现代化产业体系的特征要求与构建路径

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摘　要：现代化产业体系是现代化国家的物质技术基础，必须把握好智能化、绿色化、融合化等基本特征和完整性、先进性、安全性等基本要求，准确把握现代化产业体系建设的内涵与特征要求。同时，瞄准影响产业体系完整性、先进性和安全性的主要因素，把握产业结构调整这个关键、筑牢产业安全根基、畅通“科技—产业—金融”循环、持续推进世界级产业集群建设，加快建设以实体经济为支撑的现代化产业体系，增强发展的安全性、稳定性和主动性。

关键词：现代化产业体系　完整性　先进性　安全性

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党的二十大报告提出“建设现代化产业体系”，中共中央政治局第二次集体学习强调“要继续把发展经济的着力点放在实体经济上”，“打造自主可控、安全可靠、竞争力强的现代化产业体系”[①]。第二十届中央财经委员会第一次会议提出“推进产业智能化、绿色化、融合化，建设具有完整性、先进性、安全性的现代化产业体系”[②]。这是以习近平同志为核心的党中央立足实现第二个百年奋斗目标、统筹发展和安全作出的重大战略决策。这是中国式现代化的重要物质技术基础、构建新发展格局的产业基础和赢得未来国际竞争主动权的迫切需要，必须从统筹世界百年未有之大变局和中华民族伟大复兴战略全局高度深刻理解加快建设现代化产业体系的重大意义，准确把握其核心要义与特征要求，明晰构建路径，务实予以推动（郑栅洁，2023）。

一、准确把握现代化产业体系的特征要求

（一）现代化产业体系与现代产业体系的异同

现代化产业体系是党的二十大提出的一个新概念，但现代化产业体系有关的探索由来已久。党的十七大和十八大报告分别提出“发展现代产业体系”和“构建现代产业发展新体系”等较为接近

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① 《加快构建新发展格局 增强发展的安全性主动权》，《人民日报》2023年2月2日，第1版。

② 韩文秀：《加快建设现代化产业体系的基本要求和重点任务》，《人民日报》2023年6月1日，第9版。

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的概念。从历史演进、实践逻辑和政策发力点的角度看，现代化产业体系和现代产业体系有着诸多共同点。

第一，都比较强调“产业体系”的建设。产业体系主要是从产业构成和发展层次角度来看待产业发展问题，对应的是产业发展“不成体系”、比较零碎、没有有机结合、杂乱无章、层次不高、没有特色，党的十七大报告针对国际产业分工格局的新变化以及中国经济结构存在的突出问题，第一次提出了发展现代产业体系，主要就是为了改变这种局面，打造成体系化的产业发展能力。党的二十大报告提出“建设现代化产业体系”，也重点强调巩固优势产业领先地位、加快发展数字经济、构建优质高效的服务业新体系、推动战略性新兴产业融合集群发展、构建现代化基础设施体系等产业门类和产业体系建设的内容。

第二，都比较强调产业体系的“现代性”。“十二五”规划纲要强调“结构优化、技术先进、清洁安全、附加值高、吸纳就业能力强”，“十三五”规划纲要强调“创新能力强、品质服务优、协作紧密、环境友好”，都是从技术进步、绿色低碳、集约高效等“现代性”或“先进性”角度对现代产业体系提出的新要求。党的二十大报告提出“现代化产业体系”，强调推动制造业高端化、智能化、绿色化发展，建设高效顺畅的流通体系，二十届中央财经委员会第一次会议强调，高效集聚全球创新要素，推进产业智能化、绿色化、融合化[③]，也是对产业体系知识技术密集、创新能力强、附加值率高等“现代性”和“先进性”的具体要求。

第三，都有比较鲜明的问题导向和战略重点。党的十七大报告提出，发展现代产业体系，大力推进信息化与工业化融合，主要是针对当时信息化与工业化两化融合不够，发展方式比较粗放，产业附加值偏低，工业大而不强，装备制造业发展水平亟待提升，部分企业生产能力落后等突出问题提出的。党的十九大报告提出加快建设实体经济、科技创新、现代金融、人力资源协同发展的产业体系，也具有非常鲜明的问题导向，主要针对当时经济发展“脱实向虚”以及科技创新、现代金融、人力资源与实体经济产业发展不协同不匹配等问题而提出的。党的二十大报告提出“现代化产业体系”，则是针对全球产业大变局和分工重构的大背景，更加强调产业体系的完整性、先进性与安全性，打造自主可控、安全可靠、竞争力强的现代化产业体系，支撑中国式现代化和构建新发展格局等战略任务。

在把握现代化产业体系和现代产业体系共同点的基础上，也要看到现代化产业体系与现代产业体系的不同之处。现代化产业体系相比现代产业体系多了一个“化”字，其内涵意蕴自然也有不同。什么是“化”？“化”就是改变，改变原来的形态或者性质，使我们产业体系发生变化，表明“现代化产业体系”是在“现代产业体系”基础上更进一步，产生了重大变化，而这个变化又属于“质”的层

[③] 韩文秀：《加快建设现代化产业体系的基本要求和重点任务》，《人民日报》2023年6月1日，第9版。

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面的变化。具体来说，包括以下几个方面。

第一，产业结构变化。现代化产业体系要求抓住全球产业结构和布局调整过程中孕育的新机遇，用于开辟新领域、制胜新赛道，加快培育壮大战略性新兴产业、打造更多新支柱产业和新的增长引擎，改变传统产业占比较高的局面，使得战略性新兴产业、高技术产业成为经济增长的主导力量。

第二，发展动力变化。现代化产业体系要求产业发展驱动力从过去的要素驱动转变为创新驱动，大力推进科技创新、商业模式创新和制度创新等，持续提高全要素生产率，畅通“科技—产业—金融”循环，推动我国经济由量大转向质强，形成发展新动能，塑造更多依靠创新驱动，更多发挥科技、知识和人才优势的引领性发展。

第三，要素关系变化。现代化产业体系要求科技创新、现代金融、人力资源、数据信息等高端要素与之有效衔接、相互协同，并根据产业发展不同阶段、不同门类、不同场景的需求特点提供“量身定制”的服务并获得合理回报，形成良性循环、优化要素配置、提升要素效率的现代化产业模式和组织运行系统，成为全球重要的科技、产业、金融和数据资源配置中心。

此外，“现代化产业体系”与“现代产业体系”相比，也有三个方面的不同。第一，现代化产业体系更强调过程，而现代产业体系更强调结果或状态。第二，现代化产业体系是一个范围更大的概念。就像工业化不仅仅包括工业发展本身一样，现代化产业体系也不仅仅包括产业发展和产业体系建设本身，还包括基础设施的现代化、要素支持的现代化，甚至产业发展与城镇化、信息化、数字化、农业现代化等协同的内容等。第三，现代化产业体系是与中国式现代化、现代化经济体系等语境更吻合的概念。党的二十大报告以中国式现代化为主题，在产业发展方面的主要任务以“现代化产业体

表1：我国主要政策文件有关现代化产业体系的描述

时间	出处	内容
2007年10月	党的十七大报告	发展现代产业体系，大力推进信息化与工业化融合，促进工业由大变强，振兴装备制造业，淘汰落后生产能力
2011年3月	中华人民共和国国民经济和社会发展第十二个五年规划纲要	发展结构优化、技术先进、清洁安全、附加值高、吸纳就业能力强的现代产业体系
2012年11月	党的十八大报告	着力构建现代产业发展新体系
2016年3月	中华人民共和国国民经济和社会发展第十三个五年规划纲要	加快构建创新能力强、品质服务优、协作紧密、环境友好的现代产业新体系
2017年10月	党的十九大报告	着力加快建设实体经济、科技创新、现代金融、人力资源协同发展的产业体系。
2018年1月30日	中共中央政治局第三次集体学习	建设创新引领、协同发展的产业体系
2021年3月	中华人民共和国国民经济和社会发展第十四个五年规划和2035年远景目标纲要	坚持把发展经济着力点放在实体经济上，……，构建实体经济、科技创新、现代金融、人力资源协同发展的现代产业体系
2022年10月	党的二十大报告	建设现代化产业体系
2022年12月	中央经济工作会议	加快建设现代化产业体系
2023年1月	中共中央政治局第二次集体学习	打造自主可控、安全可靠、竞争力强的现代化产业体系
2023年5月	二十届中央财经委员会第一次会议	推进产业智能化、绿色化、融合化，建设具有完整性、先进性、安全性的现代化产业体系

资料来源：根据有关会议文件整理。

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系”替代“现代产业体系”更为适宜。

（二）现代化产业体系的基本特征与要求

关于现代化产业体系的内涵特征，学术界开展了较为丰富的研究。盛朝迅（2019a）认为，建设现代产业体系，关键要着眼于“创新引领、要素协同、链条完整、竞争力强”这几个关键词，从体制机制、要素培育、企业主体和产业发展四个层面发力，努力推动质量变革、效率变革、动力变革，提高全要素生产率，增强产业核心竞争力。黄汉权、盛朝迅（2023）从横向产业构成和纵向产业能力两个方面拓展了现代化产业体系的内涵，认为现代化产业体系是以战略性新兴产业为先导，以先进制造业、现代化服务业、现代化农业为基础，以现代化基础设施为支撑，不断实现产业基础高级化、产业结构高度化合理化、产业链现代化以及数字经济和实体经济融合化发展的产业体系，具有创新驱动、融合发展、结构优化、绿色智能、安全可控、高水平开放、竞争力强、效益良好等重要特征。刘志彪（2023）则认为，现代化产业体系应具备自主性、开放性、协调性等现代性特征。刘振中（2023）提出，现代化产业体系的内涵特征不仅仅包括产业质效的高端性、产销衔接的高效性、产业占比的协调性、产业之间的融合性以及基础配套的完善性等，还应动态考量其现代化进程中的战略支撑性、创新引领性、安全韧性、开放竞争性和发展可持续性。[④]

二十届中央财经委员会第一次会议提出“推进产业智能化、绿色化、融合化，建设具有完整性、先进性、安全性的现代化产业体系”，对现代化产业体系的特征和要求作出了深刻的概括。

从内涵特征看，现代化产业体系具有智能化、绿色化、融合化特征，这是全球产业现代化高端化发展的共同规律，也是构建现代化产业体系的重要路径。

首先，智能化是人类工业革命和科技革命的重要主线，从机械化开始，电气化、信息化、数字化乃至智能化革命的浪潮使得工业更加自动化、智能化，极大地改变了人类的生产生活方式和组织运行模式，使得人类劳动得到极大的解放和赋能，提升了劳动生产率，也使得先行国家获得了全球产业竞争中的领先优势。展望未来，能否实现产业体系的智能化转型或者说能否引领产业体系的智能化转型，在全球智能化转型的过程中“先人一步”，关系到未来国际竞争的成败和在全球产业分工体系中的位势。因此，我国建设现代化产业体系必须抢抓新一轮科技革命和产业变革机遇，加快突破人工智能、新一代电子信息等前沿科技，持续推动智能技术应用及与经济社会的深度融合，努力抢占全球产业体系智能化的战略制高点。

其次，绿色化是实现人与自然和谐共生的必然要求。随着全球工业化发展水平的提高，人类对于自然资源的获取数量和人均能源利用水平大幅攀升，使得人与自然关系变得紧张，极端天气不断增多，气候变化影响深远。人类只有一个地球，要实现人与自然和谐共生，必须要全世界共同努力，

[④] 刘振中：《如何认识现代化产业体系》，《经济日报》2023年2月14日，第10版。

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尊重自然、保护自然，推动产业体系的绿色化发展，使得能源结构和产业结构向着有利于可持续发展的方向调整和演进。与此同时，绿色技术、绿色规则也成为全球新一轮产业竞争的焦点，要求各国积极研发绿色技术、开发绿色产品，形成绿色经济新增长点。

最后，融合化是产业体系现代化的普遍形态和重要途径，产业本身是由相互关联的各个产业子系统构成，各产业的升级和突破离不开相关行业的物质和技术支撑。比如，电子信息产业的高质量发展离不开装备和材料技术的进步，信息化条件下装备工业的升级也离不开电子信息、智能技术的赋能，甚至是生物技术的进步也离不开芯片、大数据等持续突破和发展。我国制造业转型升级的重要方向也是先进制造业和现代服务业融合发展、数字经济与实体经济深度融合等。因此，推动一二三产业深度融合发展，促进相关领域前沿技术交叉融合，是催生新技术、新产品、新业态和新模式的重要途径。

从基本要求看，现代化产业体系应当具有完整性、先进性、安全性，这是实现产业体系现代化的基本要求和重要保障。完整性是对产业体系和门类提出的要求，是现代化产业体系建设的基本前提和条件。如果没有了完整性，产业安全就会大打折扣。相对而言，完整性是我国产业体系的优势所在，应当继续巩固和保持。先进性是指产业在技术、结构、标准、基础设施、工艺、方法、理念等方面居全球领先水平，这是现代化产业体系“现代性”的重要体现，是传统产业转型升级的重要方向，是获得竞争力和高端化发展的必由之路，是形成产业竞争新优势的关键所在。没有先进性，必然会面临低端锁定或“卡脖子”等安全问题。必须坚持科技是第一生产力、人才是第一资源、创新是第一动力，全面提升产业创新驱动发展水平，塑造发展新动能新优势。安全性是指产业体系的自我保护能力、抗风险能力和自我恢复能力，这是建设现代化产业体系、统筹发展和安全的必然要求。安全性和完整性、先进性密切相关，没有离开安全的发展，也没有脱离发展的安全。过去的产业发展逻辑是成本优先、效率优先，前提是安全能够得到保障，如果没有安全性作为保障，完整性和先进性也会受到影响、逐渐弱化。强化安全保障，短期看可能会牺牲一定的成本和效率，但长远看会形成产业发展新优势，即完整性、先进性、安全性相统一的优势，会使得在完整性、先进性、安全性某一方面或某几方面不具备优势国家和地区的产业和订单转移至我国，形成新的综合竞争优势。

需要说明的是，“完整性、先进性、安全性”既是对现代化产业体系的构建要求，也是现代化产业体系的重要特征和建设目标，三者紧密联合，相辅相成，缺一不可，必须整体推进、协同联动。

二、我国现代化产业体系建设的进展与问题

（一）我国现代化产业体系的主要进展与成就

1. 拥有世界上最完整的产业体系，配套能力强的优势较突出

我国着力构建以实体经济为支撑的现代化产业体系，大力推动先进制造业发展，着力稳定制

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造业比重，推动制造业规模稳定增长。2022年我国制造业增加值达到33.52万亿元，占国内生产总值比重达27.7%；占全球制造业比重从2012年的20%左右提升至2022年的30%左右，自2010年起连续13年位居世界首位，超过了第二名和第三名的总和[⑤]。与全球制造业增加值占GDP的比值为16.5%的水平相比，我国制造能力明显高于全球平均水平。无论从大类、中类还是小类的维度看，我国产业体系的完整性都居于全球前列，是全世界唯一拥有联合国产业分类中所列全部工业门类的国家，在500种主要工业产品中有超过四成产品产量位居世界第一，生产了全世界50%以上的粗钢、水泥、电解铝、平板玻璃和工业机器人，60%以上的新能源汽车、家电、微型计算机和化纤产品，70%以上的锂电池、太阳能电池和手机等。我国产业门类齐全，终端产品制造能力强，基础设施条件好，产业配套能力完善，产品转换和响应能力强，成本优势和效率优势突出，是当之无愧的全球制造业基地。

2．建成先进的产业体系，智能化绿色化融合化发展步伐加快

从产业结构看，我国战略性新兴产业不断发展壮大。2022年，我国高技术制造业、装备制造业占规模以上工业增加值比重分别为15.5%和31.8%，比2012年分别提高了6.1和3.8个百分点。从企业主体看，高技术企业数量从2012年的3.9万家增长至2022年的40万家，中小型科技企业达到50万家，有762家企业进入全球企业研发投入2500强。累计培育了近1.2万家专精特新“小巨人”企业，7万多家专精特新中小企业[⑥]。从技术水平看，我国制造业创新能力大幅增强，三代核电、5G产业化、超级计算、高速铁路、新能源汽车等部分领域已达到世界领先水平，正在实现由“跟跑者”向“并跑者”、“领跑者”的历史飞跃。从智能化发展看，我国智能工厂建设加快。有110家工厂达到国际智能制造先进水平，建成了2100多家引领行业发展的高水平数字化车间和智能工厂[⑦]，灯塔工厂数量达到50座，占全球比重达到38%[⑧]。制造业机器人密度增长15倍，达到每万名工人392台，机器人渗透率大幅提升。形成了一批有区域和行业影响力的智能制造系统集成方案提供商，对生产效率提升作用显著，智能制造应用规模和水平全球领先。绿色化发展方面，绿色低碳循环发展深入推进，培育建设了一批绿色工厂、绿色园区。绿色产品供给能力显著增强，绿色供应链加快发展。融合化发展方面，先进制造业和现代服务业融合发展试点加快推进，积极探索新业态、新模式、新路径，推动“两业”相融相长、耦合共生。研发服务外包、供应链管理、柔性制造、全生命周期管理等制造服务业和生产性服务业发展水平和能力持续提升，服务业高质量发展持续推进。

3．产业安全发展水平大幅提升，产业体系安全性的支撑不断夯实

实施了产业基础再造工程和重大技术装备攻关工程，持续推进关键核心技术攻关，通过“点的

⑤ 从亮：《扎实推动以实体经济为支撑的现代化产业体系建设》，《经济日报》2023年7月6日，第1版。
⑥ 王政：《2022年我国全部工业增加值超40万亿元 制造业规模连续13年居世界首位》，《人民日报》2023年3月18日。
⑦ 工信部：我国已建成2100多个高水平数字化车间和智能工厂，https://www.cnii.com.cn/rmydb/202303/t20230301_450779.html。
⑧ 中国“灯塔工厂”增至50座 持续排名全球第一，https://baijiahao.baidu.com/s?id=1754981634641358959&wfr=spider&for=pc。

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突破”与“链的协同”不断强化重大技术创新成果迭代应用。积极推进株洲、杭州、武汉、成都、宁德、潍坊、南通、合肥、广州、深圳、包头、齐齐哈尔等产业链供应链生态体系建设，初步形成了“链主带动、应用牵引、点链结合、串珠成链”的产业链供应链生态建设局面，重点产业链自主可控水平稳步提升。高标准农田建设持续推进，农业科技进步贡献率持续提升，粮食作物良种率和设施农业等机械化水平大幅攀升。我国粮食生产连续8年稳定在1.3万亿斤以上，人均粮食占有量明显高于世界平均水平，实现了谷物基本自给、口粮绝对安全。煤炭产能结构和布局得到持续优化，煤电油气产供储销体系建设步伐加快，石油、天然气基础设施建设取得明显进展，油气核心需求供应能力稳步提升，能源进口战略通道布局不断完善，能源基础设施互联互通取得积极进展。战略性矿产资源保障能力得到明显提高和大幅增强，自然资源部联合有关部门加快实施了新一轮找矿战略突破行动，推动锂、钴、镍等重要矿产保有资源量实现增长。

（二）存在的主要问题与挑战

1．产业体系完整性受到挑战

一是面临产业外迁的风险和压力。在经济全球化背景下，产业在全球范围内优化布局是资源优化配置和整体福利增进的有效途径。但是，一些国家以意识形态划线，从地缘政治的角度推动产业链回流本土、近岸或者所谓的“友岸”，使得全球产业体系割裂的风险上升，部分产业链出现外迁，对产业体系完整性造成损伤。二是面临产业“脱实向虚”的压力。全球范围内的供应链重组和再制造化，导致全球产业竞争日趋激烈，制造业成本大幅上升，产能利用率趋于下降，利润空间受到挤压，使得产业链上大量中小企业面临较大的经营压力和不确定性担忧，融资成本相应增加，融资难问题凸显，导致大量资金由于找不到合理回报和出口在金融体系“空转”，而一些长期亏损行业或经营压力较大的行业可能会出现资本和经营主体退出的情况，从而影响产业体系完整性和供应链效率提升。三是部分地方对传统产业或铸造、印染等部分产业环节搞“一刀切”，造成产业链环节缺失或配套不完善，影响产业体系完整性。

2．保持并扩大先进性的痛点较多

一是先进技术获取路径发生变化，发达经济体对我国技术溢出效应减弱，我国技术获取成本相对抬高，企业出于长远战略考虑加大研发投入，短期会使得企业财务成本增加明显，基础研究能力的攀升和科技自立自强需要长期的耐心资本加持和更多制度化的创新政策供给。二是智能化绿色化改造过程中出现的不协调问题。我国制造业存在大量规模小、布局分散、种类繁多的中小企业，智能化绿色化转型遇到的问题千差万别，大中小企业、区域发展不平衡问题突出，部分大企业数字化智能化投资巨大却使用效率很低，部分中小企业面临“不转型等死、转型找死”的现实困境。一些地方追求“小而全”，低水平重复建设也会造成资源浪费，影响产业体系先进性目标的实现。三是保

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持产业体系先进性要求供给侧和需求侧协同发力，通过需求引领、供给创造实现联动升级，但全球范围内的市场扩大和升级速度低于预期，特别是高端市场、高端需求对产业升级的拉动作用趋于减弱，能够引发广泛社会需求和消费者追捧的新的“爆品”减少，会影响产业体系先进性发展的步伐。全球范围内经济恢复不如预期，也会影响就业和收入，对消费升级以及随之拉动的产业升级产生影响。

3．产业体系安全性风险仍不容忽视

一是“点”的安全仍存在风险点，主要包括关键技术、产品、原材料和设备等“断供”或者物流供应、能源供给得不到有效保障。二是“线”的安全存在隐患，主要表现为产业链供应链顺畅运行中存在的可能卡点和堵点，如物料衔接、货运组织等，创新链、产业链、资金链、人才链的协同等，运行效率下降等。三是“面”和体系安全能力提升面临制约，包括产业发展文化、设计理念、思想、产品研发、产品制造、产品物流、产品销售以及市场体系的再造和升级，可能出现的产业体系重构等问题。

三、加快构建现代化产业体系的主要路径

现代化产业体系在构建新发展格局、实现高质量发展和推进中国式现代化进程中具有重要地位和作用，必须明确产业结构调整、筑牢产业安全根基、畅通科技产业金融循环、加快建设世界级产业集群等构建路径，加快建设以实体经济为支撑的现代化产业体系，增强发展的安全性、稳定性和主动性。

（一）把握产业结构调整这个关键

习近平总书记明确指出，要抓住产业结构调整这个关键，推动战略性新兴产业、高技术产业、现代服务业加快发展（习近平，2023）。纵观主要发达国家和我国东部地区产业发展历程，顺应全球产业发展大势，及时调整优化产业结构是实现产业体系升级、经济领先发展和增强竞争力的关键举措。

一是实施新支柱战略。优先培育和大力发展一批战略性新兴产业，推动战略性新兴产业、高技术产业、现代服务业加快发展，构建产业体系新支柱，培育壮大新动能。重点在新能源与智能网联汽车、高端装备、新一代信息技术、绿色环保、人工智能与大模型、生物医药、新能源新材料等领域建设创新和公共服务综合体，鼓励多技术、多产品、多场景率先推广应用，推动战略性新兴产业融合集群发展。

二是实施新赛道战略。抢抓新一轮科技革命和产业变革机遇，瞄准类脑智能、区块链、量子信息、合成生物、基因技术、深海空天开发、未来能源等技术变革前沿和未来产业方向，组织实施未来产业孵化与加速计划，强化技术研发、人才、配套产业和新型基础设施等供给，布局建设一批未来产

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业技术研究院和未来产业发展先导区[9]，打造若干未来技术应用和产业跨界融合示范场景，加速未来产业从技术到产业化的进程，不断开辟新领域，制胜新赛道。

三是加快传统产业改造升级。要避免“贪大求洋”“喜新厌旧”的思维，避免“一刀切”的做法，持续推动传统产业改造升级，保持产业体系的完整性、多样性和体系性。继续深入实施增强制造业核心竞争力和技术改造专项，加大政策支持力度和普惠力度，鼓励更多中小企业应用先进适用技术，推动设备更新和新产品规模化应用。深入开展质量提升行动，继续高水平办好中国品牌日活动，推动制造业“增品种、提品质、创品牌”。发挥数字经济赋能实体经济作用，以智能制造为主攻方向推动产业技术变革和优化升级，推动互联网、大数据、人工智能同实体经济深度融合，做大做强数字经济。加大制造业绿色化转型支持力度，推动重点领域节能降碳改造升级，带动全行业绿色低碳转型。适应工业化发展规律，加快推动研发设计、现代金融、会计审计、会议会展、高端商务、现代物流等生产性服务业发展，深入推进制造业和现代服务业深度融合。加快繁荣发展餐饮住宿、养老、医疗、健康、文化创意、旅游休闲、购物娱乐等生活性服务业，构建优质高效服务业新体系。

（二）筑牢产业安全根基

现代化的产业体系是现代化国家建设的重要物质技术基础。产业安全是国家安全的重要内容和支撑力量。在国际环境错综复杂、全球产业链加速重构、各种“黑天鹅”“灰犀牛”事件影响叠加的背景下，要统筹好发展和安全，把维护产业体系的安全性放在更加突出的位置，努力构建自主可控、安全高效的产业链供应链，切实提升能源、资源和粮食安全保障水平，以高质量发展筑牢现代化产业体系可持续发展的安全根基。

一是继续打好产业基础高级化和产业链现代化攻坚战。实施好产业基础再造工程，聚焦制约产业基础能力提升和产业链现代化的基础零部件、基础元器件、基础软件、基础材料、基础工艺和产业技术基础等“六基”瓶颈短板开展集中力量攻关。对面向产业链重点领域、关键环节的基础研究提供长期稳定支持，完善基础研究成果评价机制，通过财政投入引导企业加大研发力度。强化重大创新成果迭代应用，进一步推进首台（套）装备、首批次材料、首版次软件示范应用。[10]坚持精准分类施策，促进短板产业补链、优势产业延链、传统产业升链、新兴产业建链，加快形成具有更强创新力、更高附加值、更安全可靠的产业链供应链（倪红福、田野，2021）。

二是提升矿产资源保供能力。建立健全关键矿产资源清单，制定持续的关键矿产资源国家战略，鼓励矿产资源领域中央企业围绕关键矿产资源清单积极参与全球矿产资源合作，加大国内找矿工作力度，构建面向生态和全产业链的关键矿产智慧治理体系。推动矿产资源回收再利用体系建

[9]《中华人民共和国国民经济和社会发展第十四个五年规划和2035年远景目标纲要》。
[10] 黄群慧：《建设完整性与先进性兼具的现代化产业体系》，《人民政协报》2023年7月13日，第3版。

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设，发展循环经济和再回收再利用平台。完善矿产资源储备体系和交易平台建设，着力增强矿产资源交易定价权、话语权。

三是提升能源安全保障水平。深入推进能源革命，通过大力发展风电、光伏等清洁能源，加大国内油气资源勘探开发力度，拓展传统能源运输通道和来源，加强能源产供储销体系建设等，切实提高能源自主安全保障能力。有序释放煤炭先进产能，推进煤电与可再生能源联营，促进多种能源互补，形成结构优化、清洁高效、安全稳定的能源发展格局。

四是切实保障好粮食安全。发挥各省粮食生产优势，统筹规划，实施分品种生产保障策略，提升粮食整体自给能力。加强耕地保护，持续推进高标准农田建设，严守18亿亩耕地红线。进一步加强种业技术攻关，加大力度推进种子库和种质资源保护利用建设，确保种源安全。营造粮食节约氛围，减少粮食在生产、流通、存储和加工环节的不必要浪费，打击粮食浪费行为。积极培育国际大粮商和跨国农业企业集团，推进生产、加工、仓储物流等全产业链布局。

（三）畅通“科技—产业—金融”循环

科技和金融就好比现代化产业体系的任督二脉，畅通“科技—产业—金融”循环，推动创新链、产业链资金链人才链深度融合，是构建现代化产业体系，保持产业体系“先进性”的重要途径。一是畅通科技—产业循环。聚焦现代化产业体系“先进性”的重要要求，坚决补上在技术积累和工业化基础方面的短板，着力深化科技体制改革，推动关键核心技术攻关持续突破，努力提升技术层次和水平，力争主要产业技术水平达到国际先进水平，加快实现高水平科技自立自强。深入推进全面创新改革试验，把产业体系和科技体系更好贯通起来，从制度上确立企业技术创新主体地位，畅通企业科技人才职称评审和院士评选通道，鼓励企业加大长期科技创新投入，根据产业实际需求加大科技研发或向全社会提出科技攻关需求，政府着力提供场景和采购订单等支撑，产学研多方合作做“有用的研究”，解决“科技—经济”两张皮问题。鼓励多行业交叉融合，推动数据资源开放共享，提升数据资源应用效能，解决部分行业长期存在的难题。

二是畅通产业—金融循环。促进金融和实体经济深度链接，聚焦现代化产业体系和实体经济升级发展方向，结合短板产业、优势产业、传统产业、新兴产业链不同环节不同阶段融资需求，调整优化金融机构布局和绩效考核评价要求。根据“力度要够、节奏要稳、结构要优、价格要可持续”的要求，着力构建多元化、运转高效的金融服务体系和健康的资本市场，为现代化产业体系建设的初创企业、中小微企业、专精特新企业和领军企业等提供精准有效的金融服务，解决经济“脱实向虚”问题。特别是，大力支持中小微企业、绿色发展、科技创新、制造业等重点领域，推动实体经济融资成本稳中有降，增强金融支持实体经济的可持续性，发挥好金融在促消费、稳投资、扩内需中的积极作用。

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三是实现供需联动升级。实现“科技—产业—金融”良性循环，给市场比给资金更重要。要充分发挥我国拥有的超大规模市场优势，实施需求扩张战略，推动供需联动，支持新产品和新技术在国内大市场尽快迭代优化升级，形成竞争优势后再去拓展国际市场。要加快建设全国统一大市场，建立完善国内行业标准、检验检测、认证认可和规则体系，形成产业链供应链内部尽快认可新技术新产品的生态体系，推动新动能产品和技术快速市场应用。支持场景创新和需求侧应用推广，用好用足超大规模市场优势，率先在国家重大工程、重大项目、城市建设等应用场景中使用国产新动能产品，增强全社会购买自主研发产品的意识，构建关键核心技术国产替代商用生态体系。强化新动能基础设施建设，支持有条件的地区推进5G、新算力、智能汽车测试场等新型基础设施适度领先布局。[11]

四是强化人才等高端要素保障。优化高校专业与课程设置，推动高校和企业、科研机构、事业单位等联合开展人才培养，根据现代化产业体系建设需求加快培育人工智能、生物医药、新能源、新材料等领域跨学科复合型人才。高度重视企业家人才、投资家人才和科学家人才，倍加珍惜爱护优秀企业家，鼓励实干兴邦，充分释放人才资源活力。进一步完善有关高端外籍人才来华工作、访学的政策，通过充满前景的科研项目、有国际影响力的科研平台、有强大凝聚力的科研团队、有竞争力的薪酬福利和完善的医疗教育保障等持续吸引留学生和外籍科学家与我国开展科技创新合作，使我国成为对海内外优秀科学家具有强大吸引力的人才高地。

（四）持续推进世界级产业集群建设

集群发展是产业发展的重要组织形态，也是当今全球产业竞争的重要形态和产业升级发展的主要路径（盛朝迅，2019b），要注重产业集群建设，通过集群强化各类企业技术经济联系，推动要素、资源向集群集聚。提高产业链上下游协作配套能力，着力打造世界级先进制造业集群、具有国际竞争力的数字产业集群、战略性新兴产业集群和现代服务业集聚区，巩固制造业体系完备性、提升现代产业的先进性。

一是以集群发展优化产业布局。坚持全国一盘棋，引导各地发挥比较优势，建设各具特色的先进产业集群，重点在专业化、差异化、特色化上下功夫，做到有所为、有所不为。

二是以集群发展强化企业主体培育。充分激发民营经济活力，围绕龙头企业供应链进行招商引资，完善产业链协作机制和集群公共服务平台。共同打造产业生态圈，培育一批在产业生态中具有控制力的主导企业和在细分产品市场位居全球或全国前列的“隐形冠军”“单项冠军”，壮大优质企业群体，加速形成世界一流企业。

三是以集群发展营造良好产业发展环境。坚持有效市场和有为政府更好结合，通过集群发展

[11] 王昌林、盛朝迅：《夯实新发展格局的产业基础》，《经济日报》2023年5月24日，第10版。

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促进技术创新和转化应用，适度超前布局基础设施和新型基础设施建设，推动高端化、智能化、绿色化转型，着力营造产业发展的良好生态。

四是以集群发展提升产业开放水平。围绕集群内企业发展需求，打造一批高水平、宽尺度、深层次开放平台和载体，形成对全球资源要素的引力场，吸引更多外资、外技、外智流入中国。依托集群内领军企业和园区平台等载体，加强产业链供应链国际合作，推动构建“两国双园”等跨境产业链合作新模式新路径，推动开放合作与协同创新，促进中国与全球产业链深度融合发展。

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Essential Characteristics and Pathways for Creating a Modern Industrial System

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Abstract: *Modern nations are built upon the material and technological foundation of the modern industrial system. It is important to identify the characteristics of intelligent, environmentally sustainable, and integrated industrial development, in addition to security, competitiveness, and integrity. Policymakers should be clear-eyed about what the industrial system means and entails. Taking into account the factors that influence industrial integrity, competitiveness, and security, it is recommended that the government promote industrial security via industrial restructuring, facilitate the flow of "technology, industry, and finance," endeavor to establish world-class industrial clusters, and construct a modern industrial system backed by the real economy in order to bolster the stability, security, and impetus of development.*

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The Report to the 20th CPC National Congress advocated the "construction of a contemporary industrial system." During its second study session, the Politburo of the 20th CPC Central Committee emphasized: "We should continue to prioritize the development of the real economy" and "construct an independent, secure, dependable, and competitive modern industrial system."[1] During its first session, the Central Commission for Financial and Economic Affairs (CCFEA) under the 20th CPC Central Committee recommended that "efforts be made to develop a comprehensive, competitive, and secure modern industrial system while advancing intelligent, green, and integrated industrial operations."[2] This signifies the determination of the CPC Central Committee with Comrade Xi Jinping as the core to pursue the second centennial goal and maintain a balance between security and development. The establishment of a modern industrial system is a prerequisite for the modernization of China to act as a foundation for a new paradigm of development, and prevail in future international competition. We must be mindful of the importance of accelerating the development of a modern industrial system, identifying its key principles and requirements, and charting a clear path forward in the context of turbulent changes in today's world while envisioning the rejuvenation of the Chinese nation (Zheng, 2023).

1. Requirements for Creating a Modern Industrial System

1.1 Industrial System for the Modernization Drive

The 20th CPC National Congress introduced the concept of an "industrial system for the

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[1] "Accelerate the Building of a New Development Pattern and to Make Development more Secure," *People's Daily*, February 2, 2023, page 1.
[2] Han Wenxiu, "Basic Requirements and Key Tasks for Accelerating the Construction of a Modern Industrial System," *People's Daily*, June 1, 2023, page 9.

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modernization drive," but research into the modern industrial system is not new. Comparable notions were expressed in the Reports to the 17th and 18th CPC National Congresses, including "constructing a new system for modern industrial development" and "developing a modern industrial system." The reference to an industrial system for the modernization drive is similar to the earlier notion of the "modern industrial system" in terms of historical evolution, practical rationale, and policy targets.

Both terms emphasize the progress of an industrial system. The term modern industrial system refers to industrial competition and level of development, and is the antithesis of industrial development that is disorganized, fragmented, erratic, low-level, and lacking in distinctiveness. The Report to the 17th CPC National Congress, in response to challenges in China's economic structure and shifts in the international division of labor, advocated for the establishment of a modern industrial system as a means of improving China's economic structure and promoting systematic industrial development. This recommendation was new and unprecedented. With the objective of improving China's economic structure, the Report to the 20th CPC National Congress outlined a plan to "construct an industrial system for the modernization drive": Fortify leadership in advantageous industries, establish the digital economy, develop a new service sector system characterized by superior quality and efficiency, encourage the coordinated and integrated growth of strategic emerging industries, and construct a modern infrastructure system.

Both terms emphasize the importance of modernizing the industrial system. Prioritized in the *Outline of the 12th Five-Year Plan* were "substantial job creation, advanced technology, clean and secure development, and high value addition." The *Outline of the 13th Five-Year Plan* emphasized "environmental friendliness, high-quality services, and close collaboration." Both imposed additional requirements on a modern industrial system, that it is environmentally sustainable, technologically sophisticated, and efficient. The notion of an "industrial system for the modernization drive" was introduced in the Report to the 20th CPC National Congress. This document underscored the importance of developing advanced, intelligent, and environmentally sustainable manufacturing processes, as well as establishing an effective and streamlined distribution network. The first session of the Central Commission for Financial and Economic Affairs under the 20th CPC Central Committee emphasized the importance of integrating global innovation factors and fostering intelligent, environmentally sustainable, and integrated industrial development,[3] in this way, creating a knowledge and technology-driven industrial system characterized by innovation and value addition.

In addition, both terms focus on problem solving and the setting of strategic objectives. As stated at the 17th CPC National Congress, it is necessary to build a modern industrial system that integrates informatization and industrialization in order to address gaps in the integration in the industrial sector, as well as improve the quality of development, add industrial value and enhance competitiveness, strengthen equipment manufacturing, and boost productivity. The Report to the 19th CPC National Congress provided a distinctive problem-oriented approach to building an industrial system characterized by coordinated development of the real economy, innovation, modern finance, and human resources. The objective was to tackle challenges such as the unchecked expansion of the virtual economy and the contradictions of innovation, finance, and human resources, balancing them with the needs of the real economy. The Report to the 20th CPC National Congress advocated the establishment of a "modern industrial system" that prioritized security, competitiveness, and integrity to establish a modern industrial system that should be independent, secure, dependable, and competitive in order to facilitate the realization of the modernization of China and the establishment of a new paradigm for development, among other strategic priorities.

From a "modern industrial system" to an "industrial system for the modernization drive," as the policy statements advocate, China's industrial system is to be modernized to undergo these significant

[3] Han Wenxiu, "Basic Requirements and Key Tasks for Accelerating the Construction of a Modern Industrial System," *People's Daily*, June 1, 2023, page 9.

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changes as follows:

First, the industrial structure must be transformed. We should take advantage of opportunities presented by shifts in the global industrial landscape and establish a modern industrial system that expands into new territories and is successful in new areas. Instead of relying on established industrial sectors, which make up a substantial portion of the economy at the moment, it is important to cultivate emerging industries that will become the driving forces of economic growth.

Secondly, the trajectory of development must be adjusted. The modern industrial system requires the traditional factor-driven path of industrial development to be transformed into an innovation-driven one. Technological, institutional, and business mode innovations should be fostered in order to bolster factor productivity, facilitate the circulation of "technology, industry, and finance," enhance the competitiveness of China's economy, amplify development momentum, and advance innovation-driven development that cultivates technological, intellectual, and talent resources.

Third, the modern industrial system requires effective linkages and coordination between innovation, modern finance, human resources, data, and other high-end factors. It also requires the provision of specialized services in accordance with the needs of industrial development at various stages, categories, and situations. The outcome is an organizational system and industrial paradigm that facilitates circulation and enhances the efficiency of factor allocation. This will enable the nation to emerge as a prominent global center for the distribution of financial, technological, industrial, and data resources.

The phrase "industrial system for the modernization drive" has the following implications: First, it focuses on the process of modernizing the industrial system. Second, it reflects a broader concept in that the industrial system's progress toward modernization includes not only industrial progress and system development, but also infrastructure modernization, supportive factors, and even industrial development, urbanization, informatization, digitalization, and agricultural modernization. Similarly, industrialization encompasses more than just industrial development. Third, it demonstrates a stronger link between Chinese modernization and the establishment of a modern economic system. With the theme of Chinese modernization in mind, the Report to the 20th CPC National Congress advocated "modernizing the industrial system."

Table 1: Descriptions of the Modern Industrial System in China's Key Policy Documents

Time	Source	Description
October 2007	*Report to the 17th CPC National Congress*	Develop a modern industrial system, integrate informatization and industrialization, enhance industrial competitiveness, strengthen equipment manufacturing, and phase out backward capacities
March 2011	*Outline of the 12th Five-Year Plan for National Economic and Social Development of the People's Republic of China*	Develop a modern industrial system with a reasonable structure, advanced technology, clean and safe operations, high value addition, and strong job creation
November 2012	*Report to the 18th CPC National Congress*	Strive to create a new system for modern industrial development
March 2016	13th Five-Year Plan for National Economic and Social Development of the People's Republic of China	Expedite the development of a new modern industrial system characterized by ingenuity, good quality of services, close collaboration, and eco-friendliness
October 2017	*Report to the 19th CPC National Congress*	Strive to develop an industrial system for the coordinated development of the real economy, technology innovation, modern finance, and human resources.
January 30, 2018	Third Collective Study Session of the Politburo of the 19th CPC Central Committee	Construct an industrial system led by innovation and coordinated development

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Table 1 Continued

Time	Source	Description
March 2021	*Outline of the 14th Five-Year Plan for National Economic and Social Development and Vision 2035 of the People's Republic of China*	Keep the focus of economic development on the real economy, and create a modern industrial system for the coordinated development of the real economy, technology innovation, modern finance, and human resources.
October 2022	*Report to the 20th CPC National Congress*	Modernize the industrial system
December 2022	Central Economic Work Conference	Expedite the development of a modern industrial system
January 2023	Second Collective Study Session of the Politburo of the 20th CPC Central Committee	Develop an independent, secure, reliable and competitive modern industrial system
May 2023	First session of the Central Commission for Financial and Economic Affairs under the 20th CPC Central Committee	Promote intelligent, green and integrated industrial development, and build a complete, advanced and secure modern industrial system.

Source: Compiled based on relevant conference documents.

1.2 Characteristics and Requirements of the Modern Industrial System

The characteristics of the modern industrial system have been thoroughly explored by academics. The modern industrial system, according to Sheng (2019a), is defined by innovation, factor coordination, complete value chains, and competitiveness. Efforts should be made to improve quality, efficiency, dynamism, total factor productivity (TFP), and core industrial competitiveness through institutional processes, factor cultivation, business entities, and industry growth. Huang and Sheng (2023) elaborated the implications of the modern industrial system by considering the two aspects of horizontal industrial composition and vertical industrial capabilities. They believe that the modern industrial system, which includes advanced manufacturing, modern services, modern agriculture, and modern infrastructure, should be led by strategic emerging industries. The modern industrial system is defined by the growing sophistication of the industrial foundation, a rational industrial structure, a modern industrial chain, and integration of the digital and real economies. As such, the modern industrial system should be fueled by innovation, integration, structural improvement, green and intelligent operations, security and self-sufficiency, a high level of openness, competitiveness, and a desirable economic return. Liu (2023) asserts that the modern industrial system can be defined not only by the degree of industrial performance, effective manufacturing-marketing linkages, the proper ratio of industries, the degree of integration between industrial sectors, and the completeness of infrastructure, but also by its role in advancing modernization, innovation leadership, security, resilience, openness, competitiveness, and the sustainability of development.[4]

The first session of the Central Commission for Financial and Economic Affairs under the 20th CPC Central Committee pledged to "promote intelligent, eco-friendly, and integrated industrial operations, and build a complete, advanced, and secure modern industrial system", which is an insightful summary of the modern industrial system's characteristics and requirements.

Intelligent, eco-friendly, and integrated operations are characteristics of industrial sophistication around the world. It is also an important step toward developing a modern industrial system.

First and foremost, intelligent operations are an ongoing theme in human industrial and technological revolutions. Since the mechanization age, electrification, informatization, digitalization, and the AI-based revolution have accelerated industrial automation and intelligence. This has revolutionized people's ways of life and work, boosted productivity, and given leading nations a global

[4] Liu Zhenzhong, "Understanding the Modern Industrial System," *Economic Daily*, February 14, 2023, page 10.

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industrial competitive edge. China's success or failure in global competition, as well as its position in the global division of labor, are dependent on its ability to make the first move in the global transition to intelligence. In order to build a modern industrial system, we must seize the opportunities that come with a new round of technological revolution and industrial change, race to achieve breakthroughs in new technologies such as artificial intelligence and next-generation information technology, integrate smart technology applications with social and economic development, and strive to take the strategic high ground of global industrial intelligenization.

Second, eco-friendliness is critical for the harmonious relationship of man and nature. Humanity's acquisition of natural resources and energy consumption has both increased in tandem with rising global industrialization. Hence, the human-nature relationship has become more intense, as indicated by more frequent extreme weather events and climate change. The Earth is the only habitat available for the human race. The entire world must work together to achieve harmony between man and nature, to respect and protect nature, to encourage green industrial development, and to revamp the energy and industrial structures in ways that promote sustainable growth. Green technology and green rules have become focal points of a new wave of global industrial competition. Countries must develop green technologies and green products in order to establish new drivers of the green economy.

Finally, integration is a common element of a modern industrial system and a crucial channel for its actualization. Industry is made up of many subsectors, and no industrial growth can be achieved without the material and technological assistance of a variety of sectors. For example, the high-quality development of the IT industry is dependent on advances in equipment and material technology. Chips and big data are critical for advances in biotechnology. Integration of sophisticated manufacturing and modern services, as well as digital and real economies, is an essential part of China's manufacturing revolution and upgrading. Deep integration of primary, secondary, and tertiary industries, as well as the integration of ground-breaking technologies in relevant fields, is critical for developing new technologies, products, and business models.

Integrity, sophistication, and security are fundamental parts of the modern industrial system. Integrity refers to the completeness of the industrial system and sectors and is essential for industrial security. China should continue to strengthen and promote its industrial integrity. Sophistication refers to industry's global leadership in technology, structure, standardization, infrastructure, processes, methodologies, and concepts. The level of sophistication is a key indication of the current industrial system's cutting-edge nature. Increasing sophistication is an important way for industries to transition and upgrade and is a path to competitiveness and development. It is essential for the creation of new competitive advantages. Without sophistication, the country will be trapped in low-value operations or suffer security issues with chokepoint technology. We must improve industrial development through innovation by focusing on technology, talent, and creativity. Security refers to an industrial system's self-protection, risk resilience, and self-restoration. Balancing development and security is a prerequisite for constructing a modern industrial system. Security, integrity, and sophistication are interconnected. There can be no development without security, and security cannot exist without development. Previously, we prioritized cost and efficiency in industrial development. However, without security, integrity and sophistication will suffer and be weakened. Security may come at the expense of cost and efficiency in the short run. Yet it is beneficial to the establishment of new industrial strengths in terms of accomplishing integrity, sophistication, and security in the long run. This will encourage industries in countries and regions that lack a competitive advantage in one or more of those aspects to relocate to China, strengthening our overall competitiveness.

Integrity, sophistication, and security are prerequisites for developing a modern industrial system. The three elements are interconnected and complementary. A comprehensive approach is necessary to make coordinated progress on various fronts.

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2. Progress and Problems in China's Development of a Modern Industrial System

2.1 Progress and Achievements of China's Development of a Modern Industrial System

2.1.1 China boasts the most complete industrial system in the world with strong supporting capabilities

China has made significant efforts to build a modern industrial system based on the real economy, develop advanced manufacturing, maintain a stable manufacturing proportion of the economy, and encourage steady manufacturing growth. China's manufacturing value-added reached 33.52 trillion yuan by 2022, accounting for 27.7% of the GDP, and China's share of global manufacturing activity rose from roughly 20% in 2012 to around 30% by 2022[5]. Since 2010, China has ranked first in the world for 13 years in a row, outpacing the combined production capacities of the world's second and third largest manufacturing nations. In comparison to the global manufacturing value-added, which accounts for 16.5% of the global GDP, China's manufacturing capacity has far outstripped the global average. China maintains the highest level of industrial system integrity globally, encompassing broad, medium, and small categories. It is the only country that has all of the industrial sectors included in the UN industry classification. It leads the world in the production of more than 40% of 500 important industrial products. It produces more than half of the world's crude steel, cement, electrolytic aluminum, flat-panel glass, and industrial robots, as well as more than 60% of new energy cars, household appliances, microcomputers, and chemical fiber products, and more than 70% of lithium batteries, solar cells, and mobile phones. Without question, China is a global manufacturing powerhouse, with a variety of industrial sectors, competitive product manufacturing capability, an adequate infrastructure, comprehensive industrial support capability, rapid product commercialization, and considerable cost and efficiency advantages.

2.1.2 Building an advanced industrial system and accelerating intelligent and green operations

China's emerging industries have flourished, as shown by the country's industrial structure. High-tech manufacturing and equipment manufacturing accounted for 15.5% and 31.8% of value-added from large industrial enterprises in 2022, respectively, up 6.1 and 3.8 percentage points from 2012. By 2022, China had some 400,000 high-tech enterprises, up from 390,000 in 2012, as well as 500,000 small and medium-sized tech firms, and 762 companies had joined the global top 2,500 enterprises in terms of R&D spending. Nearly 12,000 "little giant" firms and over 70,000 small and medium-sized specialized enterprises delivering novel goods have been nurtured in China.[6] China's manufacturing industry has become more inventive in terms of technology, and now leads the world in third-generation nuclear power, 5G commercialization, supercomputing, high-speed rail, and new energy vehicles. It is nearing completion of a transformation from a follower to a parallel runner and even forerunner in certain fields. Significant progress has been made in the creation of smart factories. In China, 110 plants meet globally advanced levels of smart manufacturing. China has built around 2,100 digital workshops and smart factories[7], as well as 50 beacon factories, accounting for 38% of the world's total[8]. China's industrial robot density has expanded 15-fold to 392 units per 10,000 workers, representing a significant increase in the penetration of industrial robots. The advent of smart manufacturing system integration solution providers with regional and industry prominence has boosted manufacturing efficiency, reinforcing

[5] Cong Liang, "Making Solid Efforts to Develop a Modern Industrial System with the Real Economy as the Backbone," *Economic Daily*, June 7, 2023, page 1.

[6] Wang Zheng, " In 2022, China's Total Industrial Added Value Exceeded 40 Trillion Yuan, and the Scale of Manufacturing Ranked First in the World for 13 Consecutive Years," *People's Daily*, March 18th, 2023.

[7] The Ministry of Industry and Information Technology, "China Has Built over 2,100 Digital Workshops and Smart Factories," https://www.cnii.com.cn/rmydb/202303/t20230301_450779.html.

[8] "China's 'Beacon Factories' Increased to 50, Continuing to Rank First in the World," https://baijiahao.baidu.com/s?id=1754981634641358959&wfr=spider&for=pc.

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China's global leadership in the scope and sophistication of smart manufacturing applications. Green and low-carbon circular development has made steady progress, as indicated by the establishment of green firms and campuses, resulting in an increase in the supply of green products as well as the development of green supply chains. Rapid progress has been made in manufacturing-service integration, as well as explorations for new business modes, paradigms, and paths for the development of manufacturing and services. Manufacturing services such as R&D outsourcing, supply chain management, flexible manufacturing, and full-lifecycle management, as well as producer services, have seen steady advancements. The high-quality development of the service sector has made steady progress.

2.1.3 Increasing the level and support of industrial security

China has worked hard to strengthen its industrial basis while also improving the iteration and application of technological discoveries. It has fostered the development of the supply chain ecosystem in places such as Zhuzhou, Hangzhou, Wuhan, Chengdu, Ningde, Weifang, Nantong, Hefei, Guangzhou, Shenzhen, Baotou, and Qiqihaer. These supply chain ecosystems are linked, coordinated, and led by dominant supply chain firms, with the goal of increasing supply chain self-reliance. The construction of high-quality farms has made steady progress. Agri-technology is a growing contributor to agricultural output growth, resulting in major gains in agricultural yield and the mechanization of facility agriculture. China's grain output has topped 650 billion kg for eight years in a row, with a per capita level greatly exceeding the global average. The nation has achieved basic green self-sufficiency and absolute food supply security. The country has steadily improved the structure of its coal output, accelerated the development of coal, electric power, oil and gas production, storage, and distribution systems, and greatly accelerated the construction of oil and gas infrastructure. Steady progress has been made in essential oil and gas supply capacity, strategic energy import corridors, and energy infrastructure interconnectivity. The assurance of strategic mineral resources has increased significantly. The Ministry of Natural Resources has conducted a fresh round of mineral resource searches in partnership with other ministerial agencies in order to increase the inventory of important mineral resources such as lithium, cobalt, and nickel.

2.2 Problems and Challenges

2.2.1 Challenges to industrial system integrity

First, in the context of economic globalization, industrial relocation can help to optimize resource allocation and improve overall welfare. However, for geopolitical reasons, some countries are reshoring, near-shoring, or friend-shoring supply chains, raising the possibility of segmentation in the global industrial system. Some supply chains have moved elsewhere, compromising the integrity of the industrial system. Another issue is the increasing cost of finance. Global supply chain rearrangement and reshoring have increased competition and manufacturing costs. As a result, both the operating rate and the profit margin have decreased, creating severe challenges and uncertainties for many small and medium-sized businesses. Due to rising finance costs and decreasing accessibility, a significant amount of capital in the financial system is not being used due to a lack of a suitable return and outlet. Some loss-making sectors are expected to see capital and operating entities leave, threatening the integrity of the industrial system. Third, some communities have taken a one-size-fits-all approach to traditional sectors like steel foundry and dyeing, resulting in supply chain gaps, hurting the integrity of the industrial system.

2.2.2 Challenges to maintaining and increasing industrial sophistication

First, there have been challenges to acquiring advanced technology. The cost for China to acquire new technologies has increased as the spillover effect of developed economies has decreased. Due

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to long-term strategic considerations, businesses have increased R&D spending, making company financial costs greater in the short run. Increasing technological autonomy and self-sufficiency requires more investments of capital over the long term, as well as a more robust innovation policy. Second, coordination issues hamper eco-friendly and smart building upgrades. Numerous small and medium-sized enterprises (SMEs) that are distributed across China's manufacturing industry's regions and sectors encounter various obstacles in pursuing green transition. There is a considerable degree of disparity in development across firms of various sizes and geographies. Most large corporations have made significant yet ineffective digital and intelligent investments. For some SMEs, whether they accept change or not is critical to their existence. Some communities have engaged in low-level repetitious construction, wasting resources and creating impediments to increased sophistication of the industrial system. Third, maintaining a high degree of sophistication in the industrial system requires coordinated efforts on both the supply and demand sides to bring about coordinated upgrades driven by both demand and supply. However, global market expansion and upgrade have been slower than anticipated. The high-end market and high-end demand, in particular, have played a diminishing role in driving the upgrading of the industry. The production of fewer sensational products, which may otherwise increase consumer demand, has reduced the rate of increased industrial sophistication. The underwhelming global economic recovery also has had an impact on employment and income, affecting consumption and industrial upgrading.

2.2.3 Industrial security risks needing attention

First, there is the security risk of choke points, such as supply disruptions of essential technologies, products, raw materials, and equipment, and the lack of energy security. Second, supply chain security risks include potential problems in the coordination of material and freight transportation, as well as coordination between innovation chains, supply chains, capital chains, and talent chains, and operational inefficiencies. Third, there is the risk of encountering barriers to improving security capabilities, such as re-engineering and upgrading industrial development culture, design concept, R&D, manufacturing, logistics, sales, and market systems, as well as potential challenges to industrial system restructuring.

3. Key Pathways for Constructing the Modern Industrial System

The modern industrial system is essential to establish a new development paradigm, attain high-quality development, and further Chinese-style modernization. It is critical to identify the direction of industrial restructuring, strengthen the foundation of industrial security, facilitate financial circulation for tech industries, and accelerate the development of world-class industrial clusters in order to create a modern industrial system supported by the real economy and improve the security, stability, and initiative of development.

3.1 Focusing on Industrial Restructuring

General Secretary Xi Jinping underlined the need to promote industrial restructuring and expedite the development of strategic emerging industries, high-tech sectors, and modern services (Xi, 2023). As shown by the industrial development journeys of major developed countries and China's eastern region, adjustment of the industrial structure in accordance with global industrial development trends is critical in order to upgrade the industrial system, promote economic growth, and increase competitiveness. The following priorities merit our attention. First, a new pillar strategy should be implemented. The government should encourage the development of key industries, as well as high-tech industries and modern services, in order to build new pillars for the industrial system and cultivate fresh vitality. Priority should be given to developing new energy and intelligent connected vehicles, high-end equipment, next-generation information technology, eco-friendliness, AI and large language model,

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biomedicine, and new energy and new materials. These technologies, products, and applications should be implemented in order to promote the integrated growth of strategic emerging sectors.

Second, a new track approach should be taken. The current wave of technological revolution and industrial change should be taken advantage of by focusing on areas such as artificial intelligence, quantum information, synthetic biology, deep-sea and airspace development, genetics technology, and future energy, among other frontiers and directions of technology change. The Future Industrial Incubation and Acceleration Program[9] should be implemented, the supply of talent, R&D, supporting industries, and new infrastructure should be increased, a network of future technology research academies and product development zones should be created, and demonstrative technology applications and cross-sectoral industrial integration should be initiated to speed up the commercialization of technologies, explore new domains, and triumph in new arenas.

Third, conventional industries which need to be upgraded more rapidly should not be treated in a one-size-fits-all manner by policymakers. Instead, the renovation and upgrading of old industries should be encouraged in order to preserve the industrial system's integrity, diversity, and systematic nature. Special programs to improve core manufacturing competitiveness and technology, boost policy support and inclusivity, encourage SMEs to embrace modern technology and equipment, and promote product commercialization should continue to be conducted. Quality improvement programs, such as the Chinese Brand Day event, should be carried out in order to boost manufacturing products, enhance quality, and develop brands. The digital economy should help the real economy by increasing energy efficiency, lowering carbon emissions in essential industries, and hastening the transition to green and low-carbon manufacturing. Modern services should be integrated with manufacturing, and producer services including R&D design, modern finance, accounting and audit, conferences and exhibitions, high-end commercial services, and modern logistics should be developed. It is also critical to develop consumer services such as catering, hotels, senior care, health and wellness, culture and creativity, travel and leisure, and shopping and entertainment, as well as to establish a new system of high-quality and efficient services.

3.2 Bolstering the Foundation of Industrial Security

The modern industrial system is the basis of China's modernization. Industrial security is a vital aspect of national security. In such a situation that the impacts of various "black swan" and "grey rhino" events, the complex international environment and the restructuring of the global value chain are adding together to the complication, it is important to strike a balance between development and security, to prioritize industrial security, and to aim for independent, secure, and efficient supply chains. The goal is to promote food security and reinforce the security of modern industrial development. The first objective is to improve the sophistication of the industrial system and modernize supply chains. Efforts should be made to solve the impediments to improving industrial capabilities and modernizing supply chains, which include basic parts, basic components, basic software, basic processes, and basic industrial technologies. Long-term support should be given to research in essential areas and processes of the industrial chain, the evaluation of basic research outcomes should be improved, and firms should be provided with tax incentives to boost R&D spending. The iteration and application of important innovation breakthroughs should be increased.[10] To develop more innovative supply chains with higher value-added and greater safety and security, the government should implement policies that complement, extend, upgrade, and establish value chains for underdeveloped, advantageous, traditional, and emerging

[9] "Outline of the 14th Five-Year Plan for Economic and Social Development (2021–2025) and Long-Range Objectives through the Year 2035 of the People's Republic of China."

[10] Huang Qunhui, "Constructing a Complete and Advanced Modern Industrial System," *The Chinese People's Political Consultative Conference Journal*, July 13, 2023, page 3.

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industries (Ni and Tian, 2021).

Second, the supply of mineral resources should be increased. An inventory of critical mineral resources should be created, a national strategy for critical mineral resources should be developed, and central SOEs in the field of mineral resources should be encouraged to engage in global partnerships for assessment of the critical mineral resources listed in the inventory; greater efforts should be made to identify domestically located mineral resources, and a system by which critical mineral resources could be managed should be created for business ecosystems and complete value chains. A system for mineral resource recovery and recycling should be created, as well as platforms for the circular economy and recycling. The mineral resource reserve system and transaction platform should be improved, focusing on mineral resource pricing power.

Third, the level of energy security should be raised. The energy revolution should be used to develop wind power, photovoltaic and other clean energy sources, increase domestic oil and gas exploration and development, and promote the complementarity of various energy sources to create an energy landscape characterized by structural optimization, clean and efficient operations, and secure and stable development.

Fourth, food security should be ensured. Provinces should conduct overall planning and execute product-specific production policies based on their individual capabilities in grain production to increase grain self-sufficiency. Efforts should be made to increase arable land output, build high-quality farms, and protect the country's minimum 120 million hectares of arable land. Research on seed technology should be increased, as well as seed bank development and seed resource protection, to assure seed security. Public awareness of the importance of minimizing food waste in the production, distribution, storage, and processing chains of food should be raised. Major global grain corporations and multinational agribusinesses should be fostered to develop entire value chains, including production, processing, storage, and logistics.

3.3 Facilitating Technology-Industry-Finance Circulation

Technology and finance form the lifeblood of the modern industrial system. Smoothing the technology-finance circulation and integrating the innovation, industrial, capital, and talent chains are essential to creating a modern industrial system and achieving industrial progress. The primary aim is to improve the interaction of technology and industry. To increase the sophistication of the modern industrial system, it is necessary to compensate for shortcomings in technology and industrial strength, to deepen institutional reforms, and to make constant progress in the development of critical technologies to achieve world-class levels and technology independence and self-reliance. The government should integrate the industrial system with the technology research system through comprehensive innovation reforms, and establish firms as technology innovators. Opportunities should be created for corporate technologists to advance in their careers, and corporations should be encouraged to invest more in technological innovation. Businesses should expand their spending on R&D. More collaboration between industry, academia, and research institutions is needed to overcome the technological-economic divide. Policymakers should promote cross-sectoral overlap and integration, expand open access to data resources, improve the value of data resources, and address persistent issues confronting certain sectors.

Second industry-finance circulation should be facilitated. The government is advised to combine finance with the real economy, to focus on the modern industrial system and the real economy's development trends, and to modify the layout and performance evaluation criteria of financial institutions. A diverse and well-functioning financial survey system and a healthy capital market should be established in accordance with the requirements of adequate strength, consistent pace, structural optimization, and sustainable pricing in order to provide targeted financial services to start-up businesses, small, medium-sized, and micro businesses, and enterprises specialized in manufacturing precision, unique, and novel products. Financial services should assist the real economy. Small, medium-sized, and

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micro businesses, as well as priority areas such as green development, innovation, and manufacturing, should be given special attention in order to reduce the financing cost of the real economy, increase the sustainability of financial support to the real economy, and better utilize the finance industry's role in stabilizing investment and expanding domestic consumption.

Third, the supply-demand match should be improved. Market demand is more important than financial support in maintaining the positive cycle of technology, industry, and finance. A demand expansion strategy based on China's ultra-large market advantage should be implemented; the optimization and upgrade of new products and technologies in the local market should be accelerated, and should be extended into the international market once a competitive advantage has been established. Steps should be taken to create a unified national market, establish comprehensive domestic industry standards and rules for inspection, testing, certification, and source recognition, in order to create an ecosystem for the recognition of new technologies and products in supply chains, and to accelerate the market application of products and technologies. Innovation and demand-side applications should be supported, our ultra-large market advantage should be capitalized on by incorporating indigenous new-dynamism products into major national projects and urban construction, the public should be encouraged to purchase home-designed products, and a business ecosystem should be built for the adoption of domestic core technology. The building of new-dynamism infrastructure should be increased and qualified regions should be assisted in taking the lead in the development of new infrastructure such as 5G, computing power, and smart vehicle test fields.[11]

Fourth, talent and other high-end factors should be assured. In accordance with the modern industrial system, educational authorities should optimize university majors and curricula, promote joint educational programs between universities and businesses, scientific research institutions, and government-affiliated agencies, and increase the cultivation of cross-disciplinary professionals in the fields of AI, biomedicine, new energy, and new materials. Entrepreneurs, investors, and researchers all deserve a lot of credit. Care and support for great entrepreneurs should be encouraged while also unleashing the vitality of human resources. Improvements should be made in the arrangements for highly qualified expatriates to work and study in China, as should efforts to recruit international students and scientists to collaborate with Chinese institutions on scientific research and innovation. To this end, government incentives such as forward-looking scientific research programs, internationally influential research platforms, unified scientific research teams, competitive remuneration, and assurances of healthcare and education should be provided. The goal is to make China a magnet for top scientists from both home and abroad.

3.4 Developing World-Class Industrial Clusters

Regional clusters are important for industrial development. They are vehicles for global industrial competition and avenues for industrial upgrading and development (Sheng, 2019b). The establishment of industrial clusters should be prioritized in order to strengthen technological and economic links between firms of all sorts and to encourage the concentration of production factors and resources. Efforts should be made to improve upstream and downstream industry coordination, to establish advanced world-class manufacturing clusters, internationally competitive digital industry clusters, strategic emerging industry clusters, and modern services clusters, and to improve the integrity of the manufacturing system and the sophistication of modern industries.

To start with, the government is advised to optimize industrial layout via clustered development. Policymakers should consider the entire country as a single chessboard, directing regions to make the most of their unique strengths, encouraging the growth of specialized, high-tech industrial hubs, and

[11] Wang Changlin, and Chaoxun Sheng, "Strengthening the Industrial Foundation of the New Development Paradigm," *Economic Daily*, May 24, 2023, page 10.

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emphasizing the importance of expertise, specialization, and distinctiveness. Localities should focus on their strengths rather than trying to be all things to all people.

Second, corporate entities should be cultivated through clustered development. The government should unleash the dynamism of the private sector, promote investment in supply chains of leading enterprises, and develop coordination of the supply chain and public service platform for industrial clusters. Local governments should collaborate to construct industrial ecosystems, promote a group of leading enterprises and industry champions, increase high-quality enterprises, and develop world-class enterprises.

Third, foster industrial clusters to create a favorable atmosphere for industrial development. It is recommended that an effective market be combined with a capable government, that technology innovation and application be encouraged, that infrastructure be built to meet future needs, that high-end, smart, and green transitions be promoted, and that efforts be made to build a business ecosystem suitable for industrial development.

Fourth, improve industrial openness through clustered development. It is recommended that a set of competent platforms and economic openness vehicles be established to meet the development needs of firms within each cluster in order to draw global resources and factors to China. International supply chain cooperation should be strengthened in order to explore new business modes and pathways, such as "two countries, two parks" for cross-border industrial chain cooperation, in order to promote integrated industrial chain development.

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