数实融合下的新质生产力发展：发展优势、内在逻辑与实践方向

周亚虹　郎旭华*

上海财经大学经济学院

摘　要：实体经济和数字经济的深度融合（以下简称“数实融合”）发展，正在成为中国经济高质量发展的新动能、新增长极。数实融合下的新质生产力发展，具有要素提质增效、深化分工协作、拓宽市场空间和创新资源配置等四方面优势。它们贯穿从微观企业生产过程到宏观经济运行机制革新的各个方面，为新质生产力发展提供内在动力。以产业高质量发展为主线，数实融合的这些独特优势贯穿于新质生产力发展逻辑始终，即在产业层面深化专业化生产、在产业链层面重构产业关联、在产业集群层面实现资源聚合，最终通过创新资源配置，形成更大范围、更强协同的现代化产业体系，从而构建起了一个相互串联、彼此贯通、结构立体的新质生产力发展体系。面对当前中国数实融合下新质生产力发展存在的问题，要着力通过完善要素市场化机制、产业创新机制、新产业与新业态投融资机制和相应的制度体系框架，充分释放数实融合发展的技术优势、系统优势、协同优势，为新质生产力的更好发展提供坚实支撑。

关键词：新质生产力　数实融合　发展优势　实践方向

JEL 分类号：E66, O11, P26

一、引言

中国共产党第二十届中央委员会第三次全体会议明确指出“健全促进实体经济和数字经济深度融合制度”，并进一步从加快推进新型工业化、加快构建促进数字经济发展体制机制、完善促进数字产业化和产业数字化等若干方面作出新的战略部署。中国共产党第二十次全国代表大会以来，加快建设数字中国，不断做强做优做大数字经济，始终是中国的一项重要战略部署。以发展实体经济为核心发展数字经济，也是中国顺应新一轮科技革命和产业变革新机遇的必然选择。面向新质生产力的发展，实体经济和数字经济深度融合需要更加突出整体性、系统性、协同性，更加注重实体经济发展的核心地位、更加注重数字经济赋能实体经济提质增效的重要作用。可见，数实融合正在成为中国经济高质量发展的新动能、新增长极。

* 联系人：郎旭华，邮箱：langxuhua@mail.shufe.edu.cn。

基金项目：国家自然科学基金重点专项项目“政策试点改革中的策略性互动行为建模与仿真优化研究”（项目批准号：72342034）；国家资助博士后研究人员计划“数实融合下的经济发展韧性：总体逻辑、形成机理与制度建构”（项目批准号：GZC20231521）；上海市教育发展基金会和上海市教育委员会“晨光计划”项目。

中国知网 https://www.cnki.net

促进实体经济和数字经济深度融合是建设现代化产业体系的必然要求，数实融合在国民经济中的地位和作用进一步凸显。从总量看，2023年中国数字经济占GDP比重达到42.8%，对GDP增长贡献率达66.45%；从结构看，2023年产业数字化占数字经济比重进一步提高，达到81.3%，第二产业数字经济渗透率首次超过25%，实体经济和数字经济融合发展持续拓展深化[①]。同时，数字经济的发展有助于打破地理空间的固有局限，更好挖潜本地优势资源禀赋、聚合形成区域内特色产业集群、不断优化区域间产业协同布局，从而在技术革命性突破、生产要素创新性配置、推动产业深度转型升级等方面成为催生和发展新质生产力的重要抓手。

对于数字经济与新质生产力发展之间的关系，理论界已有了热烈探讨。李晓华（2019，2023）、胡莹（2024）、孙绍勇（2024）等学者普遍认为，新质生产力颠覆性创新、产业链条新、发展质量高的一般特征，同数字技术的融合性、渗透性特征内在相合，因此，数字经济发展形成的新技术、新要素、新业态等是新发展阶段经济发展新动能的具象表现，数实融合是经济高质量发展的时代特征。就发展实践来看，任保平和王子月（2023）认为数实融合下形成的数字新质生产力是新质生产力的一种具体表现，也是经济高质量发展的基础要素；沈坤荣等（2024）认为数字技术的持续创新对生产方式的变革，是推动新质生产力形成和赋能经济高质量发展的主要方式；洪银兴（2024a，2024b）则指出数字经济的发展在建设现代化产业体系中具有重要作用，为新质生产力的发展提供了良好的发展条件。现有研究尽管对数实融合下的新质生产力发展有了较为全面的认识，但在整体性、系统性上还有待进一步发展。本文在现有研究的基础上，科学认识数字经济的发展优势所在，以此为基础系统构建数实融合下发展新质生产力的内在逻辑，并站在全局高度分析当前中国更好打通新质生产力发展存在的难点、堵点、卡点，进而为实现数实融合下先进生产力质态的涌流和迸发提供有益的政策思路和建议。

二、数实融合下发展新质生产力的四大优势

数字经济最早源于互联网大规模商用所形成的一系列网络经济活动（Tapscott, 1996），随着信息技术的深化发展和深度应用，社会经济活动逐步数字化、智能化，形成了以ICT技术广泛应用为核心特征的一系列经济活动，包括数字技术的应用迭代、数字化资本的形成积累、数字化产品与服务的生产流通活动等（Kotarba, 2017），形成了数字经济信息化引领、开放化融合和泛在化普遍的典型特征（梅宏，2022）。数字经济的这三大特征，从市场发展广度和参与产业活动深度两个方面同实体经济深度融合，并在要素、产业、市场等多个层面形成了催生和发展新质生产力的独特优势。

[①] 数据来源：中国信息通信研究院.中国数字经济发展研究报告（2024）[EB/OL]. 2024-08-28[2024-09-18], http://221.179.172.81/images/20240828/53111724804104890.pdf.

中国知网 https://www.cnki.net

（一）要素提质增效的优势

传统的生产力发展以规模化生产为主要特征，重在实现总量提高，主要通过生产资料、劳动力等实体性要素的大规模积累来开展社会经济活动；而数实融合下的新质生产力发展则重在提升单位生产效率，在要素层面通过数字技术创新的渗透性、革命性改造提高生产资料和劳动力的质量，来实现单位时间内的生产效率和产能利用率的跃升。这种要素提质增效优势主要表现在两个方面。

第一，数字技术和数据要素通过生产管理活动中各类生产要素的重构组合，推动要素提质增效。一方面，人工智能、区块链、大数据和云计算等数字技术的普及和应用，实现了生产过程的自动化管理和智能化控制，通过对人流、物流、资金流、信息流的数据化和精准分析，实现了价值创造和实现过程的全局统筹和无损传导（洪银兴、任保平，2023），显著减少了因管理科层、人际沟通等因素导致的信息损耗，从而有效提高生产效率；另一方面，数据的要素化有助于激发要素创新能力，通过分析计算对生产要素的投入比例和生产方式进行重组，实现以更少的生产要素投入获得更高的价值回报，从而提升产能利用率。

第二，数字技术和数据要素赋能传统生产要素的提质增效。从生产资料的角度看，传统机器设备同传感器、工业软件等的结合有助于更好满足差异化、个性化的柔性生产需要，在提高要素利用率的同时实现供求两端“产销一体”；从劳动力的角度来看，数字技术和数据要素的广泛使用催生出更多善于从事复杂脑力运动、灵活适应市场环境的高素质劳动者，从而通过人力资本结构升级进一步消除了劣质低效的传统生产要素的无用损耗，实现产品质效的跃升（黄卓等，2024）。

（二）深化分工协作的优势

生产社会化是市场经济运行的重要特征。数字技术的泛在联结为不同产业的关联带动提供了技术基础，同时也开辟了一个全新的数字空间，通过信息化引领实现更大范围、更广层次、更强协同的分工协作，从而推动社会生产力的发展质效跃升到新的高度。这种新的分工协作体系具有新的特征。

第一，从企业内部的生产过程来看，企业生产资料使用的社会化特征日趋明显。企业的分工协作体系日渐依赖于包括生产数据的收集、原料数据的加工提取与需求数据的社会化分析等环节在内的数字产业，特别是工业软件产业。根据中华人民共和国工业和信息化部发布的《中国工业软件产业发展研究报告（2024）》，2023年，中国工业软件市场规模约为2414亿元，同比增长12.3%，工业软件企业关键工序数控化率达到62.2%[②]，企业数据社会化使用的产业生态正在加快形成。

第二，从企业间的分工协作来看，社会化数据信息网络以及生产资料与劳动力的社会化流通

[②] 数据来源：中国中小企业协会. 报告：2023年国内工业软件市场规模约2414亿元[EB/OL], (2024-06-25)[2024-09-18], https://www.ca-sme.org/content/Content/index/id/51161/isadmin/1.

中国知网 https://www.cnki.net

突破了企业既有的组织形式与空间限制，形成了头部企业运营核心业务，众多外包企业参与生产经营的网络化协作方式。在这种分工协作方式中，头部企业与外包企业既通过发展各自的主营业务实现专业化生产活动，同时又基于互联网提供的要素流动便利深化了生产社会化进程，形成了更高水平、更大规模的商品生产活动（王璐、李晨阳，2022）。以服务外包为例，2023年，中国企业承接服务外包合同额同比增长了17.6%，其中离岸信息技术外包、业务流程外包、知识流程外包执行额同比增长13.1%、17.8%和18.4%[③]，数字化产品和服务需求逐渐成为重要支柱。

（三）拓宽市场空间的优势

传统生产力的发展受制于地理空间、文化习俗和制度环境等差异，容易形成市场分割和资源错配，从而限制市场空间的扩张和经济发展规模的增长。数字经济中算力、算法的发展与优化，使得社会大生产可以利用云计算、边缘智能等技术实现分布式生产、智能化生产，从而在推动不同产业开放式融合生产的过程中实现新质生产力的发展。

在这一过程中，“场景”是数字经济表达产业活动中各类生产组织形式和生产关系的具体形式。基于算力提升和算法驱动，新场景在不断生产出来的同时，不同应用场景间数字化融合创新又反过来延展和拓宽了产业发展的现实增长空间。一方面，通过数据要素在泛在数智化网络中形成的技术“可供性”，数字技术得以有效地将产业需求与社会认知背景、生产组织形式等有机结合，形成场景落地应用的可行方案（Melville, 2010）；另一方面，场景的数字化迭代更新，有助于现实中不同产业的生产特征、联系方式、发展定位的动态优化（Woodruff, 1997），进一步加强产业的前向、后向和侧向关联，从而在推动产业价值共创方式的深刻变革的过程中，持续解放和发展社会生产力。

（四）创新资源配置的优势

数字经济的技术特性，决定了它可以通过从现实场景中提取、整理、计算、加工数据，实现经济活动中各类生产过程、流通过程的全面塑造。移动互联网、云计算、大数据、人工智能等数字技术集群式和交互式发展，不仅塑造了实体经济中产业发展方式和协作模式的全新形态，而且也形塑了市场资源配置的全新方式，为发展新质生产力提供了坚实基础。

一方面，在要素端，以科技创新体系的运行为核心，创新市场生产要素配置机制。主要表现在三个方面：（1）产业数字化转型中形成的海量数据，有力推动了科研范式的变革、提高了科技创新活动的知识生产和转化效率，推动产业从过去的规模竞争转向质量竞争，从而加速人才、资本等高质量生产要素向产业活动前端集聚；（2）数字技术丰富了知识扩散的渠道和模式，平台组织的

[③] 数据来源：中华人民共和国商务部. 商务部服贸司负责人谈2023年我国服务外包产业发展情况[EB/OL], 2024-02-04[2024-09-18], https://www.mofcom.gov.cn/xwfb/sjfzrfb/art/2024/art_6f2a80a5ed2a42358972dc80396e4dbd.html.

中国知网 https://www.cnki.net

产生显著加强了产销两端匹配的即时性、精准性，促进生产要素的加速周转和精细化配置，进而带动柔性生产等一系列生产组织形式的变革；(3)数实融合改变了知识应用的方式，通过要素支持体系、产业协同体系、数字化治理体系的生态构建，形成体系内部、体系之间的要素形成与配置的完整闭环，从而服务于新质生产力的形成和发展。

另一方面，在产业端，以产业体系现代化建设为核心，创新区域资源协同配置机制。(1)在数字技术的泛在融合作用下，本地优势企业、龙头企业的辐射作用能够推动产业链的延伸，在产业链供应链对接合作的过程中实现要素集聚，形成集研发、制造、服务于一体的产业集群，从而完成以区域内资源聚合为特征的第一次配置；(2)数字技术的溢出和扩散效应，有助于实现产业链上下游企业的技术应用水平的提高，从而在带动价值链向中高端迈进的过程中深化分工协作，完成区域资源在产业链上的第二次配置；(3)数字技术的无边界特征有助于不同区域间不同产业边界的消解和再造，推动不同产业间业务、组织、管理和市场等资源的整合，从而形成新技术、新业态、新模式，反哺各地区优势产业发展，完成区域间资源的第三次配置。

由此，数实融合下的新质生产力发展，通过要素提质增效、深化分工协作、拓宽市场空间、创新资源配置等四方面的优势，从微观企业生产过程到宏观经济运行机制革新，推动了高质量发展下的社会经济形态重塑。

三、数实融合下新质生产力的发展机理：产业高质量发展的四重逻辑

新质生产力是由技术革命性突破、生产要素创新性配置、产业深度转型升级而催生的先进生产力质态，与实体经济的高质量发展息息相关。数字经济的高创新性、强渗透性、广覆盖性，在推动实体经济高质量、高效能、体系化发展中具有重要作用，这为新质生产力的发展注入了强大动力。从产业、产业链、产业集群、产业体系四个发展维度，我们可以全面认识并考察数实融合下新质生产力的发展机理。

（一）立足要素提质增效的优势，在挖掘要素禀赋潜力的过程中形成本地特色产业

发展新质生产力需要立足本地的自然资源种类、土壤类型、地形与气候等因素，充分发挥科学技术的赋能作用，形成与本地自然资源相适应的生产力发展布局。数字经济的要素提质增效优势，既有盘活产业存量的作用，又有激发产业发展增量的作用。直接作为生产要素的数据：(1)能够挖掘传统发展模式中难以发现的潜在需求，并将闲置要素、零散要素和一些过去认为无关的要素进行整合，实现生产要素的“增量补充”（武宵旭、任保平，2022）。(2)可以统筹生产场景中的实时数据，通过生产管理流程的变革提升“存量生产”过程中的生产效益和商品质量。而对于起到间

中国知网 https://www.cnki.net

接作用的数据：一是可以作用于劳动力和生产资料等传统生产要素，使得劳动者的劳动技能得到发展更新、生产资料得到充分利用和更新迭代，从“存量”中发掘要素潜力；二是能基于市场需求和生产过程的数据分析，找到供求适配、特色鲜明、优势明显的产业发展路径，并通过数智技术的开放创新推进产业创新，挖掘要素禀赋发展“增量”。

在数字经济发展中形成本地特色产业是构筑地区发展竞争优势的重要环节，对于新质生产力的发展十分重要。根据中国软件行业协会公布的《制造业数字化转型发展指数报告（2024）》，2023年中国制造业数字化转型仍然呈现出“东部和沿海经济发达地区强，西部和东北地区相对薄弱”的格局，且制造业数字化转型水平同各地区制造业发展基础密切相关，有着明显的集群分布特征，特别是在钢铁、化工、能源、建材等重型工业领域，数字化转型尚不充分。这些领域有望成为数实融合的新赛道、新热点。

（二）立足深化分工协作的优势，在优化产业协同的过程中形成效能高、韧性强的产业链

不同地区特色产业的发展，有助于充分发挥各地区的经济发展优势，形成本地的优势企业、龙头企业。同时，地区产业优势的辐射效应也为同地区以外企业的联结和合作提供了可能。数字经济泛在互联、开放融合的特性，首先通过联结不同地区产业发展过程中先进生产工艺的示范效应和溢出效应，在优势产业特色化发展的过程中，不断深化与地区产业相关的上下游企业的产业链分工水平，从而带动产业链供应链价值链向中高端迈进；其次，支持数字经济发展的新型基础设施体系，打破了传统的社会分工仅限于局部地域、劳动者地区分布较为集中的发展特征，在支持产业协同聚合的过程中为新技术、新要素提供有力载体；再次，服务业通过数字经济的赋能和渗透作用，为产业链上各企业提供资金融通和智力支持，进而推动技术研发—成果转化—产业应用—市场开拓的完整产业发展链条的形成，构筑产业链的内在发展韧性。

产业链的高效能和强韧性是中国产业发展增强冲击抵御力、激发内生增长动力、提升社会服务能力的体现，也是推动中国新质生产力稳健发展的重要内容。数字技术的出现，使得产业链协作链条的堵点被成功打通，形成了新的发展活力。以希音（Shein）等跨境服装电商的“小单快返”模式为例，通过将客户下单、生产材料流转、库存监控、生产、质检、物流配送等环节集中到企业微信上，通过数据集成打通产业链协作链条，实现了以“短周期、快周转、小批量、即时销”为特点的服装销售新模式，避免了因服装生产积压造成的高昂仓储成本[④]，从而始终确保产业链上下游企业分工协作的高效协同。

[④] 案例来源：腾讯研究院. 2023数字经济高质量发展报告[EB/OL].(2023-09-26)[2024-09-19], https://new.qq.com/rain/a/20230926A08F5U00.

中国知网 https://www.cnki.net

（三）立足拓宽市场空间的优势，在促进资源聚合的过程中形成具有质量引领力的产业集群

以新一代数智技术、Web3.0互联网和数据要素为核心构成的数字空间，拓宽了实体经济创新增值、降本增效的新发展领域。首先，数字空间为实体经济中的各个产业提供了广阔的实验场景，帮助实体经济实现从研发、设计到生产的全周期仿真模拟。数字空间的无时空、无边界、开源性特点，有助于凝聚社会力量，以开放式融合构建产业创新网络，最终形成完备的产业创新生态系统。其次，数字空间对场景、人才、资金、数据等要素的资源聚合作用，突破了传统产业发展的地理空间局限，从更大范围、更深层次推动解决实体经济关键核心技术的“卡脖子”问题，通过要素集群化、技术集群化构建起的资源空间来实现高质量、高效能产业集群新形态的形成。再次，数字空间对实体经济发展过程中的生产管理、技术创新、发展模式上的迭代再造，有助于实现数字技术联结之下各产业的研发、设计、制造、营销、协同能力，从而通过产业基础高级化和产业链的现代化，形成具有质量引领力的产业集群“节点”，构筑起具有良性产业生态的发展空间。

事实上，“集链成群、成群竞争”是当今全球产业链供应链重构背景下中国产业数智化重塑、梯度化转移的发展需要，也是发展高质量、高效能、强韧性的新质生产力的必由之路。目前，中国产业集群分布呈现东密西疏、南多北少的格局，东部地区重点产业集群超过半数，尤以港口、航运、贸易等领域为主，但仍需在基础设施互联互通、链主引领与链员企业协同发展、供应链集成服务与协同安全体系等方面予以进一步发展优化。

（四）立足创新资源配置的优势，在产业数字化与数字产业化的良性互动中形成具有完整性、先进性、安全性的现代化产业体系

数字产业化和产业数字化共同构成了数字经济发展的重要支柱，前者为实体经济提供技术、产品和服务支持，后者则推动了各类产业发展模式的全面改造升级。二者的创新发展和共同作用，推动了产业和要素两端资源的创新性配置，从而为新质生产力的发展提供坚实支撑。从要素端来看，数字产业化通过数字技术创新及其对数据要素的产业化、商业化应用，催生出实体经济中产业发展的新业态新模式（任保平，2023）。由这些新业态新模式带来的技术密集型、知识密集型的产业发展新形式，重构和优化了具体生产过程中各类生产要素的组合方式，推动生产力质量实现进一步跃升（黄泰岩、刘宇楷，2023）；从产业端来看，产业数字化通过数据要素与劳动、资本、知识、技术等其他生产要素的有机结合，实现生产环节要素投入比例的动态优化和高效协同。数据要素和数字中间产品的持续投入，还有助于促进、深化甚至重构不同产业间的资源流通方式和分工协作模式，重塑资源配置方式，从而在推动传统产业价值创造能力显著提升的同时，为发展

中国知网 https://www.cnki.net

和培育战略性新兴产业和未来产业奠定基础，最终形成具有完整性、先进性、安全性的现代化产业体系，实现新质生产力的发展和提升。

可见，数实融合下的新质生产力发展，是以上四重逻辑环环相扣、共同作用的结果：数字经济的高创新性，既能在产业层面深化专业化生产，支持地区特色产业优势，又能通过其强渗透性，在产业链层面实现不同产业的前向、后向甚至侧向关联，还能依托其广覆盖性，在产业集群层面打破发展壁垒，实现资源聚合，进而通过创新资源配置，形成更大范围、更强协同的现代化产业体系来催生和发展新质生产力。因此数实融合下的新质生产力发展，事实上是一个以产业为“点”、以产业链为“线”、以产业集群为“面”、以现代化产业体系为“体”，相互串联、彼此贯通、结构立体的发展体系（见图1）。

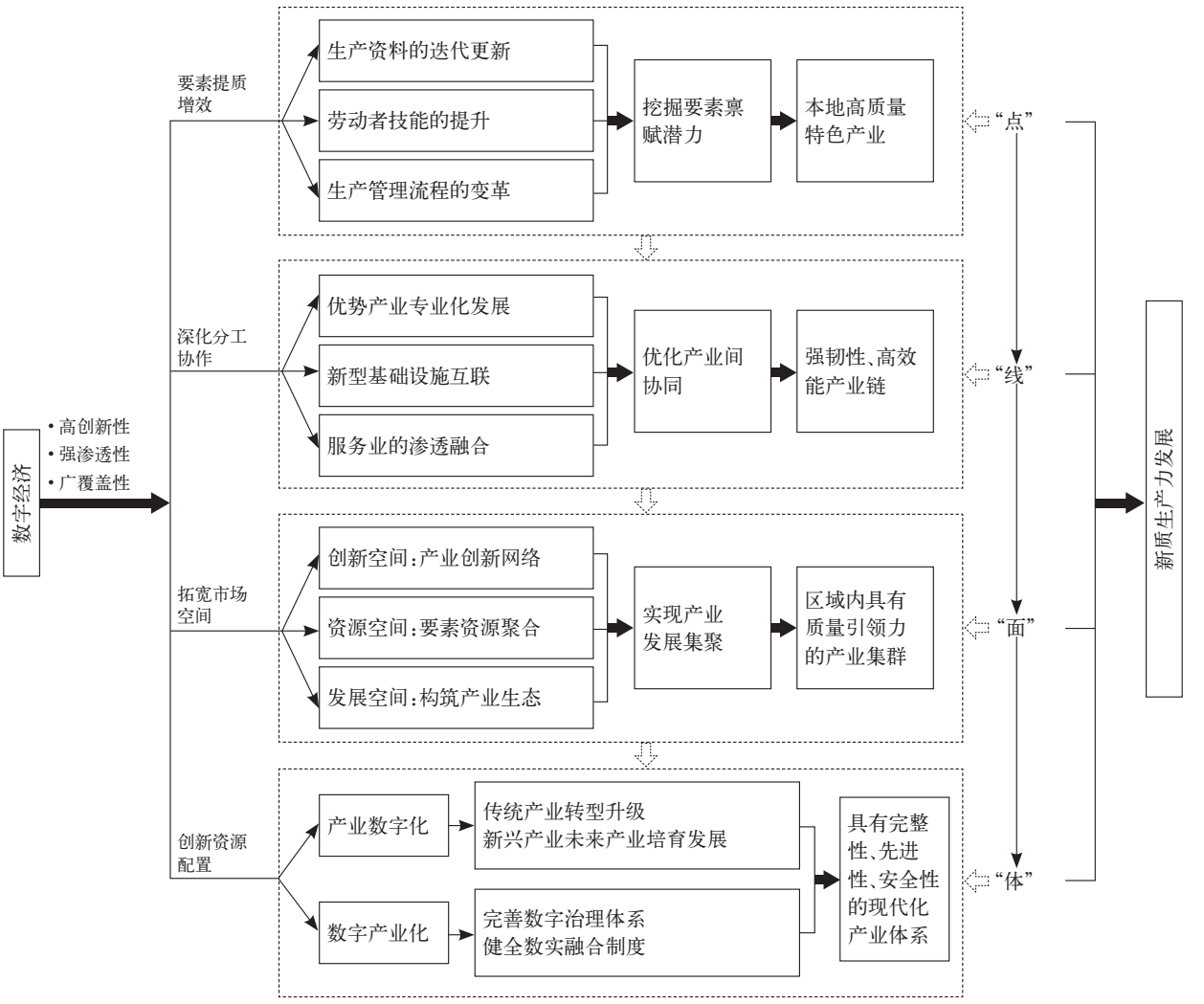

图1：数实融合下新质生产力的理论机理

中国知网 https://www.cnki.net

四、数实融合下新质生产力发展存在的问题

数实融合能够有效赋能新质生产力的发展，但在实践中，这一过程也存在数字经济与实体经济发展“两张皮”，产业横向竞争与同质化发展严重，数实融合的体制机制和政策体系尚未形成合力以及数实融合发展的安全性、稳定性仍有欠缺等问题。这些问题都限制了数实融合四大发展优势的发挥，制约了新质生产力的发展水平和实现效率。

（一）企业层面，数字经济与实体经济融合过程中的“两张皮”问题

智能制造是数实融合战略的具体抓手和体现，也是新质生产力发展实现的重要环节。然而，目前智能制造在企业，尤其是制造业中的渗透率仍然不高，数字经济和实体经济“两张皮”问题仍然存在，使得数字经济在要素提质增效等方面的优势难以发挥。

第一，生产规模小、生产过程要求和管控要求相对少的企业，开展数字化转型的意愿不强。数字化转型是将人工智能、云计算、大数据等新型技术与传统行业全面融合的过程，通过将企业的上下游生产要素、组织协作关系等数字化并加以科学分析，指导要素资源配置优化组合过程，进而改善企业经济效益的过程。尽管企业进行数字化转型已普遍成为市场共识，但在现实中，一些企业出于对数字化转型所要付出的高昂成本以及转型之后经营发展不确定性的顾虑，不敢、不愿推进数字化转型。根据《数字化转型发展报告（2022~2023）》的相关统计，2022年中国企业数字化转型发展的整体水平为51.8。从水平层级的划分来看[⑤]，尚处入门级（L1）或尚未开展数字化转型的企业占比超过42%，且以中小微企业为主体。制造业行业中，轻工、纺织、包装、建材、废弃资源综合利用等行业平均利润率相对较低、生产过程管控要求较少的行业，数字化转型发展水平低于50%。

表1：中国部分制造业行业企业数字化转型发展水平情况（2022年）

制造业行业	数字化转型发展水平评分
电子	58.0
交通设备制造	57.5
石化	55.3
医药	52.7
食品	50.9
冶金	50.8
机械	50.4
轻工	48.9
纺织	48.1
包装	46.3
建材	45.4
废弃资源综合利用业	41.8

资料来源：《企业数字化转型分级分类评估诊断对标模型研究报告》，转引自《数字化转型发展报告（2022~2023）》。

[⑤] 水平层级划分是指按照企业数字化转型评估诊断总得分和各维度主要评价维度的得分情况，对企业数字化转型发展水平进行的综合评分。L1级为入门级，L5级为卓越级，逐级递升。

中国知网 https://www.cnki.net

第二，已开展数字化转型的企业更加注重数字技术的场景应用，但在数字技术的基础研发和成果转化上有待改进。具体而言：(1)数字化转型企业的研发支出中基础占比较低，反映出企业的原始创新能力还不强，很难产生具有颠覆性、原创性技术突破和创新及潜在生产水平质的跃升。从中国与西方发达国家企业的整体研发强度的数据比较中可以发现，尽管从2010年到2020年，中国企业研发强度翻了三倍，由1.2%增长到3.6%，但仍然只有2020年美国企业同期整体研发强度的46.2%(见图2)。(2)中国数字化转型的创新产出和转化能力还需要提升。2022年，中国科技成果的转化率水平仅在30%左右，而在美国和欧盟等发达经济体，这一比例可达60%~70%。这反映出当前中国产学研用一体能力的建设仍存在较大改进空间，高校和研发机构的科研成果同企业技术应用成果之间的衔接性仍然不够。

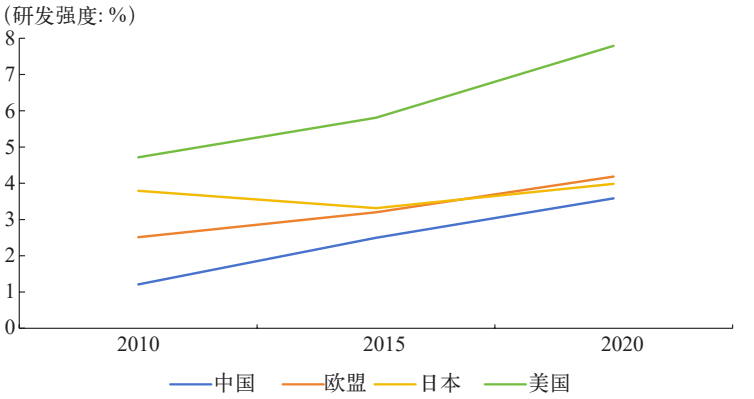

图2：中国与发达经济体企业整体研发强度的对比(2010~2020年)

说明：研发强度=研发支出/净销售额。

(二) 地区层面，数实融合过程中产业同质化、不均衡发展问题仍然存在

产业的均衡发展、协同发展，是推动新质生产力更大规模、更高质量发展的重要实现路径，但目前中国的数实融合发展，同这一愿景间还存在着一定差距，数字经济深化产业协同的优势难以完全实现。

第一，一些地区一哄而上发展数字产业，盲目上马芯片制造、人工智能等热门产业领域，将传统产业当作低端产业简单退出，导致地区产业同质化竞争激烈。新兴的热门产业通常具有技术密集型、资本密集型的典型特征，因而前期需要更为深厚的要素积累和扎实的产业基础条件。在数实融合发展实践中，一些地区盲目跟风时代风口、技术潮流，在不具备相关的产业配套、人才资源、技术储备的情况下仓促加码、强行建设。这使得部分地区的数字产业始终处于低水平重复建设，产业的低端化、同质化竞争导致数字经济与实体经济适配度低，烂尾多、成果少，反而导致了更大的资源浪费和更严重的资源配置扭曲。

中国知网 https://www.cnki.net

第二，不同地区的产业基础条件差异导致地区层面的数字化协同能力较弱，不均衡发展问题突出。2023年，中国第一、第二、第三产业的数字化渗透率分别为10.78%、25.03%和45.63%，仍然反映出不同产业间较大的发展不充分、不均衡问题。由于中国不同地区的产业结构差异很大，以服务业为产业主体的东部沿海地区数字化水平更高，而以制造业甚至农业为产业主体的一部分中西部地区数字化水平相对落后。这一方面使得东西部产业数字化发展水平非均衡化特征较为突出，同时也限制了数字技术在更大的市场范围内深化产业协同、优化资源配置等能力的实现。

（三）数字发展环境层面，数实融合的安全性、稳健性水平仍需提高

数实融合发展的安全性、稳定性对新质生产力的韧性发展起着重要作用，但在现实中，数字经济在数据、算力、算法等方面仍然存在着诸多风险挑战，对数字经济在开拓市场空间、创新资源配置等方面的优势形成限制。

第一，从数据的角度来看，由于权利边界不明晰、技术手段有局限、标准规范较滞后，中国在数据要素开放、共享以及交易活动中仍有较强的“不愿、不敢、不易、不能”障碍，数据产权与分割、开放与保护之间的矛盾较为明显，“数据孤岛”问题仍然存在，数据要素配置的市场机制、定价机制、分配机制尚处于起步阶段（李鹏，2022）。这使得数据要素的生产潜能、匹配功能无法得到充分释放，数据安全风险持续存在。

第二，从算力的角度来看，中国的算力发展面临着三个方面的问题：（1）算力协同能力不足，尤其是“东数西算”工程中枢纽节点算力结构有待进一步深化，东西部算力协同发展能力仍有待提升。（2）算力生态不完善。由于区域间数字化发展水平不均衡，中国部分地区（主要在中西部地区）数据中心的运行效果与原有算力设计规模的设想差距较大，且上下游企业基于算力协同联动的能力和应用生态市场的协同发展程度不够（郭亮，2024）。（3）算力体系建设自主程度还不高。目前中国算力在核心技术创新方面仍存短板，特别是在芯片软件研发领域对外依存度仍然较高，关键核心技术的“卡脖子”风险持续存在。这不仅不利于更高性能的算力建设，也为日后的算力应用和安全运维带来潜在的风险隐患。

第三，从算法的角度来看，算法的不合理发展可能会给市场竞争、产业协同等发展新质生产力的重要因素方面带来风险挑战：（1）妨碍市场机会公平。算法的运行并非完全透明，许多大型互联网平台企业会借助算法技术、算法决策、算法推荐等手段构筑自身数据优势、用户优势，并通过确立市场优势地位的方式妨害其他市场主体的正常公平竞争。这不利于市场竞争机制的充分发挥和经济活力的充分释放。（2）形成算法壁垒，妨碍产业协同。一些企业处于维护自身垄断优势，设置算法壁垒限制数据要素在不同产业间的价值流动与共享，这会直接影响产业协同的效度，恶化产业体系发展生态。

中国知网 https://www.cnki.net

五、数实融合下新质生产力发展的实践方向

在数实融合背景下促进新质生产力的发展，必须围绕数实融合发展新质生产力的四大优势，从要素、产业、市场等多个维度着手，在健全和完善数实融合相关体制机制的过程中凝聚发展新质生产力的制度合力。

（一）完善要素市场化机制，释放新质生产力所需要素的发展活力

第一，聚焦数据要素市场同其他各类要素市场制度的联动建设，着力破除要素自由流动的体制机制障碍，丰富要素流动渠道，更好推动要素提质增效。这其中有两个方面的重要内容：(1)对于数据要素市场而言，要加快打通导致场内场外数据各自循环的壁垒和关键环节，建立健全高效的公共数据共享机制与数据流通交易规则，实现数据的规模化流通和合理性应用。(2)对于数据要素赋能其他各类生产要素而言，要以新型基础设施体系建设为抓手，实现区域间物流、信息流、数据流的协同流动，并在统一政策、规则、规制、标准的基础上降低市场准入门槛、破除不必要的制度壁垒，推动要素在更大市场范围内充分涌流、高效流通。

第二，要打通市场应用的难点、堵点，以要素生态、创新生态为抓手发展产业生态，优化要素市场运行机制。具体而言：(1)要健全并丰富要素交易平台种类，创新新型生产要素培育和交易的市场规则，积极拓展现有公共资源交易平台功能，探索要素交易平台交易联动机制，推动实现新要素与传统要素的自由流通、有效结合。(2)大力健全科技成果交易、转化和收益分配机制，完善知识产权保护体系，推动知识技术人才等创新要素的流畅流动。

第三，要以高水平、高质量为总领，加快推进全国统一的质量、标准体系建设，积极推动地区间标准互认和采信机制，着力增强要素交易和资源配置的公平性、灵活性、协同性和适应性。

（二）完善产业创新机制，加快科技创新成果向现实生产力转化

第一，要依靠改革破除科技领域体制机制障碍，加强科技研发成果与国家需要、人民要求、市场需求的匹配度，着力实现“技术开发—成果转化—产品应用”全产业链的畅通（李翰斌，2022），推动从科学研究到实验开发再到推广应用的三级跳，让一切创新源泉充分涌流。

第二，要进一步深化“产学研用”的协同联动，畅通技术研发与产业链之间的关节链接，鼓励技术专利增量创造与成果转化，推动创新资源在“研发—转化—应用”的全周期配置。要及时对产业应用条件成熟的技术专利进行开源共享，充分释放市场经营主体的生产活力和技术再创新能力，鼓励市场经营主体通过多方协作、技术共享等方式搭建创新平台，探索未来前沿科技的新型开发协作机制。

第三，要在正确把握政府和市场关系的基础上完善产业创新体制，进一步打通科技创新与经

中国知网 https://www.cnki.net

济社会发展之间的通道。要积极响应市场需求，引导技术创新资源的高效合理配置，形成创新活动价值创造的强大合力。要在产业创新活动中突出企业的创新主体地位，推动相适宜的各类要素资源向企业集聚、向产业集聚、向产业集群集聚，支持企业完善技术创新决策、研发投入、科研组织以及成果转化的全链条生产创新活动体系。引导社会力量、企业力量参与重大科技规划、重点产品科研攻关以及科技成果转化的具体活动和规则制订中，进一步凝聚政府和市场的协同创新合力。

（三）完善新产业、新业态投融资机制，全面提高各类资本的利用效率

第一，要着力促进投资与融资的双向协调匹配。投融资活动是项目与资金的“牵线人”，以资金和项目的性质、特征、期限以及主体的相互匹配为活动开展前提。要逐步打破目前过度倚重债务融资开展市场化产业活动的恶性循环，在特色优势产业、专精特新产业、形成前瞻共识的产业上下更大功夫，以政府基金引导、社会投融资力量共创的方式，为数实融合下新模式、新业态的产业化落地提供稳定可持续的保障。

第二，要大力发展直接融资，积极发挥多层次资本市场应有的功能和作用。科创板、创业板和北交所是培育和发展新质生产力的重要阵地。支持新质生产力发展，加快新产业、新业态、新模式的培育，需要资本市场增强对科技含量高的领域的精准服务能力，以专精特新的资产质量、技术含量为“金标准”盘活融资活动。具体而言，科创板要持续完善面向世界科技前沿、经济主战场和国家重大需求的高新技术产业和战略性新兴产业的融资支持体系，以“科技成果产业化”为标准推进上市条件多元化、信息披露规则完备化；创业板要发挥服务“三创四新”的定位，以“企业成长性”为标准，推动更多传统产业通过技术革新、设备更新等方式发掘潜在创新生产能力；北交所则要立足服务“专精特新”中小企业这一战略定位，以“企业在垂类细分市场的发展”的标准，靠前发力支持各领域产业创新的持续涌现。

（四）完善制度保障，更好统筹不同区域发展模式、发展动能的转型升级

第一，要完善新型举国体制，以数实融合为抓手大力发展科技创新。一方面，发展新质生产力需要更好发挥有为政府的导向作用。政府应针对发展新质生产力进行前瞻性思考、全局性谋划、战略性布局、整体性推进，加快在关键性、颠覆性技术方面实现重大突破，争取早日解决“卡脖子”难题，打造中国科技竞争新优势；另一方面，发展新质生产力也离不开有效市场的积极作用。市场经济主体应积极响应政府政策，努力探索前沿科技，通过科技创新的重大突破催生新质生产力。

第二，要建立健全区域协调发展体制机制，立足数实融合的发展机遇，更好统筹本地区、区域内、区域间三种不同层次的发展模式，因地制宜发展新质生产力。具体来说：(1)要立足本地已有

中国知网 https://www.cnki.net

的资源禀赋，在数实融合提升赋能的过程中引导资源投入本地区新产业、新模式、新动能的发展建设中，提高资源禀赋的利用效能。(2)要借助泛在互联的数字技术赋予的治理效能，积极为区域内产业集群的高效能发展创造更加普惠公平的制度便利条件，营造产业良性再生、互生、共生的区域发展环境。(3)要立足产业体系的完整性、先进性、安全性，结合国家战略部署，统筹区域间新型生产要素的差异化配置，形成不同区域错位发展、协同共生的新质生产力发展格局。

参考文献

郭亮.我国算力产业发展挑战与建议[J].信息通信技术与政策, 2024(2): 2-6.

黄泰岩，刘宇楷.马克思经济形态理论及其扩展与创新——兼论数字经济是一种新经济形态[J].教学与研究,2023(10):68-84.

黄卓, 陶云清, 刘兆达等.智能制造如何提升企业产能利用率——基于产消合一的视角[J].管理世界,2024(5):40-57.

洪银兴.发展新质生产力建设现代化产业体系[J].当代经济研究,2024a(2):7-9.

洪银兴.新质生产力及其培育和发展[J].经济学动态,2024b(1):3-11.

洪银兴,任保平.数字经济与实体经济深度融合的内涵和途径[J].中国工业经济,2023(2):5-16.

胡莹.新质生产力的内涵、特点及路径探析[J].新疆师范大学学报(哲学社会科学版),2024 (5): 36-45+24.

Kotarba M., Measuring Digitalization: Key Metrics[J]. Foundations of Management,2017(1):123-138.

李翰斌.加快科技成果向现实生产力转化[N].人民日报,http://paper.people.com.cn/rmrb/html/2022-03/25/nw.D110000renmrb_20220325_2-09.htm.

李鹏.完善我国数据要素产权制度[N].学习时报,https://paper.cntheory.com/html/2022-08/17/nw.D110000xxsb_20220817_1-A2.htm.

李晓华.数字经济新特征与数字经济新动能的形成机制[J].改革,2019(11):40-51.

李晓华.新质生产力的主要特征与形成机制[J].人民论坛,2023(21):15-17.

梅宏.大数据与数字经济[J].求是,2022(2).

Melville N. P.Information System Innovation for Environmental Sustainability[J]. MIS Quarterly, 2010 (1):1-21.

任保平.以产业数字化和数字产业化协同发展推进新型工业化[J].改革,2023(11):28-37.

任保平,王子月.数字新质生产力推动经济高质量发展的逻辑与路径[J].湘潭大学学报(哲学社会科学版),2023(6):23-30.

沈坤荣,金童谣,赵倩.以新质生产力赋能高质量发展[J].南京社会科学,2024(1):37-42.

孙绍勇.发展新质生产力：中国式经济现代化的核心要素与实践指向[J].山东社会科学,2024(1):22-30.

Tapscott D. The Digital Economy: Promise and Peril the Age of Networked and Intelligence[M]. NewYork: McGraw-Hill, 1996.

王璐,李晨阳.数字经济下的生产社会化与企业分工协作:演进与特性[J].北京行政学院学报,2022(1):84-94.

Woodruff R. B., Customer Value:The Next Source for Competitive Advantage[J]. Journal Of the Academy of Marketing Science,1997 (2):139-153.

武宵旭,任保平.数字经济背景下要素资源配置机制重塑的路径与政策调整[J].经济体制改革, 2022(2):5-10.

中国知网 https://www.cnki.net

Digital-Real Economy Integration: Empowering New Quality Productive Forces

Zhou Yahong, Lang Xuhua*

School of Economics, Shanghai University of Finance and Economics (SUFE), Shanghai, China

Abstract: *The deep integration of the real and digital economies ("digital-real economy integration") is emerging as a new growth driver for China's high-quality economic development. In the context of digital-real economy integration, the development of new quality productive forces has four main advantages: improving the quality and efficiency of factors, deepening the division of labor and collaboration, expanding market space, and innovating resource allocation. These advantages are embedded in every aspect of corporate manufacturing and macroeconomic operations, resulting in inherent dynamism for the development of new quality productive forces. With a focus on high-quality industrial development, these distinct advantages of digital-real economy integration are reflected throughout the development mechanisms of new quality productive forces. Specifically, specialized industrial production, industrial chain restructuring, and resource integration of industrial clusters result in a more comprehensive and coordinated modern industrial system, as well as an interconnected and structured development system for new quality productive forces. Given the challenges facing China's development of new quality productive forces in the context of digital-real economy integration, it is critical to enhance market-based factor mechanisms, industrial innovation mechanisms, investment and financing mechanisms for new industries and business models, and the corresponding institutional frameworks in order to fully support the development of new quality productive forces. This will unleash the technological, systematic, and synergistic advantages of digital-real economy integration.*

Keywords: *New quality productive forces, digital-real economy integration, development advantages, future trajectory*

JEL Classification Code: E66, O11, P26

DOI: 10.19602/j.chinaeconomist.2024.11.04

1. Introduction

The Third Plenary Session of the 20th Central Committee of the Communist Party of China (CPC) called for "improving digital-real economy integration systems" and approved new strategic plans to advance new industrialization, establish institutional systems for developing the digital economy, and

* CONTACT: Lang Xuhua, email: langxuhua@mail.shufe.edu.cn.

Acknowledgment: This study is supported by the following projects: the Key Special Project of the National Natural Science Foundation of China (NSFC) "Study on the Modeling and Simulated Optimization of Strategic Interaction Behaviors during the Pilot Policy Reform (Grant No.72342034); the State-Sponsored Postdoctoral Researchers Program "Digital-Real Economy Integration and Economic Resilience: Core Rationale, Formation Drivers, and Institutional Innovation" (Grant No.GZC20231521); "Chenguang Program" supported by Shanghai Education Development Foundation and Shanghai Municipal Education Commission.

中国知网 https://www.cnki.net

improve digital industrialization and industrial digitalization. Since the 20th CPC National Congress in 2022, the Chinese government has prioritized the "Digital China" Initiative and the development of the digital economy as strategic priorities. In the midst of a new round of technological revolution and industrial change, China is well-positioned to seize new opportunities by developing its digital economy and capitalizing on its enabling effect on the real economy. Policymakers should prioritize the holistic, systematic, and coordinated nature of digital-real economy integration when developing new productive forces. They must emphasize the importance of the real economy and the role of the digital economy in enhancing its quality and efficiency. Clearly, the deep integration of the real and digital economies ("digital-real economy integration") is emerging as a new growth driver for China's high-quality economic development.

In order to develop a modern industrial system, it is critical to promote the deep integration of the real and digital economies, which have grown in importance to the national economy. In terms of aggregate volume, China's digital economy now accounts for 42.8% of its GDP, contributing 66.45% to GDP growth in 2023. In terms of structure, China's industrial digitalization as a share of its digital economy continued to increase to 81.3% in 2023, and the digital economy's adoption rate in the secondary industry surpassed 25% for the first time, indicating continuous progress in digital-real economy integration[1]. Meanwhile, the development of the digital economy helps break the inherent limitations of geographical space, better tap into local advantageous resources, aggregate to form regional characteristic industrial clusters, and continuously optimize the inter-regional industrial collaborative layout. This makes it an important driver for fostering and developing new quality productive forces through revolutionary technological breakthroughs, innovative allocation of production factors, and promoting deep transformation and upgrading of industries.

There have been lively discussions in academia regarding the relationship between the digital economy and development of new quality productive forces According to Li (2019, 2023), Hu (2024), and Sun (2024), new quality productive forces are defined by disruptive innovations, new industrial chains, and high development quality, which are combined with the integrated and pervasive nature of digital technologies. New technologies, factors, and business models emerging from the digital economy are indications of China's new economic dynamism in the new stage, with digital-real economy integration serving as a defining feature of China's high-quality economic development. According to Ren and Wang (2023), digital new quality productive forces arising from the digital-real economy integration are a specific manifestation of new quality productive forces, as well as critical factors for high-quality economic growth. Shen et al. (2024) believed that ongoing digital innovations had transformed the mode of production, acting as a key driver for the formation of new quality productive forces and enabling high-quality economic development. Hong (2024a, 2024b) emphasized the importance of the digital economy in creating a modern industrial system and paving the way for the development of new quality productive forces. While existing research has provided a comprehensive understanding of the development of new quality productive forces in the context of digital-real economy integration, more holistic and systematic research is still needed. This paper aims to identify the developmental advantages of the digital economy and uses this as a foundation to systematically construct the intrinsic logic for developing new quality productive forces under the integration of digital and physical economies. It also analyzes, from a comprehensive perspective, the current challenges,

[1] Source: China Academy of Information and Communication Technology ("CAICT"). Research Report on China's Digital Economy Development (2024) [EB/OL]. August 28, 2024 [September 18, 2024]. http://221.179.172.81/images/20240828/53111724804104890.pdf.

中国知网 https://www.cnki.net

bottlenecks, and obstacles that China faces in better facilitating the development of new quality productive forces. Furthermore, it intends to provide policy insights and recommendations for realizing the surge and burst of advanced productivity through digital-real economy integration.

2. Digital-Real Economy Integration: Four Advantages of Developing New Quality Productive Forces

The digital economy arose from a series of network economy activities, including the widespread commercialization of internet applications (Tapscott, 1996). The extensive development and application of information technologies, as well as the digitalization and intelligence of social and economic activities, have resulted in an abundance of economic activities based on the widespread use of information and communication technologies (ICTs). They include the use and evolution of digital technologies, the accumulation of digital capital, and the creation and distribution of digital goods and services (Kotarba, 2017). The digital economy is distinguished by the typical features of ICT-based applications, open integration, and ubiquity (Mei, 2022). These three features of the digital economy are combined with the real economy in terms of market development scope and industrial participation depth, resulting in unique advantages of new quality productive forces at the factor, industry, and market levels.

2.1 Advantage of Enhancing Quality and Efficiency of Factors

The development of traditional productive forces is defined by large-scale production and a focus on quantitative growth, in which social and economic activities are carried out through the mass accumulation of physical factors such as means of production and labor force. In contrast, the development of new quality productive forces centers around increasing efficiency per unit of output while also improving the quality of the means of production and labor force through the pervasive and disruptive nature of digital innovations to increase productivity and capacity utilization within unit time. The advantages of improving factor quality and efficiency are manifested in the following two aspects:

First, digital technologies and the data factor help to improve factor quality and efficiency by recombining different production factors in manufacturing and management activities. To begin with, the widespread adoption of digital technologies such as artificial intelligence (AI), block chains, big data, and cloud computing has enabled automated management and intelligent control of manufacturing processes. Data processing and precise analysis of people, material, financial, and information flows have enabled the overall coordination and loss-free transmission of value creation and realization activities (Hong and Ren, 2023), resulting in significantly less information loss due to management hierarchies and interpersonal communications and thereby increasing productivity. Another benefit of transforming data into a factor of production is that it allows other factors of production to unleash their innovation potential. By adjusting the input proportion of production factors through analysis and calculation and recombining the mode of production, manufacturers can achieve a higher return with less input of production factors, thus increasing capacity utilization.

Second, digital technologies and data have made it possible to improve the quality and efficiency of traditional production factors. In terms of the means of production, the combination of traditional machinery with sensors and industrial software enables manufacturers to meet the demands for differentiated and customized flexible production, achieving integrated manufacturing and distribution on both the supply and demand sides while increasing factor utilization. In terms of labor force, the widespread adoption of digital technologies and the data factor has generated highly qualified workers

中国知网 https://www.cnki.net

who are skilled at intellectual activities and adaptable to changing market conditions. The improvement of human capital structure has further eliminated unnecessary losses caused by inferior and inefficient traditional factors of production, facilitating product quality and efficiency improvements (Huang et al., 2024).

2.2 Advantage of Deepening Division of Labor and Cooperation

The socialization of production is an important aspect of market-based economic activities. With their ubiquitous connections, digital technologies serve as the technological foundation for the correlation of various industrial sectors, resulting in a brand-new digital space in which informatization spearheads a broader and more coordinated division of labor, raising social productivity to new levels of development quality and efficiency. This new division of labor system has the following new features:

First, the internal production processes of businesses show a growing trend of socialization in the use of the means of production. The division of labor in businesses is becoming increasingly reliant on digital industries, particularly industrial software, for data collection, processing, and extraction, as well as socialized analysis of demand data. According to the Chinese Ministry of Industry and Information Technology's (MIIT) Research Report on China's Industrial Software Development (2024), China's industrial software market was worth 241.4 billion yuan in 2023, up 12.3% from the previous year, and the numerical control ratio of critical work processes in industrial software enterprises reached 62.2%[2]. An industrial ecosystem is rapidly developing for socialized data access.

Second, socialized data and information networks, as well as the socialized distribution of labor and production means, have transcended the current organizational form and spatial limitations of enterprises. This has led to a networked mode of collaboration in which leading enterprises operate core businesses and numerous outsourced businesses participate in production and operations, as evidenced in the division of labor and collaboration between enterprises. In this mode of collaboration, leading enterprises and outsourced businesses specialize their respective main businesses while deepening the production socialization process based on internet-based factor flow, resulting in commodity production activities at a higher level and on a larger scale (Wang and Li, 2022). Take service outsourcing, for instance: the value of service outsourcing contracts signed by Chinese enterprises in 2023 increased by 17.6% year on year. Offshore IT outsourcing, business process outsourcing, and knowledge flow outsourcing volumes grew by 13.1%, 17.8%, and 18.4%[3] year on year, respectively. Service outsourcing has emerged as a key driver of demand for digital products and services.

2.3 Advantage of Broadening Market Space

Constrained by differences in geographical space, cultural customs, and institutional environments, traditional productivity tends to create market segmentation and resource misallocation , thus limiting market expansion and economic development. In the digital economy, increasing computing power and improving algorithms have resulted in the development of cloud computing, edge intelligence, and other technologies that enable distributed and intelligent socialized mass production. New technologies have created new quality productive forces in open and integrated production across industries.

---

[2] For data source, please refer to: the China Association of Small and Medium Enterprises. Report: China's Industrial Software Market Hit 241.4 Billion Yuan in 2023. [EB/OL], (June 25, 2024) [September 18, 2024], https://www.ca-sme.org/content/Content/index/id/51161/isadmin/1.

[3] Source: The Ministry of Commerce of the People's Republic of China. Head of the Service Trade Department of the History of Commerce on China's Service Outsourcing Industry Development in 2023 [EB/OL], February 4, 2024 [September 18, 2024] [September 18, 2024], https://www.mofcom.gov.cn/xwfb/sjfzrfb/art/2024/art_6f2a80a5ed2a42358972dc80396e4dbd.html.

中国知网 https://www.cnki.net

In this process, "scenarios" represent a specific type of various production organizations and relationships in industrial activities. While computing power and algorithms created new scenarios, digitally integrated innovations in various application scenarios expanded and broadened the growth space of industrial development. On the one hand, digital technologies effectively combine industrial demand with social perceptions and production organizational forms through technological availability, which manifests as a ubiquitous digital intelligence network, generating viable options for scenario applications (Melville, 2010). On the other hand, digital iterations of scenarios are conducive to the dynamic optimizations of the production characteristics, linkages, and development positioning of various industries (Woodruff, 1997), further enhancing the forward, backward, and lateral industrial correlations to liberate and develop social productive forces while advancing industrial value co-creation.

2.4 Advantage of Innovating Resource Allocation

With its technological characteristics, the digital economy is well-positioned to extract, collate, calculate, and process data from real-world scenarios, reshaping economic production and distribution processes. The clustered and interactive development of digital technologies such as mobile internet, cloud computing, big data, and AI has not only reshaped industrial development and collaboration paradigms, but has also transformed market-based resource allocation, laying the groundwork for the development of new quality productive forces.

On the factor side, digital technologies have brought innovations to the market-based allocation of production factors based on the operation of a technology innovation system, as evidenced by the following three aspects: (1) The massive data generated by the industrial digital transition has transformed the R&D paradigm, increased knowledge production and commercialization efficiency in technological innovation activities, and facilitated the shift from quantitative competition to qualitative competition, thereby accelerating the clustering of high-quality production factors such as talent and capital at the front end of industrial activities. (2) Digital technologies have created additional avenues and modes for knowledge diffusion, and the emergence of platform organizations has significantly increased the instantaneity and accuracy of production-distribution matching, prompting the rapid turnover and refined allocation of production factors, as well as change in the forms of production organization, such as flexible manufacturing. (3) The integration of the digital and real economies has transformed the mode of knowledge application by creating an ecosystem of factor support, industrial coordination, and digital governance, resulting in a complete closed-loop of factor formation and allocation within and between systems, facilitating the emergence and development of new quality productive forces.

On the industrial side, digital technologies have resulted in innovations for coordinated resource allocation supported by industrial system modernization. (1) As a result of the widespread integration of digital technologies, local advantageous and leading enterprises have expanded industrial chains, allowing factor concentration in the process of industrial and supply chain cooperation to develop industrial clusters integrating R&D, manufacturing, and services, thereby completing the primary allocation characterized by inter-regional resource agglomeration. (2) The spillover and diffusion effects of digital technologies contribute to increasing the level of technology applications for upstream and downstream enterprises, deepening the division of labor, facilitating value chain upgrades to mid- and high-end links, and completing the secondary allocation of regional resources along industrial chains. (3) Because of their boundaryless nature, digital technologies facilitate the dissolution and re-creation of

中国知网 https://www.cnki.net

boundaries between regions and industries, as well as the integration of their business, organizational, managerial, and market resources across industries to form new technologies, business models, and paradigms that support the development of advantageous industries in various regions, completing the third allocation of inter-regional resources.

In a nutshell, the development of new quality productivity in the context of digital-real economy integration, leveraging its four advantages of improving factor quality and efficiency, deepening division of labor and cooperation, broadening market space, and innovating resource allocation, has driven the reshaping of socio-economic forms under high-quality development, from micro-level enterprise production processes to macro-level economic operation mechanisms.

3. Developing New Quality Productive Forces: Four-Pronged Rationale for High-Quality Industrial Growth

New quality productive forces are advanced forms of productivity that result from revolutionary technological breakthroughs, creative allocation of production factors, and profound industrial transitions. They are critical to the high-quality development of the real economy. The digital economy, with its ingenuity, penetration, and broad coverage, contributes significantly to the high-quality, efficient, and systematic development of the real economy, fostering the development of new quality productive forces with robust dynamism. Using the four dimensions of industries, industrial chains, industrial clusters, and industrial systems, we can gain a comprehensive understanding and assessment of the development mechanism of new quality productive forces in the context of digital-real economy integration.

3.1 Advantage of Improving Factor Quality and Efficiency: Nurturing Local Distinctive Industries Through Capitalizing on Factor Endowment Potentials

New quality productive forces must be developed based on such factors as natural resource availability, soil, topography, and climate. The enabling effect of science and technology should be fully applied to land productivity distribution using local natural resources. With its advantage of improving factor quality and efficiency, the digital economy is conducive to not only activating industrial stock but also stimulating industrial growth. As a production factor: (1) Data allows for the identification of potential demand that would otherwise be impossible to find under the traditional development model, as well as the integration of idle, sporadic, and otherwise uncorrelated factors to produce an "incremental supplement" effect (Wu and Ren, 2022). (2) Real-time data from production scenarios can be integrated to improve production efficiency and commodity quality by transforming manufacturing and management processes. Data, through its indirect effect, (1) can be applied to traditional production factors such as labor force and means of production, allowing for the renewal of labor skills as well as adequate utilization and iteration of means of production to explore factor potentials from inventory. (2) Data analytics based on market demand and production processes aid in identifying industrial development paths that align supply-demand and provide distinct advantages. Open innovations in digital intelligence technologies drive industrial innovation and spur the growth of factor endowment.

Localities must foster competitive advantages and new quality productive forces by developing local digital economy industries. According to the *China Association of Software Industry's Manufacturing Digital Transition Development Index Report* (2024), China's prosperous eastern and coastal regions maintained their lead in digital transition in 2023, while western and northwestern regions lagged behind. Furthermore, manufacturing digital transition is closely related to the level of manufacturing

中国知网 https://www.cnki.net

development in various regions and has a clustered distribution. Heavy industrial sectors, such as iron and steel, chemical engineering, energy, and building materials, are particularly behind in their digital transition. These industrial sectors have the potential to become new tracks and hotspots for digital-real economy integration.

3.2 Advantage of Deepening Division of Labor: Promoting Energy-Efficient and Resilient Industrial Chains through Optimal Industrial Coordination

Developing characteristic industries makes it easier for localities to leverage their economic advantages in order to foster locally advantageous and leading enterprises. Meanwhile, regional industrial advantages open up opportunities for partnership and collaboration with businesses outside the region. Because of its ubiquitous connectivity, openness, and inclusiveness, the digital economy brings together the demonstration and spillover effects of advanced manufacturing processes during industrial development across various regions. As advantageous industries thrive, the digital economy enables the level of industrial chain division of labor between upstream and downstream enterprises in regional industries to be continuously deepened, hastening the upgrade of industrial, supply, and value chains to mid- and high-end links. Second, the new infrastructure system that underpins the growth of the digital economy overcomes past limitations of the regional concentration of the workforce and the socialized division of labor to specific regions. It facilitates industrial coordination and convergence and acts as an efficient vehicle for new technologies and factors. Third, the service sector promotes financial intermediation and intellectual support for industrial chain enterprises through its enabling and permeation effects on the digital economy, resulting in a complete industrial development chain that includes R&D, commercialization, industrial application, and market exploration. In this way, the service sector strengthens the inherent development resilience of industrial chains.

Industrial chain efficiency and resiliency are China's industrial development strengths in resisting external shocks, unleashing endogenous growth dynamism, and expanding socioeconomic service capabilities. They also play an important role in China's development of new quality productive forces. The emergence of digital technologies has eliminated barriers to industrial chain coordination, resulting in new development dynamism. Shein is a typical cross-border apparel e-commerce company that operates on the "small orders and quick reorders" model. Customer orders, production material turnover, inventory monitoring, production, quality inspection, and logistical distribution are all integrated into the company's WeChat platform. Through industrial chain integration based on dataset, the company has explored a new business model for apparel sales characterized by "short cycle, rapid turnover, small quantity, and instant distribution", avoiding the hefty warehousing costs due to apparel production backlogs[4] and ensuring effective coordination among upstream and downstream industrial chain enterprises.

3.3 Advantage of Expanding Market Space: Fostering Quality-Oriented Industrial Clusters through Resource Agglomeration

The digital space, which is composed of new-generation digital intelligence technologies, Web3.0, and data factor, has opened up new opportunities for the real economy to create value, reduce costs, and increase efficiency. First, digital space generates broad experiment scenarios for various industries in the real economy, enabling full-lifecycle simulation of the real economy from R&D to design and manufacturing. With its timeless, spaceless, boundaryless, and open characteristics, digital space is

[4] Tencent Research Institute. 2023 Digital Economy High-quality Development Report[EB/OL].(2023-09-26)[2024-09-19], https://new.qq.com/rain/a/20230926A08F5U00.

中国知网 https://www.cnki.net

ideal for bringing together private actors to create an industrial innovation network through openness and integration, resulting in a complete industrial innovation ecosystem. Second, digital space enables the convergence of business scenarios, talent, capital, and data beyond the geographical limitations of traditional industrial development, allowing for a broader and deeper approach to addressing "chokepoint" problems in the critical technologies of the real economy. Factor and technology clusters are resource spaces that result in high-quality, efficient industrial clusters. Third, the iteration of production management, technology innovation, and the development paradigm through digital space is conducive to the realization of R&D, design, manufacturing, marketing, and coordination capabilities in various industries linked by digital technologies. The resulting industrial sophistication and modernization paved the way for the emergence of quality-oriented industrial cluster nodes, allowing for the construction of development space within a favorable industrial ecosystem.

In the context of global industrial and supply chain restructuring, China is undergoing a digital industrial transformation and relocation, necessitating the formation and competition of industry chains. Similarly, industrial chains are critical for the creation of competitive, efficient, and resilient new quality productive forces. Currently, China's industrial cluster distribution is more concentrated in the eastern and southern regions than in the western and northern regions. The eastern region is home to more than half of China's critical industrial clusters, particularly those related to ports, shipping, and trade. However, there is still room for improvement in infrastructure connectivity, coordinated development among leading supply chain enterprises and participating companies, integrated supply chain services, and a coordinated supply chain security system.

3.4 Advantage of Innovating Resource Allocation: Fostering a Complete, Advanced, and Secure Modern Industrial System amid Positive Interactions Between Industrial Digitalization and Digital Industrialization

Digital industrialization and industrial digitalization together form an important pillar for the digital economy's development. While the former supplies the real economy with technologies, products, and services, the latter drives the comprehensive renovation and upgrade of various industries. Their innovative development and combined effects have accelerated the innovative allocation of industrial land factor resources, thereby providing solid support for the development of new quality productive forces. On the factor side, digital industrialization generates new business models for industrial development in the real economy by promoting digital technology innovations as well as industrial and commercial data applications (Ren, 2023). New forms of technology and knowledge-intensive industrial development driven by new business models have restructured and optimized the combination of various production factors in specific production processes, allowing for further improvement in the quality of productive forces (Huang and Liu, 2023). From an industrial standpoint, industrial digitalization has enabled dynamic optimization of the proportion and efficient coordination of factor input in the manufacturing process. Continuous input of the data factor and intermediate data products promotes, deepens, and even restructures the resource distribution and division of labor among various industries. While increasing the value creation of traditional industries, such input paved the way for the development of strategic emerging and future industries that comprise a comprehensive, sophisticated, and secure modern industrial system and strengthen new quality productive forces.

Obviously, the development of new quality productive forces in the context of digital-real economy integration results from the joint effects of the preceding four elements. With its innovativeness, the digital economy not only relies on specialized production at the industrial level to support distinct regional industrial advantages, but it also generates forward, backward, and lateral correlations between

中国知网 https://www.cnki.net

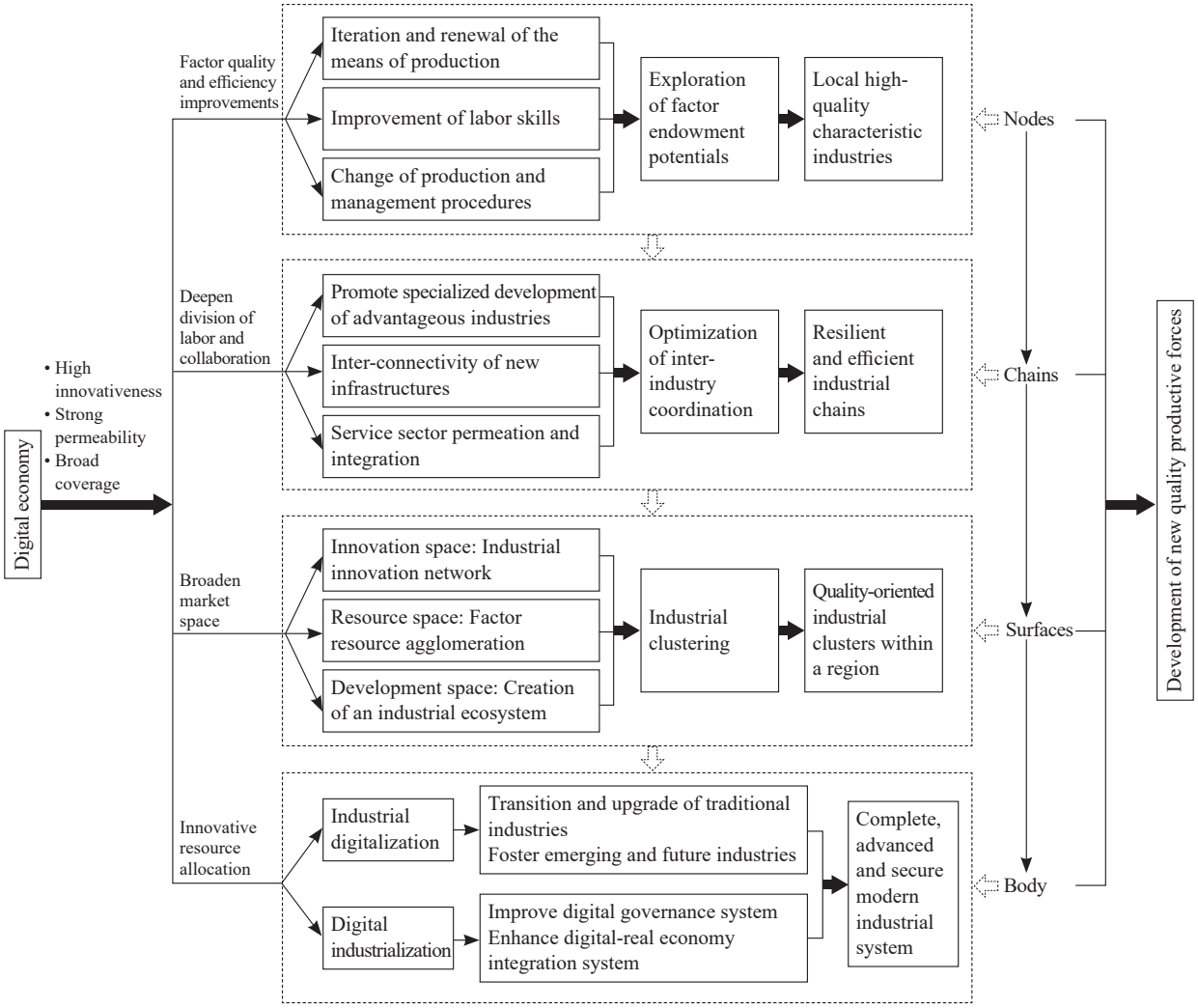

Figure 1: Theoretical Mechanism of New Quality Productive Forces in the Context of Digital-real Economy Integration

various industries at the industrial chain level due to its high permeability. The digital economy, with its broad coverage, breaks down development barriers at the industrial cluster level, bringing resources together and forging a broader and more coordinated modern industrial system by allocating innovation resources to foster new quality productive forces. The development of new quality productive forces in the context of digital-real economy integration is to develop a system that is interconnected, mutually integrated, and structurally three-dimensional. It takes industries as "nodes", industrial chains as "chains", industrial clusters as "surfaces", and the modern industrial system as the "body" (Figure 1).

4. Problems and Challenges in Developing New Quality Productive Forces under the Integration of the Digital and Real Economies

Integration of the digital and real economies can help to develop new quality productive forces. However, in practice, this process is fraught with problems such as the divide between real and digital economies, horizontal industrial competition and homogeneous development, a lack of synergy between

中国知网 https://www.cnki.net

the institutional and policy systems to support digital-real economy integration, and deficiencies in the security and stability of digital-real economy integration. These issues have limited the impact of the four benefits provided by digital-real economy integration, undermining the level and efficiency of new quality productive forces.

4.1 Corporate Level: Divide in the Digital-Real Economy Integration

Intelligent manufacturing is the foundation and manifestation of China's digital-real economy integration strategy. It also serves as an important link in the development of new quality productive forces. However, intelligent manufacturing has a limited penetration. The divide between digital and real economies persists, limiting the digital economy's ability to improve factor quality and efficiency.

First, smaller and less regulated businesses lack the drive to embrace digitalization. The digital transition is the process of incorporating AI, cloud computing, big data, and other new technologies into traditional industries. The digitalization and scientific analysis of upstream and downstream corporate production factors, as well as organizational collaboration relationships, will help to optimize factor resource allocation and improve corporate economic performance. Despite widespread agreement on the importance of embracing digital transition, some businesses are hesitant or unwilling to do so due to concerns about the high costs and uncertain business outlook. According to the *Digital Transition Development Report* (2022-2023), China's corporate digital transition reached 51.8 in 2022. The level of performance is judged based on the total score of the corporate digital transition assessment as well as scores on various dimensions. They represent overall scores for the corporate digital transition. On an increasing scale, L1 represents entry level and L5 represents excellence level. Enterprises that are still at the entry level (L1)[5] or have yet to implement digital transition accounted for 42%, with the majority being small and medium-sized enterprises (SMEs). Manufacturing sectors such as light industries, textiles, packaging, building materials, and waste recycling have lower industry average profitability rates and fewer process control requirements, resulting in a digitalization rate of less than 50%.

Table 1: Level of Digital Transition for Some Manufacturing Enterprises in China (2022)

Manufacturing sectors	Score of digital transition level
Electronics	58.0
Transportation equipment manufacturing	57.5
Petrochemicals	55.3
Pharmaceuticals	52.7
Food	50.9
Metallurgy	50.8
Machinery	50.4
Light industry	48.9
Textiles	48.1
Packaging	46.3
Building materials	45.4
Waste recycling	41.8

Source: *Research Report on the Hierarchical and Classified Assessment, Diagnosis and Benchmarking Model for Corporate Digital Transition*, cited from the *Digital Transition Development Report* (2022-2023).

[5] The term "level of performance" refers to the total score of the corporate digital transition assessment, as well as the scores on various dimensions, which represent the overall scores for the level of corporate digital transition, with L1 representing entry level and L5 representing excellence level, in that order.

中国知网 https://www.cnki.net

Second, enterprises that have embraced the digital transition place a higher value on scenario-based applications of digital technology, but there is still room for basic R&D of digital technologies and commercialization of R&D results. Specifically, (1) enterprises making the digital transition devote a small portion of their total budget to R&D, reflecting their limited original innovation capacity. Limited R&D investment makes it difficult for them to generate disruptive and novel technological breakthroughs, innovations, and potential productivity gains. A comparison of overall R&D intensity data between Chinese and Western enterprises reveals that the R&D intensity of Chinese enterprises tripled between 2010 and 2020, from 1.2% to 3.6%, but it was only 46.2% of the overall R&D intensity of US enterprises during the same period of time in 2020 (see Figure 2). (2) China's digital transition has yet to improve its innovation and commercialization capabilities. In 2022, China's commercialization rate of sci-tech research results was only about 30%, which pales in comparison to developed countries such as the United States and the European Union, which were 60% to 70%. This demonstrates that China has significant room for improvement in its construction of the industry-university-research-application integration capabilities. And the connection between the scientific research achievements of universities and research institutions and the technological application achievements of enterprises is still inadequate.

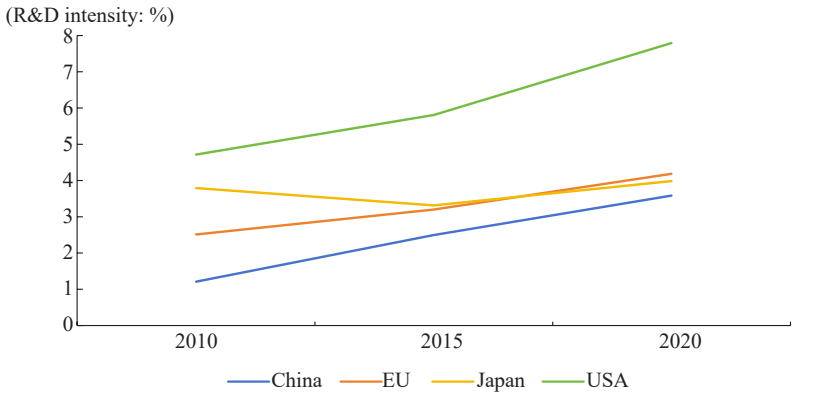

Figure 2: Comparison of Overall R&D Intensity between China and Developed Countries (2010-2020)

Notes: R&D intensity = R&D spending / net sales volume.

4.2 Homogeneous and Uneven Development Persists in Digital-Real Economy Integration at the Regional Level

Balanced and coordinated industrial development is an important path for new quality productive forces to emerge on a larger scale and with higher quality. However, China's current digital-real economy integration still falls short of this vision, making it difficult to fully realize the advantage of the digital economy in deepening industrial cooperation.

First, the stampede for digital industries in some localities has exacerbated homogeneous industrial competition, as evidenced by a rush to develop chip manufacturing and AI while regarding traditional industries as "low-end" sectors to be relocated elsewhere. Emerging industries have technology and capital-intensive characteristics, necessitating more factor accumulation and a stronger industrial base. In the integration of the digital and real economies, some localities have jumped on bandwagons and followed technology trends by developing industries that lack proper industrial conditions, human

中国知网 https://www.cnki.net

resources, and technological reserves. This has resulted in low-level repetitive construction in the digital industry in certain areas. Low-end industrial development and homogeneous competition have resulted in a low degree of compatibility between real and digital economies. Uncompleted projects caused more resource waste and severe resource allocation distortions.

Second, the differences in industrial infrastructure conditions across different regions lead to weak digital collaboration capabilities at the regional level, highlighting prominent issues of uneven development. In 2003, digital technology adoption rates in China's primary, secondary, and tertiary industries were 10.78%, 25.03%, and 45.63%, respectively, highlighting the issues of inadequate and uneven development across industries. China's industrial structure varies significantly by region. The level of digitalization is higher in the eastern coastal region, which is dominated by the service sector, but it is relatively low in some parts of the central and western regions, where the manufacturing and even agricultural sectors predominate. This contrast highlights the west-east industrial digitalization disequilibrium. It also restricts the implementation of digital technology capabilities for improving industrial coordination and resource allocation on a larger market scale.

4.3 Opportunities for Enhancing Security and Robustness in Digital-Real Economy Integration

The security and stability of digital-real economy integration are critical to the resilience of new quality productive forces. However, China's digital economy continues to face numerous risks and challenges in terms of data, computing power, and algorithms, limiting its ability to explore market space and innovate resource allocation.

First, the unclear boundary of rights, limited technological means, and gaps in standardization have discouraged and disabled data openness, shared access, and transactions in China. There are significant contradictions between data property rights and segmentation, as well as between openness and protection. The problem of "data islands" persists. The market, pricing, and distribution mechanisms for the data factor are still in their early stages (Li, 2022). As a result, the data factor's role in increasing productive capacity and matching supply and demand cannot be fully realized, and data security risks remain.

Second, China is facing the following three challenges in developing computing power: (1) Computing power coordination is insufficient. There is room to improve the computing power structure of nodes through the "East Data, West Computing" project, as well as coordinate computing power between the eastern and western regions. (2) The computing power ecosystem is imperfect. Data centers built in certain parts of China (primarily in the central and western regions) fall short of their intended computing capacity due to disparities in digitalization levels across regions. Furthermore, there is insufficient coordination between upstream and downstream enterprises in the development of an application ecosystem market (Guo, 2024). (3) The rate of computing power development is insufficient. There are still weaknesses in China's computing power for core technology innovation. Its reliance on foreign sources of chips and software poses a chokepoint risk. This is not only detrimental to the development of high-performance computing power, but it also raises concerns about future computing power applications, as well as secure operations and maintenance.

Third, unreasonably aggressive algorithmic development may pose risks and challenges to market competition, industrial coordination, and other critical factors in developing new quality productive forces. (1) Barriers to fair market opportunities. Algorithmic operations are not fully transparent. Many large internet platform enterprises use algorithm-based technologies, decision-making, and recommendations to develop their data and user advantages while obstructing fair competition with other

中国知网 https://www.cnki.net

market entities through their dominant market position. Such impediments do not contribute to fully unleashing the market competition mechanism and economic dynamism. (2) The creation of algorithmic barriers that impede industrial coordination. Some businesses have implemented algorithmic barriers to limit data factor flow and sharing across various industrial sectors, reducing the effectiveness of industrial coordination and worsening the industrial ecosystem.

5. Practical Directions for Developing New Quality Productive Forces in the Context of Integrating the Digital and Real Economies

To develop new quality productive forces in the context of digital-real economy integration, it is essential to concentrate on leveraging the four key strengths of integrating the digital and physical economies to foster advanced productive capabilities. This involves addressing various aspects including resources, sectors, and markets. By refining and enhancing the institutional frameworks supporting this integration, a cohesive systemic force would be built to drive the growth of high-quality productivity.

5.1 Enhancing Market-Based Factor Mechanisms to Release Dynamism for New Quality Productive Forces

First, the data factor market should be developed in collaboration with other factor market systems, with the goal of breaking down institutional barriers to free factor flow and improving factor quality and efficiency. This includes two key elements: (1) In terms of the data factor market, it is critical to remove barriers to internal and external data circulation, establish complete and efficient public data sharing mechanisms, as well as data distribution and transaction rules, and allow for the mass flow and reasonable use of data. (2) In terms of the data factor's enabling effect on other factors of production, it is suggested to coordinate the flows of materials, information, and data within regions by developing new infrastructure. Market thresholds should be lowered to break unnecessary institutional barriers on the basis of unified policies, rules, regulations, and standards, and promote the flow and distribution of production factors on a broader market scale.

Second, priority should be given to addressing market application challenges, developing industrial ecosystems, beginning with factor and innovation ecosystems, and optimizing factor market operational mechanisms. Specifically, (1) the government should improve and expand the types of factor transaction platforms, enact market rules for the cultivation and transaction of innovative and new-type production factors, proactively expand the functions of existing public resource transaction platforms, investigate transaction linkage mechanisms for factor transaction platforms, and promote the free flow and effective combination of new and traditional factors. (2) More efforts should be made to improve the mechanisms for transacting, commercializing, and distributing scientific research results, to strengthen the intellectual property rights protection system, and to promote the free flow of innovation factors such as knowledge, technology, and talent.

The third step should be to develop nationally unified quality and standard systems, proactively implement mutual recognition and adoption of standards across regions, and promote fair, flexible, coordinated, and compatible factor transition and resource allocation.

5.2 Enhancing Industrial Innovation Mechanisms to Convert Sci-Tech Outputs into Productivity

First, reforms should be implemented to remove institutional barriers in the field of technology, conduct scientific research to meet the needs of the country, people, and market, and smooth the "technology development, commercialization, and product application" cycle (Li, 2022). All sources

中国知网 https://www.cnki.net

of innovation should be fully utilized by linking scientific research with experimental development and commercialization.

Second, steps should be taken to bring together industries, universities, research institutions, and users, to facilitate the links between technology R&D and industrial chains, to encourage the creation and commercialization of technology patents, and to promote the full lifecycle allocation of innovation resources across R&D, commercialization, and application. It is suggested to promote the openness and shared access of technology patents ready for industrial applications, fully unleash market entities' dynamism and ingenuity, and encourage market entities to establish innovation platforms through multiparty collaboration and shared access to technology in order to explore new development and collaboration mechanisms for future frontier technologies.

Third, it is critical to improve the industrial innovation system by balancing the government-market relationship and better aligning technological innovation with socioeconomic development. The government should direct the efficient and reasonable allocation of technology innovation resources to meet market demands and improve the synergy of innovation activities that create value. Industrial innovation activities should emphasize the importance of enterprises as the foundation of innovation. Various factors and resources should be directed toward enterprises, industries, and industrial clusters to help enterprises improve the entire system of production innovation activities, including technology innovation decision-making, R&D spending, scientific research organization, and commercialization. To promote government-market synergy for innovation, socil entities and enterprises should be encouraged to participate in specific activities and rule-making on major technology planning, key product R&D, and commercialization.

5.3 Enhancing Investment and Financing Mechanisms for New Industries and Business Models to Boost Capital Utilization Efficiency

First, priority should be given to investment and financing matchmaking. Investment and financing activities establish links between projects and funds. They are subject to mutual compatibility in terms of project and fund nature, characteristics, duration, and entity. Steps should be taken to break the vicious cycle of over-reliance on debt financing and increase efforts to develop feature, specialized, sophisticated, unique, and innovative industries, as well as forward-looking industries. Government fund guidance should be combined with private-sector investment and financing to help commercialize new business models for digital-real economy integration.

Second, significant efforts should be made to expand direct financing and promote the role of a multi-tiered capital market. The Sci-Tech Innovation Board (SSE STAR Market), the ChiNext board, and the Beijing Stock Exchange (BSE) are all important platforms for developing new quality productive forces. The capital market should improve its service capabilities for high-tech sectors in order to foster new productive forces and create new industries, business models, and paradigms. Financing activities should support specialized, sophisticated, unique, and innovative enterprises with a strong technological focus. Specifically, the SSE STAR Market should continue to improve its financing support system for high-tech and strategic emerging industries that are at the forefront of global technology and are critical to international economic competition and major national needs. The securities regulator is advised to diversify public listing criteria based on the "R&D results commercialization" standard and to improve information disclosure rules. The ChiNext board should encourage innovative, creative, and entrepreneurial ventures that incorporate new technologies, industries, business models, and paradigms. It should motivate traditional industries to unleash their innovations through means such as technology

中国知网 https://www.cnki.net

renovation and equipment renewal under the standard of "enterprise growth potential". With its strategic mandate to serve specialized, sophisticated, unique, and innovative SMEs, the Beijing Stock Exchange (BSE) should promote the emergence of industrial innovation in a variety of sectors through the "enterprise development in vertical market segments".

5.4 Strengthening Institutional Assurance to Harmonize Regional Development Patterns and Boost Development Vitality

First, it is critical to develop sci-tech innovations by enhancing the system of national mobilizaion in order to accelerate digital-real economy integration. On the one hand, it requires a capable government to create new quality productive forces. The government should conduct forward-thinking reflections, overall planning, strategic arrangements, and comprehensive implementation to foster the development of new quality productive forces. It should speed up major breakthroughs in critical and disruptive technologies, work to resolve "chokepoint" issues, and establish China's new technological competitive advantages. On the other hand, an effective market must be proactive in developing new quality productive forces. Market economic entities should be proactive in responding to government policies, pursuing frontier technologies, and generating new quality productive forces through major breakthroughs in science and technology.

Second, it is critical to establish effective mechanisms for coordinating development models at the local, regional, and inter-regional levels in order to capitalize on the opportunities presented by digital-real economy integration and foster new quality productive forces tailored to local conditions. (1) Local governments are encouraged to use resources more efficiently when attracting investment in new industries, business models, and dynamism in their jurisdictions based on local resource endowment. (2) They should use ubiquitous and connected digital technologies to create more inclusive and equitable institutional conveniences for effectively developing industrial clusters in the region, as well as foster a regional development environment for industrial regeneration, complementarity, and symbiosis. (3) It is recommended that the central government coordinate the differentiated allocation of new production factors across regions, resulting in a landscape of regionally differentiated development and the symbiosis of new quality productive forces. CE

References:

Guo L. China's Computing Power Industry Development: Challenges and Suggestions [J]. Information and Communications Technology and Policy, 2024 (2): 2-6.

Hong Y. X. Develop New Quality Productive Forces in Building a Modern Industrial System [J]. Contemporary Economic Research, 2024a (2):7-9.

Hong Y. X. New Quality Productive Forces and Their Cultivation and Development [J]. Economic Perspectives, 2024b(1):3-11.

Hong Y. X., Ren B. P. Implications and Approaches of Digital-Real Economy Integration [J]. China Industrial Economics, 2023(2):5-16.

Hu Y. New Quality Productive Forces: Implications, Characteristics and Paths [J]. Journal of Xinjiang Normal University (Edition of Philosophy and Social Sciences), 2024 (5): 36-45+24.

Huang T. Y., Liu Y. K. Marxist Theory of Economic Forms and Its Expansion and Innovation: On the Digital Economy as a New Economic Form [J]. Teaching and Research, 2023 (10):68-84.

中国知网 https://www.cnki.net

Huang Z., Tao Y. Q., Liu Z. D.,et al. How Does Intelligent Manufacturing Improve Industrial Operating Rate? From the Perspective of the Unity of Production and Consumption [J]. Management World, 2024 (5): 40 - 57.

Kotarba M., Measuring Digitalization: Key Metrics[J]. Foundations of Management, 2017(1):123-138.

Li H. B. Transforming Sci-tech Achievements into Real Productive Forces [N]. People's Daily, http://paper.people.com.cn/rmrb/html/2022-03/25/nw.D110000renmrb_20220325_2-09.htm.

Li P. Improving China's Property Rights System for the Data Factor [N]. Study Times, https://paper.cntheory.com/html/2022-08/17/nw.D110000xxsb_20220817_1-A2.htm.

Li X. H. Main Characteristics and Formation Mechanisms of New Quality Productive Forces [J]. People's Tribune, 2023(21):15-17.

Li X. H. New Characteristics of the Digital Economy and the Formation Mechanism of the New Drivers of the Digital Economy [J]. Reform, 2019 (11):40-51.

Mei H. Big Data and Digital Economy [J]. Seeking Truth, 2022(2).

Melville N. P., Information System Innovation for Environmental Sustainability[J]. MIS Quarterly, 2010 (1):1-21.

Ren B. P. Advancing New Industrialization through Coordinated Development of Industrial Digitalization and Digital Industrialization [J]. Reform, 2023(11):28-37.

Ren B. P., Wang Z. Y. Digital New Quality Productive Forces Propelling High-quality Economic Development: Rationale and Pathway [J]. Journal of Xiangtan University (Edition of Philosophy and Social Sciences), 2023(6): 23-30.

Shen K. R., Jin T. Y., Zhao Q. Empowering High-Quality Development with New Quality Productive Forces [J]. Nanjing Journal of Social Sciences, 2024(1): 37 - 42.

Sun S. Y. Developing New Quality Productive Forces: Core Elements and Practical Directions of Chinese-Style Economic Modernization [J]. Shandong Social Sciences, 2024(1):22-30.

Tapscott D. The Digital Economy:Promise and Peril the Age of Networked and Intelligence[M]. NewYork:McGraw-Hill, 1996.

Wang L., Li C. Y. Socialization of Production and the Division of Labor and Collaboration among Enterprises in the Digital Economy: Evolution and Characteristics [J]. Journal of Beijing Administrative College, 2022(1):84-94.

Woodruff R. B., Customer Value:The Next Source for Competitive Advantage[J].Journal Of the Academy Of Marketing Science,1997 (2):139-153.

Wu X. X., Ren B. P. Paths and Policy Adjustments for the Reconstruction of the Allocation Mechanism of Factor Resources in the Context of the Digital Economy [J]. Reform of Economic System, 2022(2):5-10.

中国知网 https://www.cnki.net