 617,000, 29.1% rise over 1988; among them 407,800 were scientists and engineers, 38.1% up over 1988. Of these scientists and engineers, 205,000, 50.3% of the total, were from R&D institutes, 56,500, 13.9% of the total, from industrial enterprises, 118,200, 29% of the total, from colleges and universities,

and 28,100, 6.8% of the total, from other sectors. In China scientists and engineers engaged in R&D activities numbered 357 per million population.

Compared with other countries, China ranks the fourth, in terms of its absolute size of scientists and engineers engaged in R&D, only after the former Soviet Union, the United States and Japan. However, the number of scientists and engineers per million population in China is far smaller than that of the developed nations, ranking in the upper middle among the developing countries (according to estimation by UNESCO, in the 1980s, by average, the number of scientists and engineers was 3,000 per million population for the developed countries, and 130 for the developing countries).

2. S&T Financial Resources

In 1991, S&T financial resources of China totalled 47.43 billion yuan RMB, 67.7% increase over 1988. Of such an amount, 15.62 billion yuan RMB, 32.9% of the total, up 32.4% over 1988 came from government fund appropriation; 18.11 billion yuan RMB, 38.2% of the total, 78.1% rise over 1988, was S&T investment by industrial enterprises; 7.55 billion yuan RMB, 15.9% of the total, 54.5% up over 1988, was bank loans.

In 1991, R&D funding in China reached 14.23 billion yuan RMB, increased by 59% over 1988. The sources of funding includes: 54.9% came from government appropriation, 25.4% was enterprise funding for R&D, 14.0% was made up by other sources. The funding breakup in terms of performing sectors is as follows: 50.1% was for R&D institutions, 27.4% was for in-house R&D of enterprises, 12.1% for R&D in colleges and universities and 10.4% for other R&D activities. R&D funding as percentage of GNP in China was 0.72%, or R&D / GNP was 0.72%. Compared with developed countries, R&D funding in China, both in absolute and relative terms (R&D / GNP), was far too small, and was smaller than such newly industrialized countries and regions as Korea, Singapore and Taiwan. According to estimation by UNESCO, in the 1980s, by average, R&D funding as percentage of GNP of developed countries was 2.2% whereas that of the developing countries was only 0.45%. It is obvious that the financial input on R&D in China was at a very low level, ranking in the upper middle among the developing countries.

C. S&T Development Programme

Pushed forward by S&T management system reform and in line with S&T and economic development trend in the world and national conditions, a strategy of S&T development in China has gradually taken shape. The strategy consists of three levels: serving the mainstream of economic development, developing high and new technologies and in-

dustries, and strengthening basic research. A series of S&T development programmes has been formulated to effect this strategy.

1. Serving the Mainstream of Economic Development

At this level, the National Programme of Key Projects, the National Programme of Key Industrial Demonstration Projects, the Spark Programme, the National Extension Programme of Key S&T Achievements and so on, are organized and executed.

1) National Programme of Key Projects

The National Programme of Key Projects of the Seventh Five- Year Plan was implemented from 1988 through 1990. 76 subjects embracing 349 projects were identified, and 4,696 contracts concluded. During this period, total investment reached 6.75 billion yuan RMB, including 3.19 billion yuan RMB, 47.3% of the total, funded by government through appropriation; an average of 108 thousand people were involved annually in activities related to the Programme, 81.2% of them were scientists and engineers. Positive results have been achieved from 10,462 contracts, including sub-contracts.

The National Programme of Key Projects during the Eighth- Year Plan, started from 1991, and more than 170 projects has been identified.

2) National Programme of Key Industrial Demonstration Projects

National Programme of Key Industrial Demonstration Projects links up with programmes dealing with research and development of key projects which are in the upper reaches of S&T development. The Programme identifies projects each year on a revolving basis. Since 1984, 126 projects at national level have been planned, among which 80 were industrial demonstration lines, 37 were industrial demonstration bases. 59 projects have passed appraisal by the end of 1991.

3) Spark Programme

From 1988 to 1991, the Spark Programme identified 25,118 projects, 1,713 projects, 6.8% of the total, were national projects; 8,997 projects, 35.8% of the total, were provincial projects; total investment was 18.03 billion yuan RMB, among them 980 million, accounting for 5.4%, were appropriation by government at various levels, 7.02 billion yuan RMB, making up 38.9%, were bank loans, 10.03 billion were self-raised, accounting for 55.7%. Throughout the country 67 Spark Training Centers were set up. A total of 6.23 million people have received training. From 1988 to 1991, 18175 projects were completed with output value, profits and taxes worth 45.9 billion yuan RMB and 10.6 billion yuan YMB respectively.

4) National Extension Programme of Key S&T Achievements

National Extension Programme of Key S&T Achievements were carried out on trial basis in 1989, altogether 37 items of major S&T achievements were to put into application. The Programme were formally introduced in 1990, and 92 major projects, consisting of 485 items of S&T achievements, were listed. Total investment during the two years were 820 million yuan RMB, mainly from bank loans.

2. Developing High and New Technology and Industry

In order to follow the frontier advances of high and new technology in the world and promote high tech-based industries, High Technology Research and Development Programme and Torch Programme were organized and implemented.

1) High Technology Research and Development Programme (863 Programme)

Formally initiated at the end of 1987, 863 Programme has selected as its priorities on 15 subject projects in seven areas: biotechnology, space technology, information technology, laser technology, automation technology, energy technology, and new materials. 863 Programme is wholly funded through government special appropriation. From 1987 through 1991, 856 million yuan RMB were invested in five areas of civil sectors. Professionals took part in projects research averaged 10,000 annually. By the end of 1990, over 400 items of positive results were achieved in five areas in the civil sectors.

2) Torch Programme

Introduced in 1988, the Torch Programme emphasizes high-tech projects and lays its basis on high technology development zones. From 1988 through 1991, the Programme identified 2,897 projects, including 880 at national level; total investment amounted to 4.36 billion yuan RMB, including bank loans of 2.54 billion yuan RMB, 58.3% of the total. It was predicted that after going into production, these projects will produce output value worth 19.43 billion yuan RMB and 5.25 billion yuan RMB of profits and taxes. In 1991, approved by the State Council 27 high technology industry development zones at national level were established across the country, 2,587 enterprises passed examination and were granted the title of High and New Technology Enterprise, whose total output reached 7.12 billion yuan RMB, total revenue from technology development and trade 8.73 billion yuan RMB, and total profits 839 million yuan RMB in that year.

3. Strengthening Basic Research

Projects funded by National Natural Science Foundation play a very important role in stabilizing and strengthening basic research; for the same purpose, National Programme of Key Laboratories and Climbing up Programme are executed. These projects and pro-

grammes are basically supported by government through appropriation.

1) Projects Funded by National Natural Science Foundation

The amount of National Natural Science Fund was raised from 102 million yuan RMB of 1988 to 108 million yuan RMB of 1991, an increase of 48.9%. It supported on a continued basis about 60,000 research professionals and 20,000 graduate students each year. About 70% of the fund were used to support projects selected by scientists at will. From 1988 to 1991, 440 million yuan RMB were spent on total 13,000 various projects, an average of 35,000 yuan RMB for each project.

2) National Programme of Key Laboratories

Started in 1984, the Programme has approved to establish 74 national key laboratories in institutions of higher learning and research institutions under the jurisdiction of the State Education Commission, Chinese Academy of Sciences, Ministry of Agriculture, Ministry of Public Health and so on. By 1991, a total of 540 million yuan RMB of local currency and 8.3 million USD of quota were raised. Total expenditure for construction was 500 million yuan RMB, foreign currency quota expended was 7.7 million USD. Up to date, the fixed assets of each laboratory was worth, by average, 9.97 million yuan RMB, 4.6 times as much as that before the Programme supported construction.

3) Climbing up Programme

Launched in 1991, the Climbing up Programme has selected 10 major projects in basic research. The State allocated 12 million yuan RMB to support them, averaging 1.2 million yuan RMB for each project.

D. Major Output and Impacts of S&T Activities

In recent years significant progress has been made in S&T development and the country's capability in science and technology has been enhanced.

1) S&T Achievements and Awards

From 1988 to 1991, 9.6 million items of major S&T results both at national and provincial levels were achieved across the country, among them 33,000 items achieved in 1991, average growth rate through the three years was 25.4%; 800 items won National Awards for Inventions; 2,033 items won National Awards for S&T Progress; 455 items won National Spark Awards; 112 items won National Natural Science Awards.

2) Patents

From 1988 to 1991, 158,000 patent applications of three types (invention, utility mod-