以数字化为桥梁：供应链伙伴关系对制造企业组织韧性的影响研究
BRIDGING THE GAP THROUGH DIGITAL TRANSFORMATION: THE IMPACT OF SUPPLY CHAIN PARTNERSHIPS ON ORGANIZATIONAL RESILIENCE IN MANUFACTURING ENTERPRISES

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摘要

中国高度重视制造业对经济社会发展的重要性。当前，我们所处的外部环境充斥着易变性、不确定性、复杂性及模糊性（简称 “VUCA”）特征，面对 VUCA 环境常态化趋势，制造企业亟需强化组织韧性，有效缓解外部环境变化对企业造成的不利影响。已有制造企业开始积极寻求与供应链上下游伙伴间的紧密协作，构建供应链网络，获取外部资源，提高其自身组织韧性，保障企业的持续生存与发展。因此，探究 VUCA 环境下制造企业如何借助供应链解决现实问题，进而提升企业组织韧性，已成为学术界与企业界共同关注的问题，亟需深入剖析制造企业通过优化供应链伙伴关系来强化其企业组织韧性的内在关系。

本研究在理论基础与文献综述的基础上，从供应链伙伴关系对制造企业组织韧性的影响、供应链伙伴关系对制造企业数字化创新的影响、制造企业数字化创新对制造企业组织韧性的影响、制造企业数字化创新在供应链伙伴关系与制造企业组织韧性之间的中介作用方面提出了 4 个研究假设。随后通过发放问卷的形式，共收集问卷数据 408 份，运用描述性统计分析、非回应偏差分析、共同方法偏差分析、信度与效度检验、相关性分析、假设检验的统计分析方法，研究结果显示 4 条假设均得到数据支持。本研究揭示了供应链伙伴关系对制造企业组织韧性具有积极影响；制造企业数字化创新在供应链伙伴关系与制造企业组织韧性之间发挥中介作用。

关键词：供应链伙伴关系 制造企业数字化创新 制造企业组织韧性

Abstract

China attaches great importance to the role of manufacturing in socioeconomic development. Under the current external environment characterized by volatility, uncertainty, complexity, and ambiguity (VUCA), manufacturing enterprises urgently need to enhance organizational resilience to effectively mitigate adverse impacts from environmental changes. Some enterprises have begun actively seeking close collaboration with supply chain partners to build networked supply chains, acquire external resources, and improve their resilience for sustained survival and development. Therefore, exploring how manufacturing enterprises can leverage supply chain solutions to address practical challenges and enhance organizational resilience under VUCA conditions has become a shared research focus in academia and industry, requiring in-depth analysis of the intrinsic relationships between optimized supply chain partnerships and organizational resilience strengthening.

Building on theoretical foundations and literature reviews, this study proposes four hypotheses regarding: (1) the impact of supply chain partnerships on manufacturing enterprises' organizational resilience; (2) the effect of supply chain partnerships on digital innovation; (3) the influence of digital innovation on organizational resilience; and (4) the mediating role of digital innovation between supply chain partnerships and organizational resilience. Through distributing questionnaires and collecting 408 valid samples, statistical analyses including descriptive statistics, non-response bias testing, common method bias examination, reliability/validity assessments, correlation analysis, and hypothesis testing were conducted. The results demonstrate full support for all four hypotheses. This research reveals that supply chain partnerships positively influence manufacturing enterprises' organizational resilience, while digital innovation plays a mediating role between supply chain partnerships and organizational resilience.

Keywords: Supply Chain Partnership, Manufacturing Enterprise Digital Innovation, Manufacturing Enterprise Organizational Resilience

引言

制造业作为支撑中国迈向制造强国的关键支柱，始终受到中国国家战略层面的高度关注。然而，当前国际格局加速演进，全球正经历百年未有之大变局。制造企业所处的经营环境更加复杂多变，VUCA 特征日益凸显。在此背景下，制造企业亟需强化组织应变能力以应对环境波动冲击。实践表明，具备较强组织韧性的制造企业往往能够在复杂环境中保持稳健发展态势，而缺乏组织韧性管理的制造企业则易受外部冲击影响。如何通过供应链协同发展模式提升企业抗风险能力，已成为制造领域亟待破解的现实课题。同时，随着区块链、工业互联网平台、物联网等数字化技术的深度应用，传统供应链管理模式正在被重塑，这些数字化创新技术的出现，不仅有效缓解了供应链信息孤岛现象，更使制造企业能够及时捕捉全链条动态数据，并借助智能算法实现资源精准调配。这种技术嵌入不仅强化了制造企业的风险预判能力，更为制造企业组织韧性提升提供了支撑保障。

在此背景下，系统探究供应链伙伴关系、制造企业数字化创新与组织韧性之间的内在关联，对于揭示制造企业组织韧性的提升具有重要意义，也是推动经济高质量发展必须突破的关键瓶颈，对于破解制造强国建设中的提升制造企业组织韧性问题具有重要的理论价值和实践指导意义。

研究目的

本研究聚焦于制造企业这一核心主体，深入剖析供应链伙伴关系、制造企业数字化创新与制造企业组织韧性三者间的影响关系，旨在解决两个核心问题：一是供应链伙伴关系如何影响制造企业组织韧性的提升？二是制造企业数字化创新在供应链伙伴关系影响制造企业组织韧性的提升过程中发挥怎样的作用？本研究的理论创新点在于：（1）构建了“供应链伙伴关系－制造企业数字化创新－制造企业组织韧性”的逻辑链条。基于供应链管理的视角，丰富了组织间关系管理和制造企业组织韧性的关系研究，并针对 VUCA 环境下“资源获取——能力构建——价值创造”的思路进行创新性探讨；（2）从能力视角，将制造企业数字化创新按照数字业务能力与数字管理能力两个维度分别纳入整条供应链体系进行探讨，细化了动态能力、数字经济相关理论研究。

通过揭示多变量间的内在关联关系，该研究不仅为中国制造企业优化供应链治理体系、提升战略决策科学性提供理论支撑，更在数字经济时代背景下为构建韧性型组织管理模式开辟新的方法论路径，有助于推动中国制造向价值链高端攀升，为实现制造强国战略目标注入可持续发展的管理思路。

文献综述

1. 理论基础

供应链管理理论

供应链管理理论的研究脉络可上溯至 20 世纪 80 年代，历经制造资源计划、准时制生产、精益制造等阶段的迭代升级，其理论框架逐步趋于系统完善。冯檬莹等（2023）研究表明，供应链协同创新与制造企业绩效之间存在显著的正相关关系。在供应链层次上，有效的供应链管理促进了全链协同合作，增强了竞争优势，并为实现供应链的长期可持续发展奠定了坚实基础。由此可见，供应链管理理论为解析供应链伙伴关系的内在机制提供了坚实的理论基础。

动态能力理论

动态能力理论聚焦企业持续发展能力的关键作用，强调资源占有本身并非成功保障，核心在于实现资源、能力与环境间的动态协同。对制造企业而言，主动培育动态能力已成为应对外部环境变化的重要策略（赖晓烜等，2023）。赵思嘉等（2021）的研究表明，在复杂多变的环境中，动态能力能够赋能企业快速决策、灵活应对变化并创新模式，从而推动危机转化与风险规避。这一理论视角为探究 VUCA 环境下供应链伙伴关系与制造企业组织韧性的关联提供了新的分析视角。

数字经济理论

在学术界主流分类中，数字经济被划分为“数字产业化”与“产业数字化”：前者指与数字技术直接相关的特定行业，后者则是数字要素与新经济、新模式、新业态融合的新型经济形态（陈晓红等，2022）。从数据层面看，供应链伙伴间的实时交互（如库存状态、物流节点）通过区块链分布式账本实现跨组织可信共享，有效缓解了传统供应链因信息割裂引发的决策延迟问题；从技术层面看，工业互联网平台的算法优化能力（如基于机器学习的动态排产模型）与数字孪生技术的场景仿真功能（如供应链中断模拟），被纳入分析框架后验证了其对资源编排能力的重构效应，实证数据显示应用数字孪生的企业供应链恢复时效提升 42%（盛斌和刘宇英，2022）。因此，数字经济理论为解析制造企业数字化创新在供应链伙伴关系与组织韧性间的中介作用提供了关键依据。

2. 文献综述及述评

供应链伙伴关系

当前学界对供应链伙伴关系的学术界定尚未形成全球统一共识，主要涵盖价值共创视角、供应链效能视角及合作模式视角。王寅（2024）认为伙伴关系是指为了实现某个价值或者特定目标，以一定经营方式进行合作以提升企业的竞争实力。

制造企业数字化创新

制造企业数字化转型是指制造企业依托数字技术重构业务流程与商业模式的变革过程，旨在构建以数字技术为核心的新业务流程与商业模式形态（Jahanmir & Cavadas，2018）。邓程和张雪（2025）将数字化创新定义为：企业数字化转型的理想状态。黄浩和徐子贤（2025）认为，数字化创新可用于评估企业在发展数字能力方面取得的进展。当前，许多制造企业正加

大数字技术投入，通过传感器采集、数据仓库构建、算力提升及算法优化等路径，强化数据分析与可视化能力，以期实现收入与利润增长。

制造企业组织韧性

现有研究从多元视角对组织韧性内涵进行了差异化阐释，其中，基于“能力”维度界定与度量组织韧性的研究路径最具学术影响力（Wang 等，2023）。张畅（2023）针对制造企业的研究表明，组织韧性是企业在面对突发事件时展现的快速决策响应与灵活创新适应能力，鉴于突发与不确定事件对制造企业经营环境的深刻改变及其生存威胁，探究制造企业组织韧性具有重要理论与实践价值。

通过系统梳理现有文献，当前研究存在两方面不足：一是关于供应链伙伴关系影响制造企业组织韧性这一关键问题还需进一步深入剖析。制造企业的供应链关系具有高度复杂性，现有研究多基于单一视角或特定对象构建测量框架，难以全面评估供应链伙伴关系的发展水平。此外，现有研究主要对于供应链伙伴关系具体如何影响制造企业组织韧性这一问题尚未充分解答。尤其是在 VUCA 环境下，不仅使得供应链关系更加错综复杂、扑朔迷离，供应链关系呈现更强的异质性与不确定性，使得制造企业组织韧性提升难度增加。因此，亟需构建综合性测量架构，系统探究供应链伙伴关系如何通过跨组织资源流动与交换以提升制造企业组织韧性。二是数字化创新在供应链伙伴关系与组织韧性间的中介作用尚未充分解析。尽管多数学者认同供应链伙伴关系为制造企业获取外部资源奠定了坚实基础，但资源本身并不足以确保组织韧性的持续增强与维持。动态能力视角下，学者们普遍认为制造企业数字化创新是制造企业在面对突发状况时展现出的适应环境变化、应对挑战的重要能力。为从制造企业数字化创新角度深入探究供应链伙伴关系与制造企业组织韧性之间的关系提供了重要启示。然而，现有研究多停留在理论探讨层面，尚未全面剖析制造企业数字化创新各维度如何在供应链伙伴关系与制造企业组织韧性间发挥“桥梁”作用。因此，亟需全面、系统地研究制造企业数字化创新在供应链伙伴关系影响制造企业组织韧性提升过程中扮演的中介角色。

研究方法

1. 理论模型构建与假设提出

供应链伙伴关系与制造企业组织韧性

基于供应链管理理论，物流、信息流、资金流构成供应链管理的核心要素，制造企业与供应商、客户等主体通过节点联结形成资源交互网络，这种关系网络既是物质交换的载体，也是价值传递的通道，直接影响经济活动效率。动态能力理论进一步指出，供应链作为企业获取外部资源的关键路径，其与合作伙伴的良性互动能够促进隐性知识（如市场信息、技术诀窍）与显性资源（如原材料、零部件）的双向流动，从而为组织韧性构建提供资源保障。实证研究中，典型案例如华为在美国技术封锁期间通过重构供应链网络，强化伙伴协同效应，有效规避了“单点失效”风险。故提出研究假设：

H1：供应链伙伴关系对制造企业组织韧性具有正向影响。

供应链伙伴关系与制造企业数字化创新

现有文献虽未形成系统结论，但已有研究揭示供应链伙伴关系对数字化转型的促进作用。部分学者指出，长期稳定的供应链合作关系可降低专用性数字资产投资的风险感知（DesJardine et al.，2019），通过减少信息不对称提升协同效率。另一些研究则发现，供应链上主导企业可通过技术标准输出推动上下游企业的数字化能力跃迁，形成创新扩散网络

（Hamel & Välikangas，2003）。这些发现为解析供应链关系与数字化创新的关联机制提供了理论线索。故提出研究假设：

H2：供应链伙伴关系对制造企业数字化创新具有正向影响。

制造企业数字化创新与制造企业组织韧性

动态能力理论视角下，数字化创新可通过三重机制增强组织韧性：其一，数字孪生技术使供应链中断响应效率提升 40%（Knoke et al.，2023）；其二，人工智能算法将需求预测精度提升至 90%以上（Wamba et al.，2021）；其三，分布式智慧物流系统通过多中心仓储网络降低单点失效风险（Ivanov et al.，2021）。这些技术应用实质是通过重构资源配置方式提升系统抗冲击能力。故提出研究假设：

H3：制造企业数字化创新对制造企业组织韧性具有正向影响。

制造企业数字化创新在供应链伙伴关系与制造企业组织韧性之间的中介作用

供应链伙伴关系虽能降低异质性资源流动风险（Zhao et al.，2013），但其对组织韧性的持续提升需依赖动态能力过渡。具体而言，供应链协同为数字化创新提供数据共享基础，而数字化转型通过重构资源配置方式增强韧性，形成“关系网络→数字能力→韧性提升”的传导路径。华为“数字供应链星云系统”的实践印证了该机制：区块链技术实现秒级风险预警，智能合约触发替代方案，使供应链在技术封锁期间保持连续性，供应链压力测试周期缩短 83%（张通和沈瑾，2023）。故提出研究假设：

H4：制造企业数字化创新在供应链伙伴关系与制造企业组织韧性之间发挥中介作用。

整体研究假设模型如图 1 所示。

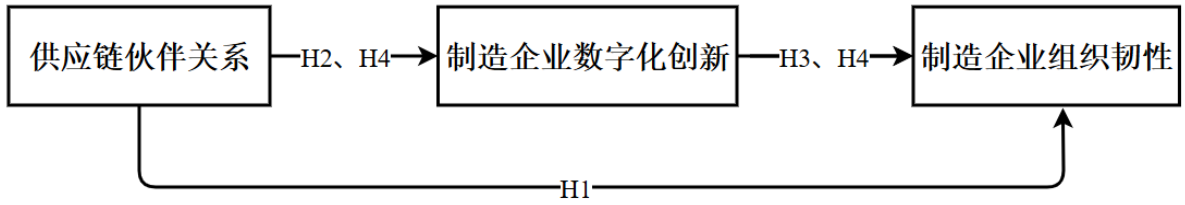

图 1： 整体研究假设模型

2. 研究设计

变量测量

本研究设定的研究变量体系包含三个核心变量：自变量（供应链伙伴关系）、中介变量（制造企业数字化创新）及因变量（制造企业组织韧性）。为保障变量测量的科学性，本研究参考了 Le et al.（2021）、Matarazzo et al.（2021）、Beuren（2022）的测量量表，并采用双向回译法，首先，邀请 2 位管理学领域的博士研究生将核心变量量表翻译成中文，在此基础上，邀请 2 位同时精通中文和英文的管理学领域专家对问卷中文题项进行反向回译，及时纠正存在显著偏差的题项，并通过多轮与制造企业中高层管理者研讨，最终构建了包含 8 个题项的供应链伙伴关系测量量表、包含 6 个题项的制造企业数字化创新测量量表以及包含 4 个题项的制造企业组织韧性测量量表。控制变量选取企业年龄、企业规模、企业性质、企业所属区域、企业所属行业，以排除非研究变量对核心关系的干扰效应。对该测量量表进行预测试，根据最终回收到的 114 份有效预调研问卷进行信效度分析，结果显示其均具有较好的信效度。

数据收集

本研究采用问卷调查法，通过线上线下相结合的方式发放并回收问卷，一方面，在采取实地调研方式时，向作者所在单位的涉及业务往来的制造企业发放问卷，调查在日常采购供应工作中现场进行，请制造企业现场填写问卷并当场收回；另一方面，采取电子邮件、电话咨询、问卷星等多种方式发送调研问卷。对于初次发放问卷后，2 周内未回复的制造企业，将再次发放作答邀请。为保障样本地理分布均衡性，调研范围覆盖东部、中部、西部及东北地区重点城市；研究对象聚焦于掌握供应链合作、数字化创新及组织韧性评估等核心信息的制造企业中高层管理者。本研究共发放问卷 500 份，按照数据缺失或逻辑矛盾判定为无效的原则，经过严格筛选最终获得有效问卷 408 份。

研究结果

描述性统计分析

根据表 1 所示的描述性统计结果，所有题项的偏度系数绝对值均低于阈值 3，峰度值低于阈值 10，表明数据分布符合正态分布特征，为后续分析提供了数据基础。

表 1： 描述性统计分析

变量	题项	均值	标准差	方差	偏度	峰度
供应链伙伴关系	A1	4.98	1.65	2.72	-0.67	-0.57
	A2	4.59	1.72	2.96	-0.39	-0.86
	A3	4.73	1.61	2.59	-0.53	-0.63
	A4	4.95	1.75	3.06	-0.66	-0.70
	A5	4.98	1.73	2.99	-0.64	-0.73
	A6	5.01	1.77	3.13	-0.64	-0.77
	A7	4.71	1.74	3.03	-0.43	-0.89
	A8	4.92	1.71	2.92	-0.59	-0.71
制造企业数字化创新	B1	4.49	1.68	2.82	-0.29	-0.94
	B2	4.45	1.70	2.89	-0.30	-0.87
	B3	4.38	1.73	2.99	-0.17	-1.00
	B4	4.42	1.67	2.79	-0.18	-0.97
	B5	4.82	1.80	3.24	-0.59	-0.79
	B6	4.80	1.82	3.31	-0.57	-0.83
制造企业组织韧性	C1	5.25	1.53	2.34	-0.84	-0.19
	C2	5.26	1.51	2.28	-0.76	-0.22
	C3	5.27	1.60	2.56	-0.81	-0.40
	C4	4.97	1.53	2.34	-0.56	-0.59

来源：本文作者整理

非回应偏差分析

在开展数据分析前，本研究采用 SPSS 29.0 软件的独立样本 T 检验法对数据进行非回应偏差分析。将问卷均分为两组，对比两组问卷中各变量数据。经 T 检验结果显示，各变量数据的检验结果均未达到显著水平（$p>0.05$），表明本研究样本数据未呈现显著的非回应偏差问题。

共同方法偏差分析

本研究通过 Harman 单因子检验法初步检验潜在的共同方法偏差效应，结果显示问卷题项特征值大于 1 的因子共有 6 个，其中首个因子的特征值为 29.912%，未达到 40%的临界阈值，说明本研究数据不存在明显的共同方法偏差。

在此基础上，为进一步验证结果可靠性，本研究采用潜因子分析法开展二次检验。借助 AMOS 24.0 软件将共同方法偏差潜变量纳入所构建的 6 因子模型中，检验结果表明模型拟合指标的变化量低于 0.01，由此可确认本研究数据未出现显著共同方法偏差。

信度分析

供应链伙伴关系测量量表的克朗巴哈系数为 0.898，各题项的 CITC 值均高于 0.4，且若删除任一题项，克朗巴哈系数值均未出现显著提升，组合信度 0.898，表明该测量量表信度表现良好（见表 2）。

表 2: 供应链伙伴关系的信度分析结果

变量	题项	CITC 值	Alpha 值	克朗巴哈系数	组合信度
供应链伙伴关系	A1	0.721	0.899	0.898	0.898
	A2	0.743	0.901		
	A3	0.694	0.898		
	A4	0.752	0.900		
	A5	0.746	0.901		
	A6	0.728	0.899		
	A7	0.690	0.898		
	A8	0.722	0.899		

来源：本文作者整理

制造企业数字化创新测量量表的克朗巴哈系数为 0.910，各题项的 CITC 值均高于 0.4，且若删除任一题项，克朗巴哈系数值均未出现显著提升，组合信度 0.911，表明该测量量表信度表现良好（见表 3）。

表 3: 制造企业数字化创新的信度分析结果

变量	题项	CITC 值	Alpha 值	克朗巴哈系数	组合信度
制造企业数字化创新	B1	0.682	0.908	0.910	0.911
	B2	0.705	0.907		
	B3	0.720	0.909		
	B4	0.725	0.908		
	B5	0.645	0.906		
	B6	0.665	0.907		

来源：本文作者整理

制造企业组织韧性测量量表的克朗巴哈系数为 0.877，各题项的 CITC 值均高于 0.4，且若删除任一题项，克朗巴哈系数值均未出现显著提升，组合信度 0.877，表明该测量量表信度表现良好（见表 4）。

表 4: 制造企业组织韧性的信度分析结果

变量	题项	CITC 值	Alpha 值	克朗巴哈系数	组合信度
制造企业组织韧性	C1	0.790	0.842	0.877	0.877
	C2	0.768	0.850		
	C3	0.805	0.836		
	C4	0.725	0.865		

来源：本文作者整理

效度分析

供应链伙伴关系测量量表中，各题项因子载荷值均高于 0.7，AVE 值为 0,610，且其平方根大于该变量与其他变量的相关系数，拟合优度指标良好，表明该测量量表的效度表现良好（见表 5）。

表 5: 供应链伙伴关系的效度分析结果

变量	题项	因子载荷	AVE	拟合优度指标
供应链伙伴关系	A1	0.772	0.610	χ2/df=1.549
	A2	0.794		GFI=0.978
	A3	0.747		AGFI=0.989
	A4	0.811		NFI=0.991
	A5	0.799		RFI=0.979
	A6	0.778		IFI=0.997
	A7	0.742		TLI=0.998
	A8	0.763		CFI=0.994
				RMSEA=0.033

来源：本文作者整理

制造企业数字化创新测量量表中，各题项因子载荷值均高于 0.7，AVE 值为 0,610，且其平方根大于该变量与其他变量的相关系数，拟合优度指标良好，表明该测量量表的效度表现良好（见表 6）。

表 6: 造企业数字化创新的效度分析结果

变量	题项	因子载荷	AVE	拟合优度指标
制造企业数字化	B1	0.789	0.558	χ2/df=1.989
	B2	0.757		GFI=0.967
	B3	0.772		AGFI=0.972
	B4	0.777		NFI=0.981
	B5	0.698		RFI=0.969
				IFI=0.995
	B6	0.759		TLI=0.981
				CFI=0.996
				RMSEA=0.048

来源：本文作者整理

制造企业组织韧性测量量表中，各题项因子载荷值均高于 0.7，AVE 值为 0.698，且其平方根大于该变量与其他变量的相关系数，拟合优度指标良好，表明该测量量表的效度表现良好（见表 7）。

表 7: 制造企业组织韧性的效度分析结果

变量	题项	因子载荷	AVE	拟合优度指标
制造企业数字化	C1	0.889	0.698	χ2/df=1.998
	C2	0.843		GFI=0.956
	C3	0.899		AGFI=0.981
	C4	0.789		NFI=0.979
				RFI=0.972
				IFI=0.991
				TLI=0.986
				CFI=0.997
				RMSEA=0.051

来源：本文作者整理

相关分析

为深入探究样本数据特征，本研究借助 SPSS 29.0 统计软件对变量间的相关性展开探讨。结果显示，各变量均值与标准差处于合理区间，数据分布符合正态特征。供应链伙伴关系、制造企业数字化创新、制造企业组织韧性之间呈现显著两两相关性，所有相关系数均低于 0.7 阈值，表明变量间未出现过度共现现象。同时，检验结果表明，全部变量的方差膨胀因子均低于 10 的临界标准。故本研究数据不存在显著多重共线性问题，为后续假设检验提供了可靠的数据基础。

假设检验

运用结构方程模型分析软件 AMOS 24. 0 对假设进行检验。模型拟合指标见表 8，各衡量指标均达到可接受范围。回归权重见表 9。从表 9 可知，显著性均小于 0.05，说明各路径成立，假设 H1、H2、H3 得到数据支持。

表 8: 结构方程模型拟合指标

常用指标	GFI	AGFI	NFI	RFI	IFI	TLI	CFI	RMSEA
判断标准	>0.9 优秀 >0.8 合格	>0.9 优秀 >0.8 合格	>0.9 优秀 >0.8 合格	>0.9 优秀 >0.8 合格	>0.9 优秀 >0.8 合格	>0.9 优秀 >0.8 合格	>0.9 优秀 >0.8 合格	<0.05 优秀 <0.08 合格
值	0.911	0.898	0.924	0.918	0.978	0.976	0.977	0.030

来源：本文作者整理

表 9: 回归权重

路径系数			Estimate	S.E.	C.R.	P	STD.Estimate
制造企业数字化创新	<---	供应链伙伴关系	0.434	0.053	8.252	***	0.577
制造企业组织韧性	<---	制造企业数字化创新	0.558	0.11	5.093	***	0.612
制造企业组织韧性	<---	供应链伙伴关系	0.183	0.059	3.112	0.002	0.266

来源：本文作者整理

基于上述分析，本研究进一步借助 Bootstrap 分析法检验制造企业数字化创新的中介效应。通过 PROCESS 中的 Model4 模块进行迭代运算后，结果如表 10 所示。结果显示，各路径

的置信区间均未涵盖零值，表明总效应、直接效应及间接效应均具有统计显著性，且中介路径成立。由此可知，制造企业数字化创新在该模型中发挥部分中介作用，假设 H4 得到数据支持。

表 10: 制造企业数字化创新中介效应分析结果

	Estimate	Lower	Upper	P
总效应	0.425	0.324	0.536	0
直接效应	0.183	0.045	0.302	0.016
间接效应	0.242	0.147	0.392	0

来源：本文作者整理

讨论

本研究依托供应链管理理论与动态能力理论，系统分析了供应链伙伴关系对制造企业组织韧性的作用情况，其中，描述性统计均值偏高，可能为主观期望对客观结果的塑造作用，实证结果表明，供应链伙伴关系与制造企业组织韧性呈显著正向关联，假设 H1 获得数据支撑。进一步地，结合供应链管理理论、数字经济理论与动态能力理论，通过构建中介效应模型，实证结果表明，制造企业数字化创新在供应链伙伴关系与制造企业组织韧性间发挥中介作用。具体而言，供应链伙伴关系通过增强制造企业数字化创新能力，进而提升其组织韧性水平，这一路径在统计层面显著成立，假设 H2、H3、H4 获得数据支撑。

研究结果表明，供应链作为制造企业接触外部资源的重要渠道，其与供应商、客户等合作伙伴之间的良好关系能够促进有效沟通合作、建立信任，从而有助于管理市场信息、技术知识等隐性资源以及原材料、零部件等显性资源。这些资源为制造企业的生存与发展提供了丰富的支撑和保障，是提高其组织韧性关键。同时，数字化创新实现“供应链伙伴关系→数字化创新→组织韧性”的逻辑链条：供应链伙伴提供数据支持，动态能力重构资源配置，数字经济理论下的“数字杠杆效应”与“即时性能力构建”验证了其中介机制，呼应了 Jahanmir 和 Cavadas 等的研究并深化了制造企业相关研究。

总结

本研究最终得出以下结论：

（1）供应链伙伴关系对制造企业组织韧性具有显著正向影响。依据已有文献，高水平的供应链伙伴关系体现为制造企业与供应商、客户等主体间建立信任、沟通高效、协作紧密、履约及时的良性互动，这种状态为上游原材料、零部件、管理经验、市场信息、技术知识等资源的跨组织流动提供了关键支撑，而此类跨组织异质资源正是制造企业提升组织韧性的重要基础。实证结果表明，供应链伙伴关系与制造企业组织韧性之间存在显著正向关联。

（2）制造企业数字化创新在供应链伙伴关系与制造企业组织韧性间发挥中介作用。从供应链管理视角看，供应链伙伴关系的构建为制造企业数字化创新构成重要资源支撑，依据动态能力理论，数字化创新被视为制造企业应对 VUCA 环境的核心能力，其通过优化资源配置模式促进其企业组织韧性增强。实证结果表明，供应链伙伴关系与制造企业数字化创新呈显著正向关联，制造企业数字化创新与制造企业组织韧性亦呈显著正向关联，且制造企业数字化创新在二者间发挥中介作用。

建议

上述研究结论为制造企业在 VUCA 环境中的生存与发展提供了实践启示，结合研究结论，制造企业可以从以下两方面优化管理策略：

（1）深化供应链伙伴关系建设，着力构建高水平的供应链伙伴关系以提升组织韧性。与其他行业相比，制造企业的供应链体系辐射结构更为复杂，供应延迟可能直接影响生产销售计划，因此更需要通过资源优化配置与产业协同实现高效运转。在当前复杂多变的外部环境下，产业链、供应链安全稳定问题日益突出，制造企业应充分发挥自身优势，投入资源与上游供应商、下游客户等主体间建立良性合作关系，积极打造高水平的供应链伙伴关系。研究表明，供应链伙伴关系能有效缓解企业资源匮乏问题，降低外部资源获取的风险与不确定性，进而促进组织韧性提升。为此，制造企业需加强对供应链伙伴关系的动态评估与管理，建立周期性评价机制，使关系发展过程可追踪、可量化。

在具体实践中，制造企业需重点关注以下方面：其一，强化信任基础，关注上游供应商、下游客户在重大决策中是否兼顾自身利益，通过长期互动增强上下游企业的互信；其二，加强沟通联结，通过定期交流、信息共享、联谊活动等形式密切与供应链主体的联系；其三，深化合作内容，与供应商、客户开展技术研发、市场拓展等多元化合作，共同应对合作中的问题挑战；其四，培育承诺意识，以时间、精力与资金的持续投入维护长期合作关系，确保履约守诺、职责到位。

（2）强化制造企业数字化创新，通过培育数字化创新增强适应 VUCA 环境的能力，充分发挥其在供应链伙伴关系与组织韧性间的传导作用。在制造企业将高水平供应链伙伴关系所获取的原材料、零部件、管理经验、市场信息、技术知识等资源向组织韧性转化的过程中，数字化创新是关键的过渡与衔接纽带。尤其在 VUCA 环境常态化背景下，制造企业需主动适应数字化转型趋势，将其作为生存发展的核心支撑。

一方面，制造企业应加大对物联网、工业互联网、大数据、人工智能等前沿技术的研发投入与应用。例如，借助物联网技术对生产设备实施实时监控与故障预警，及时发现并解决问题，减少停机损失与维修成本；通过工业互联网实现设备互联互通与数据实时采集分析，优化生产流程以提升效率与质量。同时，企业应积极探索数字化转型带来的潜在价值，通过搭建数字化平台实现产品个性化定制与在线销售，满足客户多样化需求。

另一方面，制造企业需构建完善的数字化管理体系，推动运营流程的数字化、精细化与智能化转型。利用大数据分析技术对生产、销售、财务等全环节进行实时监测与深度挖掘，为管理决策提供科学依据；加强企业内部数字化协同，打破部门壁垒，提升跨部门协作效率与效果。

同时，不可避免地，本研究同样存在一定的局限性，有待后续研究进一步完善：

（1） 本研究分析了制造企业数字化创新在供应链伙伴关系与制造企业组织韧性之间的中介作用，然而，制造企业组织韧性提升的过程中可能还涉及到其他调节变量，可能忽视了其他组织内外部变量产生的权变影响。未来研究可进一步考察数字能力差异、环境不确定性等的影响。

（2）在研究方法方面，本研究通过问卷调查方式收集的数据为截面数据，限制了对变量之间因果关系的推断。此外，本研究采用实证研究的方法，未来研究可以综合利用实验研究、追踪研究、仿真研究、系统动力学分析等多元化的研究方法，以获取面板数据或时间序列数据，不断深入、系统解构变量之间的内在逻辑联系，从而提升研究结论的说服力和普适性。

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VALUE CHAIN ANALYSIS OF LOCAL FISHERIES: A CASE STUDY OF SMALL-SCALE FISHERIES AN PAO–NAM JUED

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Abstract

This research employs a descriptive qualitative research design to analyze the value chain and develop operational guidelines for local fisheries, focusing on the case study of Small-Scale Fisheries An Pao–Nam Jued. Data were collected through in-depth interviews and field observations with a purposive sample of 21 key informants (n=21), including fishery members, management, and related stakeholders. The study utilizes Michael E. Porter's Value Chain Model as the primary analytical framework to evaluate inbound logistics, operations, and outbound logistics, focusing on factors such as raw material planning, quality control, storage, and technology integration. Content analysis was applied to synthesize the qualitative data and identify systemic gaps in the group's current value-added processes. Through interviews with based on Michael E. Porter's model. To address the four urgent areas of production, inventory control, accounting systems, and member knowledge, a dual strategic intervention is deemed essential. Firstly, the group must adopt technology for streamlined management and data integration, a foundational step for efficient operations. Secondly, to enhance value, two principal pathways are recommended: Option 1 focuses on sustainable technological modernization, specifically the construction of a solar-powered smoking/drying cabinet to standardize production and achieve energy efficiency. Option 2 targets inventory control, advocating for the immediate implementation of a simple data recording system to facilitate accurate cost forecasting, establish clear reorder points, and adopt a controlled just-in-time (JIT) procurement approach, thereby maximizing limited storage space and minimizing material spoilage through systematic layout reorganization and adherence to the first in, first out (FIFO) principle. Successful implementation of both technology adoption and comprehensive training, encompassing these two options, is critical for stabilizing operations and securing the group's long-term sustainability and competitiveness.

Keywords: Value Chain Analysis, Local Fisheries, Sustainable Development, Small-Scale Fisheries An Pao–Nam Jued

Introduction

Fisheries are both economically and socially important, serving as a significant source of income and employment. Important fishery products, including aquatic animals, offer widespread benefits to humans and the environment, including providing high-quality food, preserving the environment, serving as educational examples, acting as indicators of water quality, and beautifying the world. Human utilization of aquatic animals can be divided into two groups: saltwater and freshwater. Only 20-30% of saltwater animals are consumed fresh; the remainder are consumed in other forms, such as fresh, frozen, canned, smoked, salted, dried, and pickled foods. Some saltwater animals, such as tilapia and small tilapia, are used as fish meal or as fresh food for livestock. Given the immense benefits of fisheries resources and the widespread use of these products, the Department of Fisheries has developed a continuous fisheries development plan for 2021-2025, focusing on

enhancing the competitiveness of the Thai fisheries sector. This focus will be on technological and innovation development, promoting the production of quality and standardized products, sustainable management of fisheries resources, and ensuring food security. Fishery farmers enjoy a high quality of life. Strong organizations have emerged to implement responsible fishing practices to restore fisheries resources and the environment for sustainability. They promote freshwater and coastal aquaculture to replace the dwindling natural catches. At the same time, they encourage skilled and capable fishermen to engage in more offshore fishing, both in international waters and in the waters of some coastal countries. They also support fishing industries and businesses to maximize the utilization of aquatic animals.

Although the grassroots economy is a key foundation for sustainable economic development at the community level, focusing on engaging citizens in the production, consumption, and distribution processes creates economic stability and improves local quality of life (Community Organization Development Institute, 2016:19). In Thailand, the grassroots economy has been continuously promoted through various policies, such as the 20 year National Strategy and the Thailand 4.0 policy, which aim to promote the use of local wisdom in conjunction with modern technology to enhance the potential of community products and improve the quality of life of local people. Koh Yao Noi, Phang Nga Province, is a popular community-based tourist destination, attracting many Thai and international tourists. It is known for its beautiful natural resources and simple lifestyle. Koh Yao Noi has received numerous national and international awards, including the Outstanding Tourism Promotion and Development Award from the Tourism Authority of Thailand; the World Heritage Award for Environmental and Cultural Tourism from National Geographic Magazine, USA, in 2002 (Phongsawat Tanticharoenkit, 2005). Its convenient land, water, and air transportation are key factors contributing to the increasing number of tourists visiting Koh Yao Noi. The Ban An Pao and Ban Nam Chuet communities in Koh Yao Noi District, Phang Nga Province, remain renowned for their cultural identity and the diversity of their local products, particularly in the area of local fisheries. Consequently, they have formed the An Pao-Nam Chuet Local Fisheries Group, a local fishing community organization. These organizations produce processed marine products that reflect the local wisdom and way of life, such as Pla Ba Si fishs are salted or smoked. The An Pao-Nam Jued community serves as a critical case study due to its unique position as a micro-scale fishery operating in a remote island context, where energy costs and logistical constraints are significant barriers.

However, traditional processed marine product production still faces several problems, such as inconsistent production processes due to limited raw materials during certain seasons and the inconvenience of relying on natural sunlight for drying, which may affect product quality. Furthermore, the resulting products lack appropriate packaging for wider distribution, preventing them from fully adding value and generating revenue (Boontham et al., 2022) The An Pao-Nam Jued community serves as a critical case study due to its unique position as a micro-scale fishery operating in a remote island context, where energy costs and logistical constraints are significant barriers. This study extends Porter’s value chain framework by applying it to a community-based setting that lacks formal organizational support structures. For the above reasons, the researcher therefore applies the concept of Michael Porter's Value Chain Model with Visualizing the Value Chain to help guidelines for making competitive advantages of local fisheries. Which will result in businesses being able to respond to needs and create sustainability for the community of Small-Scale Fisheries An Pao–Nam Jued for the future.

Research Objectives

1. To study and analyze the linkages of value-added production activities within the value chain of processed marine products for local fishermen.
2. To propose guidelines to achieve a competitive advantage of small-scale fisheries in An Pao–Nam Chuet.

Conceptual Framework

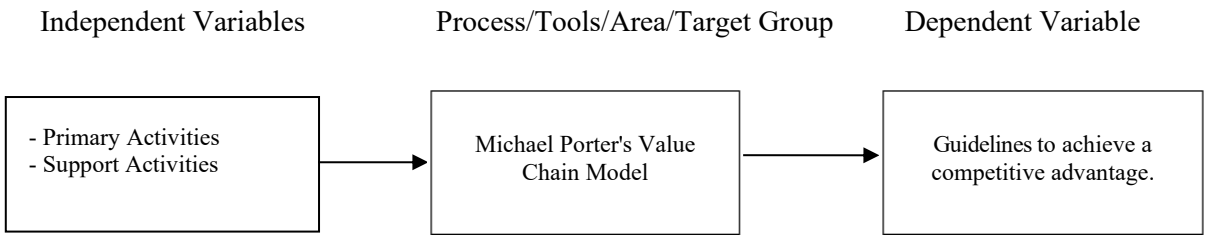


Figure 1: Conceptual Framework

Literature Review

Value Chain and Strategic Value Addition in Local Enterprises Recent studies on local industries and community enterprises emphasize the necessity of strategic management and value chain optimization to ensure economic sustainability. Suksomboon (2022) investigated the value chain of local blue crab fisheries in Chonburi Province, identifying critical bottlenecks such as rising operational costs, environmental degradation, and a heavy reliance on intermediaries for market access. These findings highlight a vulnerability in the primary sector where local producers often lack direct bargaining power within the traditional supply chain.In a similar vein, Lapito and Taphaopong (2020) examined strategies for adding value to cultural products, specifically Plarsom Fug (fermented fish) in Mahasarakham Province. Their research identified three core pillars of potential for community enterprises: administration, standardized production, and marketing. While Suksomboon focused on the structural challenges of the fisheries sector, Lapito and Taphaopong demonstrated that obtaining formal certifications (such as Food and Drug Standard Certification) and developing a cultural identity serve as transformative tools for enhancing market value and sales. A common thread between these two studies is the emphasis on capacity building and modernization. Suksomboon (2022) recommended the establishment of fishing cooperatives, financial literacy training, and the adoption of online communication to bypass intermediaries. This aligns with the strategic framework proposed by Lapito and Taphaopong (2020), which advocates for adding market channels and aligning local wisdom with the "Thailand 4.0" initiative to meet international standards.Ultimately, both researchers conclude that the survival of local enterprises depends on a transition from traditional practices to a more integrated approach. This involves intergenerational knowledge transfer, professionalized management, and the use of public relations to create a distinct competitive advantage in the modern marketplace.

Methodology

Guidelines for Analyzing the Value Chain of Local Fisheries: A Case Study of Small-Scale Fisheries An Pao–Nam Jued. This research is qualitative research. Have conducted using the following steps.

Population and sample

The sample population for this study consisted of local small-scale fishermen residing in the Small-Scale Fisheries An Pao–Nam Jued. A purposive sampling technique was adopted to intentionally select participants who members of Small-Scale Fisheries An Pao–Nam Jued only. The members possess direct experience and engagement in community-based fisheries activities. Sample population: This study employed a purposive sampling method to select participants who meet specific criteria. The sample population consisted of 21 members of the Small-Scale Fisheries An Pao–Nam Jued, all of whom are actively engaged in small-scale community-based fishing members.

The instruments and materials

The instruments and materials used in this research were derived from both documentary sources and relevant academic studies, as well as from data collected through field surveys. These research tools comprised all documents, related literature, and empirical field observations necessary to support the analysis. The research instruments consisted of (1) Interview guides and interview questions used for data collection (2) An audio recorder for capturing verbal responses during the interviews. The primary document used in the field survey was a semi-structured interview guide, which facilitated both flexibility and depth in eliciting information from participants. This approach provided a flexible yet focused framework, allowing the researcher to follow a predetermined set of questions based on Porter's Value Chain while also employing probing techniques to explore specific operational details

To ensure the quality of the research instrument, the researcher had it tested. A pilot test of the interview guidelines was conducted with three representative individuals possessing characteristics similar to the target group, including a village headman, an assistant village headman, and a community committee member. Subsequently, the feedback and suggestions obtained from the pilot test were utilized to refine the interview structure and terminology before the actual data collection began. Furthermore, to enhance data trustworthiness, findings from the brainstorming sessions were cross-verified with the in-depth expert interviews to ensure the accuracy and reliability of the operational insights.

Research Approach

This study employed a combination of two scientific approaches: the descriptive approach and the analytical approach. The descriptive approach was utilized to construct the theoretical framework, drawing upon books, academic courses, theses, and university research to explain concepts related to value chain analysis and the context of local fisheries. The analytical approach was applied to the practical aspect of the research, examining the value chain of local fisheries through field-based data collection, community participation, and systematic analysis of primary and support activities.

1. Data were collected using a combination of documentary sources and field-based methods. Primary tools included by Semi-structured interview guides designed to elicit detailed information on local fisheries practices and value chain activities.

2. Audio recording devices for used to capture interview responses accurately for later transcription and analysis.

Brainstorming tools. Including post-it notes and markers, used in structured group sessions to generate and organize ideas on key activities, issues, and value-added processes.

3. During the brainstorming sessions, participants were asked to write one idea per post-it note within a limited time. Notes were then placed on a board and collectively organized by creating headings and clustering similar ideas, enabling the identification of key issues, main and support activities, and value-added processes in the local fisheries value chain.
4. The data obtained from brainstorming sessions and interviews were subsequently verified for accuracy and completeness to ensure that the information fully met the research objectives
5. Conclusion

Results

The value chain analysis of local fisheries: a case study of small-scale fisheries in An Pao–Nam Jued. The research results were presented according to the following objectives following the table below

1. General Information

General information from interviews with Michael E. Porter was used as a guideline for the value chain analysis in the case study of Local fisheries. This included in-depth interviews with relevant stakeholders and experts, as follows **table 1** below

Table 1: Gender

Gender	Frequency (n)	Percentage (%)
Male	17	81.0
Female	4	19.0
Total	21	100.0

From table 2. The majority are male, accounting for 17 individuals, or 81.0%, of the total sample. Females represent the remaining 19.0%, with a frequency of 4. This distribution indicates that the primary participants or stakeholders involved in these activities are predominantly male.

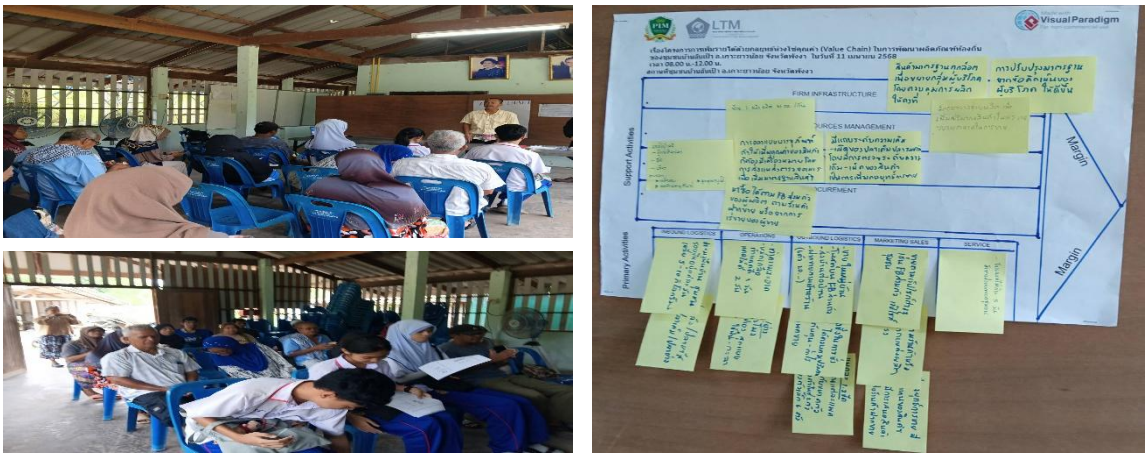
2. General Interview Results

From the general interview results, the researchers found that current management is insufficiently effective. This is because local fisheries groups currently lack operational planning, customer data collection, and raw material or inventory purchase and sales data. There are no clear purchasing standards, regulations, or policies for local fisheries. During certain periods, local fisheries groups experience a shortage of raw materials for production because fishermen cannot procure enough raw materials to process products for sale. This results in the group being unable to fully function, achieving inefficient work to meet customer demands, and maintaining product quality. Therefore, the various problems in local fisheries groups led to a value chain analysis to identify and implement changes to work processes for greater efficiency.

Fixture 3: Members of the Pramong Anpao–Nam Jued Local Fisheries Group For General Interview
Source: Author (2568)

2. In-depth Interview Results

Based on in-depth interviews with experts and stakeholders, the researcher applied Michael E. Porter's research framework to the case study value chain analysis approach. This approach provides guidance for the value chain analysis, as shown in the table below.



Fixture 4: Brain storming the Small-Scale Fisheries An Pao–Nam Jued for In-depth Interview
Source: Author (2568)

The data are summarized in **Table 2.**

Table 2: Interview Results of Brainstorming the Small-Scale Fisheries An Pao–Nam Jued for In-depth Interview

Category	Activity Name (Porter's Model)	Identified Activity Details
Support Activities	**Firm Infrastructure**	Quality and Standard Enhancement based on feedback; Focus on product quality and standards. don't have effective enough
	Human Resource Management (HRM)	This group doesn't have training and skill development for members or clear operational and organizational objectives.
	Technology Development	At present, this group has no technology for support.
	Procurement	-Sourcing raw materials and necessary equipment in local only - Local raw material sourcing (80-100%); External raw material sourcing (10-20%). Mostly, following the season.
Primary Activities	**Inbound Logistics**	By boat only. Because Area is island.
	Operations	Mostly, production and processing of products. Organizing local only. Inventory management and control; appropriate product packaging;
	Outbound Logistics	- By boat only. Because Area is island. - Shipping and distribution to customers (e.g., EMS).
	Marketing and Sales	- Public relations and consumer education; utilizing online/social media channels; building new market networks and accessing new markets. - Utilizing social media for communication and sales support.
	Service	Post-sale services (e.g., satisfaction guarantee); - Active collection and processing of customer feedback.

From table 2 the result was show that, Support Activities Overall, the support activities reveal significant structural gaps that hinder the organization's efficiency. Firm Infrastructure and Human Resource Management (HRM) are currently underdeveloped, characterized by a lack of clear organizational objectives and insufficient training for personnel. Furthermore, the absence of Technology Development suggests that the group relies on manual processes rather than modern technical solutions. On a more positive note, Procurement demonstrates a strong commitment to local sustainability, with 80-100% of raw materials sourced locally, though this creates a high dependency on seasonal availability and geographical constraints. Primary Activities The primary activities are heavily defined by the organization's island location, which mandates that both Inbound and Outbound Logistics be conducted exclusively by boat. Despite these logistical hurdles, the Operations segment is well-organized, covering everything from production and inventory control to appropriate packaging. The organization's strongest competitive advantage lies in its Marketing, Sales, and Service functions; by actively utilizing social media for

market expansion and maintaining a robust post-sale feedback system with satisfaction guarantees, the group effectively bridges the gap between its remote production site and its customer base.

3. Value Chain Expert

Interview Results of Value Chain Experts Based on Michael E. Porter's Concept. Showing the interview results of value chain experts. The data are summarized **in Table 3.**

Table 3: Interview Results of Value Chain Experts Based on Michael E. Porter's Concept.

No.	Research-Related Topics	Expert Interview Responses
1	Raw Material Planning	Local fisheries businesses should have a comprehensive raw material plan covering procurement, processing, transportation, and storage of seafood.
		Strategic raw material planning benefits procurement, streamlines processing input, and allows for stockpiling during seasonal shortages.
2	Raw Material Quality	The fisheries processing unit must establish clear quality and price standards for raw seafood materials.
		Failure to select for quality increases direct and indirect costs. Direct costs include purchasing overpriced, low-quality seafood that cannot be processed into sellable products. Indirect costs involve the time and expense of sorting and disposing of unsuitable catch.
		The unit should define specific criteria for purchased seafood, including size, freshness, species, and a price structure tied to quality.
3	Inventory Storage	The fisheries business should implement proper cold storage inventory management to optimize space for production needs.
		Effective inventory management saves space, facilitates easier and faster movement of products, and ensures a First-In-First-Out (FIFO) system to maintain product freshness.
4	Equipment Maintenance	The fisheries unit should have a scheduled maintenance plan for all processing equipment and fishing vessels, with ready-to-use spare parts.
		Planned maintenance enhances equipment longevity, reduces downtime from breakdowns, and maximizes processing efficiency.
5	Production Process	The fisheries business must manage all production processes, including cleaning, filleting, freezing, and packaging.
		Managing the production process, which transforms raw catch into finished goods, allows the business to control production timelines to meet market demand.
6	Facility Layout	Processing facility layout is crucial. Equipment should be positioned according to the sequence of the production process.
		A well-planned layout facilitates convenient and rapid movement of raw materials into production and simplifies product transportation while maintaining hygiene standards.
7	Modern Equipment	The fisheries business should invest in more modern and efficient equipment, such as improved freezing systems and processing machinery.

No.	Research-Related Topics	Expert Interview Responses
		Using modern, efficient equipment reduces processing time, maintains product quality, and lowers the production cost per unit.
8	Product Transportation	The fisheries business should manage its product transport with proper cold chain logistics, ensuring it matches market demand volumes and delivers with speed and punctuality while maintaining product quality.
9	Technology	• The fisheries business should integrate technology into various operations, including production management, inventory management, and quality control.
		• Technology offers significant benefits: increased efficiency, reduced processing time, better quality control, and lower operational costs. Adopting technology creates a competitive advantage.
		• The business can implement various technologies: inventory management systems for seafood products, temperature monitoring systems for cold storage, GPS for vessel tracking and product shipments, and quality control systems for product freshness.

From table 3 the result was show that, the expert interview responses highlight that the sustainable growth of local fisheries hinges on transitioning toward systematic and modernized operations. A primary focus is placed on Production Process Improvement and Technology Integration. Experts strongly recommend adopting specialized equipment, such as solar-powered smokehouses, to enhance food preservation efficiency while reducing energy costs. This technological shift not only ensures high hygiene standards but also significantly minimizes raw material waste and adds substantial value to the final seafood products. Furthermore, long-term competitiveness is driven by Integrated Supply Chain Management. This involves rigorous raw material planning, the establishment of clear quality and pricing standards, and the optimization of facility layouts to ensure a seamless production flow. By implementing modern inventory systems (FIFO) and precise cold-chain logistics, businesses can guarantee product freshness and punctuality. Ultimately, blending traditional local knowledge with modern technology provides the necessary foundation for these businesses to meet market demands and achieve operational excellence.

4. Analysis of approaches to creating value chains for Small-Scale Fisheries An Pao–Nam Jued.

The researchers conducted in-depth and general interviews with a total of 21 experts and stakeholders. Using Michael E. Porter's conceptual framework for analysis, the study identified the three most prioritized factors. Identifies three critical strategic priorities based on a consensus among 2 experts and stakeholders (n=21). The primary focus, supported by a significant majority of 15 out of 21 respondents (71.4%), is the integration of Production Technology, such as solar-powered drying systems, to ensure 100% year-round operational capability and standardized product quality. This is followed by the Inventory Management System, prioritized by 4 respondents (19.0%), which utilizes the First-In-First-Out (FIFO) method to optimize storage and maintain a consistent production buffer. Finally, 2 respondents (9.6%) emphasized the Transportation Management System, highlighting the use of Information Systems for route optimization to reduce fuel costs and improve delivery punctuality. Collectively, these findings demonstrate that a technology-driven approach across production, inventory, and logistics is the essential success factor for enhancing the competitive advantage of local fisheries communities.

Results and Discussion

The research analysis identifies multiple critical deficiencies within the Small-Scale Fisheries An Pao–Nam Jued, particularly in raw material procurement and data tracking, which lead to heightened costs and storage inefficiencies. These operational hurdles directly mirror the findings of Suksomboon (2022), who highlighted that inefficient value chain conditions and rising capture costs are primary obstacles for local fisheries. The excessive purchasing and subsequent lack of inventory space found in this study further illustrate the "value chain gaps" that Suksomboon identified as a major threat to the economic viability of local crab markets. Furthermore, the production of non-standardized goods due to insufficient member knowledge in the An Pao–Nam Jued group severely damages market reputation, a challenge that underscores the necessity of the "Standard Production" pillar proposed by Lapito and Taphaopong (2020) for community enterprises to achieve sustainable growth.To address these critical failures, this study determines that production, inventory control, accounting systems, and member knowledge require urgent resolution through technology integration and comprehensive training. These recommendations align with the strategic framework of Lapito and Taphaopong (2020), which emphasizes that adding value to cultural and local products requires a transition toward standardized management and increased market channels. Similarly, the call for data integration and member capability building resonates with Suksomboon's (2022) suggestions for vocational training and the adoption of online communication tools. By prioritizing these four areas, the An Pao–Nam Jued group can effectively bridge the gap between traditional local wisdom and the modern requirements of the Thailand 4.0 era, ensuring that their organizational value is enhanced through both standardized production and efficient operational management.

Guidelines for problem solving.

The urgent strategies identified to address the group's critical operational issues center on a two-pronged approach for value enhancement. Option 1 focuses on modern and sustainable production technology, recommending the construction of a solar-powered smoking/drying cabinet. Option 2 immediately address inventory overflow by implementing a simple data recording system for tracking raw material procurement and usage, which is essential for accurate cost calculation and forecasting. This data will facilitate the establishment of clear Reorder Points and Maximum Inventory Levels, enabling a controlled Just-in-Time (JIT) approach to purchasing that aligns with production needs rather than allowing surplus stock. Finally, reorganizing storage using systematic layouts and adhering to the First In, First Out (FIFO) principle will maximize limited space and minimize material spoilage, directly improving operational efficiency and reducing costs.

Conclusion

Overall, The Study of Value Chain Analysis of Local Fisheries: A Case Study of Small-Scale Fisheries An Pao–Nam Jued. The analysis of the Small-Scale Fisheries An Pao–Nam Jued Group revealed significant operational deficiencies that undermine its value proposition, particularly across procurement, inventory management, and production quality. The lack of data tracking in raw material purchasing has led to inflated costs and excessive stocking, resulting in severe storage overflow and inadequate space for finished goods. Furthermore, a critical deficit in member processing knowledge directly translates into nonstandardized products, compromising market standing. To address the four urgent areas of production, inventory control, accounting systems, and member knowledge, a dual strategic intervention is deemed essential. Firstly, the group must adopt technology for streamlined management and data integration, a foundational step for efficient operations. Secondly, to enhance

value, two principal pathways are recommended. Option 1 focuses on sustainable technological modernization, specifically the construction of a solar-powered smoking/drying cabinet to standardize production and achieve energy efficiency. Option 2 targets inventory control, advocating for the immediate implementation of a simple data recording system to facilitate accurate cost forecasting, establish clear reorder points, and adopt a controlled just-in-time (JIT) procurement approach, thereby maximizing limited storage space and minimizing material spoilage through systematic layout reorganization and adherence to the first in, first out (FIFO) principle. Successful implementation of both technology adoption and comprehensive training, encompassing these two options, is critical for stabilizing operations and securing the group's long-term sustainability and competitiveness.

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