海南热带海洋学院
人才引进聘期考核登记表
证明材料

所在单位：旅游学院

姓　　名：徐岸峰

岗　　位：专业技术四级

考核类型：中期考核☑　届满考核☐

填表日期：2025 年　11 月　7 日

海南热带海洋学院人事处制

填写说明

一、填写本表前，请认真对照人才工作协议规定的聘期工作任务，实事求是填写表中内容。

二、填写内容须为本人聘期内取得的成果。

三、所有填报业绩均须以海南热带海洋学院为署名单位；项目（国家级课题）、奖项、论文、专著、专利等成果须以海南热带海洋学院或附属科研单位为第一产权单位，本人为第一完成人（若协议有特殊约定的，按照协议约定填写）；发明专利指中国和发达国家非登记制的发明专利；论文专著限独著、第一作者或通讯作者，非任务论著成果可顺后填写；**1 项成果归属限 1 人。**

四、考核表必须逐项认真填写，没有则填“无”。

五、本表请用 A4 纸双面打印，填写不下可加行，但不得改变表格样式。

六、所在单位须对填报人填写的内容进行核实，审核人签字确认。

一、个人简况

姓名	徐岸峰	性别	男	出生年月	1980 年 1 月	海南自贸港人才层次	E 类人才
聘期	2023 年 8 月 25 日— 2023 年 8 月 24 日			所属学科：工商管理 所在专业：旅游管理		联系方式	手机：18604516657 邮箱：xuanfengcn@126.com
专业技术职务	教授	行政职务				所在单位	旅游学院
入校以来年度考核情况		合格					
科研启动费使用情况	立项总额	25 万元		已支出		62，500 万元	

二、聘期工作总结

本栏主要填写以下内容（不超过 1200 字）：

1.聘期内履行岗位职责、完成岗位工作目标和任务情况（包括师德师风、教学工作、科研工作、学科建设、管理工作、社会服务等）；

2.聘期内取得重要成果的内容、创新点、意义和前景；

3.对比协议工作任务，说明完成情况以及存在的问题。

聘期工作总结

1..聘期内履行岗位职责、完成岗位工作目标和任务情况（包括师德师风、教学工作、科研工作、学科建设、管理工作、社会服务等）

1.1 师德师风

自 2023 年 8 月进入我校工作以来，不忘立德树人初心，牢记为社会主义培养人才的使命，对党的教育事业的忠诚，认真履行工作职责，严谨治学，杜绝学术不端，创新教学方法。

1.2 教学工作

对标旅游管理国家一流专业建设要求，着眼于学生职业发展与社会需求，坚持“以本为本”，坚持“两性一度”对课程进行深入改造，锻造“价值默会引领、知识有效转化、能力真实形成、心智持续升级”的一流课程生态体系，获批省级一流课程 1 门、省教育教学改革重点项目 1 项、在教育类北大核心期刊发表教研论文 1 篇、获第十七届全国商科教育实践教学大赛二等奖 1 项。

1.3 科研工作

围绕工商管理学科建设，锚定数字科技驱动服务业创新的理论研究和社会实践，取得了一些列高水平成果。获得省部级 2 项、地厅级重点项目 1 项；在北大核心和 CSSCI 期刊发表论文 3 篇，在 AHCI/SCI/SSCI 检索期刊发表论文 3 篇，在国家级出版社出版专著 2 部。在已发表论文中 ESI 热点论文 TOP0.1%2 篇、高被引论文 TOP0.1%3 篇；，获得省社会科学二等奖 1 项，获得海南省第三届研究生导师荣誉称号。

1.4 学科建设

积极参与工商管理学科人才团队申报和博士学位授权点的申报工作；引进相关学科博士研究生 3 人。

1.5 管理工作

自担任海南省重点智库海上丝绸之路研究院副院长以来，积极参加上级主管单位省社科联组织的各项活动和会议。以智库考核升级为中心任务，开展有组织科研活动，围绕智库优势不断产出高水平成果，已通过 2025 年 10 月的考核评估，由“培育”升级为“重点智库”。依托智库平台 2025 年 6 月召开 2025 中-欧可持续生产运营论坛（2025CEFSPO）国际会议，2025 年 11 月召开第七届中国自贸智库论坛。

1.6 社会服务

作为海南自贸港宣讲团成员和当二十届四中全会宣讲团成员，举办多种形式的理论宣讲；向三亚智库提交咨政建言报告 2 份其中 1 份获得三亚人大主任的批示。

三、聘期工作任务进展情况

<table>
<tr><td>1.教学任务</td><td colspan="5">1、每学年必须主讲 2 门本科生课程且周课时不少于 6 节，且课堂质量评估良好；
2、指导本科生论文；
3、指导本科生实习见习；
4、担任本科生班主任；</td></tr>
<tr><td rowspan="16">1.1 承担课程</td><td>课程名称</td><td>学年学期</td><td>授课学时</td><td>学生人数</td><td>学生层次</td></tr>
<tr><td>旅游大数据分析</td><td>2025-26-1</td><td>34</td><td>66</td><td>本科</td></tr>
<tr><td>旅游大数据分析</td><td>2025-26-1</td><td>34</td><td>82</td><td>本科</td></tr>
<tr><td>酒店前厅与客房（理论）</td><td>2025-26-1</td><td>34</td><td>46</td><td>本科</td></tr>
<tr><td>酒店前厅与客房（实践）</td><td>2025-26-1</td><td>34</td><td>46</td><td>本科</td></tr>
<tr><td>旅游消费者行为</td><td>2024-25-2</td><td>34</td><td>57</td><td>本科</td></tr>
<tr><td>旅游大数据分析</td><td>2024-25-1</td><td>34</td><td>52</td><td>本科</td></tr>
<tr><td>旅游大数据分析</td><td>2024-25-1</td><td>34</td><td>93</td><td>本科</td></tr>
<tr><td>酒店前厅与客房（理论）</td><td>2024-25-1</td><td>34</td><td>45</td><td>本科</td></tr>
<tr><td>酒店前厅与客房（实践）</td><td>2024-25-1</td><td>34</td><td>45</td><td>本科</td></tr>
<tr><td>服务管理</td><td>2024-25-1</td><td>34</td><td>40</td><td>研究生</td></tr>
<tr><td>旅游消费者行为</td><td>2023-24-2</td><td>34</td><td>7</td><td>本科</td></tr>
<tr><td>旅游消费者行为</td><td>2023-24-2</td><td>34</td><td>33</td><td>本科</td></tr>
<tr><td>旅游大数据分析</td><td>2023-24-1</td><td>34</td><td>130</td><td>本科</td></tr>
<tr><td>酒店前厅与客房（理论）</td><td>2023-24-1</td><td>34</td><td>40</td><td>本科</td></tr>
<tr><td>酒店前厅与客房（实践）</td><td>2023-24-1</td><td>34</td><td>40</td><td>本科</td></tr>
<tr><td>酒店人力资源管理</td><td>2023-24-1</td><td>34</td><td>7</td><td>本科</td></tr>
<tr><td>1.2 指导学生</td><td>指导本科生</td><td>毕业人数：8
在读人数：5</td><td>指导硕士生</td><td colspan="2">毕业人数：0
在读人数：8</td></tr>
<tr><td>1.3 教改项目、教学成果、教学奖项或荣誉等</td><td colspan="5">注明项目成果名称、类型、授予单位、排序、时间。
（1）“跨学科融合视角下海洋型高校创新创业教学模式研究”海南省高等学校教育教学改革研究重点项目（Hnjg2024ZD-46）海南省教育厅，主持，2024. 6 万元
（2）“旅游大数据（赋能创新创业）”海南省第三批本科一流课程，海南省教育厅，课程负责人，2024.
（3）“旅游接待业”海南热带海洋学院校级在线开放课程，课程负责人，2024
（4）“自贸港跨境电商”海南热带海洋学院虚拟仿真实验，课程负责人，2024
（5）“旅游接待业”海南热带海洋学院课程思政示范课程（RHKSsk2024-13）,主持,2024
（6）“以中国优秀传统文化为课程思政融入点的一流课程创新模式”海南热带海洋学院“三全育人”综合改革专项（RHDSQYR-2024-06），主持，2024
（7）《旅游接待业》海南热带海洋学院校级教材建设项目，第一作者，2025
（8）第四届全国高校教师教学创新大赛校内选拔赛一等奖，海南热带海洋学院，2024
（9）第十七届全国商科实践教学大赛二等奖，中国贸促会，2025</td></tr>
<tr><td colspan="6">完成情况自评：完成基本教学工作量、指导本科生论文、实习，担任班主任；承担省教改重点项目 1 项、获批省级一流课程 1 门，承担校级各类教学项目 5 项，获得行业协会教学成果二等奖奖 1 项，校级教学创新大赛一等奖 1 项。各类项目合计到款额 18.5 万元。</td></tr>
<tr><td colspan="6">单位审核意见：

教学工作审核人（签字）：
2025 年 11 月 日</td></tr>
</table>

<table>
<tr><td>2.科研任务</td><td colspan="6">(一)聘期内乙方科研任务要求：乙方带领其团队应完成以下 1-4 项中的任意 2 项：
1、项目：主持申报获 1 项国家级项目；或获得 1 项到帐经费 15 万元的横向课题。
2、论文：以第一单位、第一作者发表高水平学术论文不少于 4 篇，其中 1 篇被 SSCI 收录或被 A&HCI 收录及 2 篇中文核心期刊；或 2 篇 CSSCI 及 2 篇中文核心期刊论文；
3、著作：出版 25 万字本学科领域、且经同行专家评审认定的专著(如系合著,本人撰写不少于 25 万字)
4、奖励：获得省部级或以上科研奖励(获一等奖的，我校单位列前三名，个人列前三名；获二等奖的，我校单位列前二名，个人列前二名；获三等奖的，我校单位列第一名，个人列第一名);或研究、咨询报告获得省领导指示或省级政府采用(须出具有关证明材料)。
(二)聘期内，在 FMS(国家自然科学基金委管理学的 21 本期刊),A 刊，以第一作者或通讯作者发 1 篇。</td></tr>
<tr><td rowspan="5">2.1 科研项目</td><td>项目名称</td><td>立项登记号
（起止时间）</td><td>项目来源/级别</td><td>合同经费
（万元）</td><td>本人实到
经费
（万元）</td><td>排名</td></tr>
<tr><td>新质生产力视阈下数字技术赋能海南邮轮游艇产业高质量发展研究</td><td>HNSK(JD)24-02
2024-2027</td><td>海南省哲学社会科学研究基地课题/省部</td><td>3</td><td>3</td><td>1</td></tr>
<tr><td>自贸港文旅主导企业突破式创新形成机制和治理政策研究</td><td>725RC788
2025-2028</td><td>海南省自然科学基金高层次人才项目/省部</td><td>10</td><td>10</td><td>1</td></tr>
<tr><td>新质生产力指引“数实融合”驱动三亚国际化旅游产业升级研究</td><td>SYSK2024-01
2024-2026</td><td>三亚哲学社会科学重点项目/地厅</td><td>2.5</td><td>2.5</td><td>1</td></tr>
<tr><td>基于深度极限学习机和知识图谱的海南岛旅游生成式人工智能模型开发</td><td>KLITRDMMKF2024-5
2024-2026</td><td>海岛旅游资源数据挖掘与监测预警技术文化和旅游部重点实验室科研项目/地厅</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td rowspan="4">2.2 发表论著</td><td>论文名称</td><td>期刊</td><td>年,卷（期）,页码</td><td>论文级别（中科院大类分区及影响因子）</td><td colspan="2">排名（共同第一作者标注#号，通讯作者标注*号）</td></tr>
<tr><td>数字平台企业的核心能力与作用机制研究</td><td>科学决策</td><td>2023(10):17-33</td><td>AMI 扩展/CSSCI</td><td colspan="2">1*</td></tr>
<tr><td>直播带货情境下消费者购买决策的影响因素—基于注意力经济视角</td><td>商业经济研究</td><td>2024,(01):83-86</td><td>AMI 核心/北大核心</td><td colspan="2">1</td></tr>
<tr><td>线上线下混合智慧教育模式研究</td><td>教育理论与实践</td><td>2024,44(15):57-60</td><td>北大核心</td><td colspan="2">1</td></tr>
</table>

	Balancing tourism growth, Fin-tech, natural resources, and environmental sustainability: Findings from top tourist destinations using MMQR approach	RESOURCES POLICY	2024, 89: 104670 ESI 高被引&热点	**SSCI**(中科院 2.JCR1，IF10.6，WOS:001162512700001	1*	
	Marketing Decision Model and Consumer Behavior Prediction With Deep Learning	JOURNAL OF ORGANIZATIONAL AND END USER COMPUTING	2024,36(1):336547 ESI 高被引	**SSCI** 中科院 3.JCR1,IF6.5, WOS:001185409200010	1*	
	Driving economic success: Fintech, tourism, FDI, and digitalization in the top 10 tourist destinations	HUMANITIES&SOCIAL SCIENCES COMMUNICATIONS	2024,11(1)1549 ESI 高被引&热点	**AHCI/SSC**I 中科院 2.JCRQ1, IF=3.7，WOS: 001354798600001	1	
	国合作中知识冲突对创新绩效的影响机制研究——基于领地行为的作用	工程管理前沿（预测）	已录用待发表	国家自然科学基金委管理学 A 刊	1	
	专著名称	出版单位	级别	出版时间	本人排名	
	数字战略视角下酒店综合管理能力提升研究	中国商业出版社	国家级出版社	2023.12	独立	
	视界-给你一个不一样的世界	中国旅游出版社	国家级出版社	2025.6	1/3	
2.3 专利/软件著作权	成果名称	专利号/登记号/授予部门	类型	授予时间	排名	是否已转化
	海洋文旅产业开发平台 V1.0	2025SR1039956	计算机软件著作权	2025.6.19	独立	
2.4 科研奖项	获奖项目名称	奖项名称	奖项级别	授奖单位	获奖时间	排名
	基于演化博弈的大数据产业联盟成员失败知识共享机制研究	黑龙江省哲学社会学优秀科研成果	二等奖	黑龙江省社科联	2023.12	1/2

完成情况自评:**超额完成所有科研任务，任务（一）只要求完成 2 项，现全部 4 项已完成，纵向人文类项目到款额为 16.5 万元（合同要求横向到款 15 万元）；以第一作者发表论文 6 篇（合同要求 4 篇），其中 SSCI3 篇（ESI 热点论文 TOP0.1%2 篇、TOP1%高被引 3 篇）、CSSCI1 篇、北大核心 2 篇；国家级出版社专著 2 部（35 万字）；软著权 1 项；省部级科研成果二等奖 1 项。任务（二）FMS(国家自然科学基金委管理学的 21 本期刊)A 刊以第一作者已录用待发表文章 1 篇。除上表所列第一作者成果以外，另有作为通讯作者的 SSCI 中科院 2 区论文 1 篇，SCI 中科院 2 区论文 2 篇；排名第二的 985 高校出版社教材 1 部；排名第二软著作权 1 项；排名第三省自然科学奖 1 项。**

单位审核意见：

科研工作审核人（签字）：

2024 年 11 月 日

3.团队、学科和平台建设任务	**(一)聘期内，乙方应整合学校的学科优势，积极参与申报各级各类学科建设项目。** **(二)甲方鼓励乙方积极引进符合甲方人才引进标准的人才组成科研教学团队。** **(三)乙方应积极参与海南省国际海岛休闲度假旅游研究基地、海南省自由贸易港邮轮游艇研究基地、海岛旅游资源数据挖掘与监测预警技术文化和旅游部重点实验等科研平台研究工作。**

聘期内团队建设、青年人才培养、学科及科研平台建设等情况：

3.1 团队建设：

接续黄学彬院长继续建设《旅游大数据分析》教学科研团队；组建《旅游接待业》课程教学团队，开发线上课程和数字化教材，展开该课程的课程思政融入改革。引进工商管理学科博士 2 人（刘晶磊、王曦研），管理科学与工程方向 985 高校博士 1 人（刘朝瑞）。

3.2 青年人才培养：

利用省级一流课程与青年教师杨经梓同志组建团队完善课程生态、发表大数据方向高水平文章；以服务创新为切入点和青年教师薛芮、刘颖共同撰写 985 高校出版社数字化教材 1 部、以通讯作者与薛芮共同发表北大核心和 EI（CA）论文 2 篇，与青年教师刘洋共同撰写论文 1 篇 SSCI 中科院 2 区期刊已过初审。

3.2 学科及科研平台建设：

积极参与工商管理学科建设，作为建设团队主要成员参与工商管理博士学位授权点的申报工作。积极参与海岛旅游资源数据挖掘与监测预警技术文化和旅游部重点实验室的建设工作，获批委托项目 1 项，依托该项目已发表 SCI 论文 2 篇。

完成情况自评：**积极参与工商管理学科人才团队申报和博士学位授权点的申报工作；带领青年教师开展教学和科研团队建设；引进相关学科博士研究生 3 人；获批海岛旅游资源数据挖掘与监测预警技术文化和旅游部重点实验室委托项目 1 项。高质量的完成相关建设任务。**

单位审核意见：

学科建设工作审核人（签字）：

2024 年 11 月 日

4.其他工作	**（四）社会服务积极参与国家和省内相关部门组织的社会服务，提供相关的技术咨询和服务** **（五）其他 学院合理的其他工作安排(如一般管理事务、社会服务等)**

4.1 管理工作

自担任海南省重点智库海上丝绸之路研究院副院长以来，积极参加上级主管单位省社科联组织的各项活动和会议。

以智库考核升级为中心任务，开展有组织科研活动，围绕智库优势不断产出高水平成果，已通过 2025 年 10 月的考核评估，由“培育”升级为“重点智库”。

依托智库平台 2025 年 6 月召开 2025 中-欧可持续生产运营论坛（2025CEFSPO）国际会议，2025 年 11 月召开第七届中国自贸智库论坛。

4.2 社会服务

作为海南自贸港宣讲团成员和当二十届四中全会宣讲团成员，举办多种形式的理论宣讲。向三亚智库提交咨政建言报告 2 份其中 1 份获得三亚人大主任的批示。

4.3 其他

完成学院教学、科研和学科建设的相关工作。

完成情况自评：**高质量的的完成智库管理工作，完成智库考核升级的 2025 年学校重点任务；举办国际、国内会议 2 次。提交咨政建言报告并获得批示。**

单位审核意见：

其他工作审核人（签字）：

2024 年 11 月 日

四、本人承诺

本人保证所填写内容及所提供的材料均真实、准确。若有不实之处，本人愿意承担相关责任。

签 字：徐岸峰

2024 年 11 月 8 日

五、所在单位考核意见

所在单位考核结果：（请在下方选项打√）

☐ 优秀　　☐ 合格　　☐ 不合格

盖　章：

党政负责人签字：

年　月　日

六、所在单位公示意见

经审核，被考核人教学工作、科研工作、社会服务等情况属实。考核结果为优秀/合格/不合格，经公示无异议。

盖　章：

年　月　日

七、专家评审意见

考核意见：（请在下方选项打√）

☐ 优秀　　☐ 合格　　☐ 不合格

学校考核组成员签字：

年　月　日

八、学校意见

盖　章：

年　月　日

教学工作量、班主任、研究生导师、省教改重点项目、省级一流课程

荣誉证书

CERTIFICATE OF HONOR

徐岸峰 团队：

在海南热带海洋学院“第四届全国高校教师教学创新大赛校内选拔赛”新文科正高组竞赛中荣获：

一等奖

团队成员：廖民生、黄学彬、杨经梓

特发此证，以资鼓励！

海南热带海洋学院

二〇二四年三月

聘书

LETTER OF APPOINTMENT

兹聘请 徐岸峰 为海南热带海洋学院硕士研究生导师，聘期三年。

特颁此证。

海南热带海洋学院研究生工作处

二〇二四年一月四日

海南省教育厅文件

琼教高〔2024〕12号

海南省教育厅关于下达2024年度海南省高等学校教育教学改革研究项目的通知

各高等院校：

经学校推荐，我厅组织专家评审，现将2024年度海南省高等学校教育教学改革研究项目下达给你校（详见附件），并就有关事项通知如下：

一、请认真组织，做好《海南省高等学校教育教学改革研究

号	单位	项目类型	项目编号	项目名称	项目负责人	项目参与人	研究期限	资助经费
[illegible]	海南医学院	重点资助项目	Hnjg2024ZD-35	护理专业本科生创新能力的自然演变轨迹研究	蒋新军	张华、严艳娟、黎娜、郑志超、杨玉军、叶松花、周应威	2024-01至2026-12	3
[illegible]	海南医学院	重点资助项目	Hnjg2024ZD-36	创新海南药学研究生培养教育质量评价与保障体系研究	李敏学	傅敏、林俊萍、张杰、王鹏、陈洪德	2024-01至2026-12	3
[illegible]	海南医学院	重点资助项目	Hnjg2024ZD-37	“课赛融合”模式下的大学生创新能力培养研究	傅加论	徐治民、李志芳、张莉、李晓玲、梁丹丹、詹利民、周新	2024-01至2026-12	3
[illegible]	海南医学院	重点资助项目	Hnjg2024ZD-38	OBE理念下医学检验学实验教学创新性人才培养体系中融入课程思政的研究与实践	王丹林	莫凯卿、吉福敏、何莎、戴芸锐、张瑞宏、刘梦	2024-01至2026-12	3
[illegible]	海南医学院	重点资助项目	Hnjg2024ZD-39	研究生导师考核评价体系的研究	王裕令	甘自新、金丽艳、梁培、张帆	2024-01至2026-12	3
[illegible]	海南医学院	重点资助项目	Hnjg2024ZD-40	未来医师医学生出继教育模式研究	郭纪锐	谢纪可、李宝琪、陈应军、张方科、苏畅	2024-01至2026-12	3
[illegible]	海南热带海洋学院	重点资助项目	Hnjg2024ZD-41	美育视域下红色题材声乐作品教学资源库建设研究	古丽珠	刘新飞、朱振坤、董伟、邓海洋、陈腾	2024-01至2026-12	3
[illegible]	海南热带海洋学院	重点资助项目	Hnjg2024ZD-42	新学科交叉融合资源与环境专业跨层次人才培养模式研究与实践	罗福	魏军、车瑞松、毛跃超、刘温雅	2024-01至2026-12	3
[illegible]	海南热带海洋学院	重点资助项目	Hnjg2024ZD-43	云平台下生物技术综合实验多维度混合教学资源的架构与教学探索	马红梅	王学杰、符丽林、侯兴强、马军、李东晋	2024-01至2026-12	3
[illegible]	海南热带海洋学院	重点资助项目	Hnjg2024ZD-44	现代航运产业学院建设研究与实践	王明哲	王英坤、冯德芹、刘俊杰、丁海杰	2024-01至2026-12	3
[illegible]	海南热带海洋学院	重点资助项目	Hnjg2024ZD-45	以教育家精神引领新时代教师职业道德建设研究	王明哲	郑高辉、吴力、杨杰、徐明梅	2024-01至2026-12	3
[illegible]	海南热带海洋学院	重点资助项目	Hnjg2024ZD-46	跨学科融合视角下海洋动植物检疫业教学模式研究	徐学梅	段华东、杨绍玲、杜秀玲、黄学勤	2024-01至2026-12	3
[illegible]	海南热带海洋学院	重点资助项目	Hnjg2024ZD-47	“双减”背景下《环境科学概论》一流本科课程建设改革研究与实践	徐建玲	魏军、史云峰、林文玲、徐晓雅	2024-01至2026-12	3

海南省教育厅文件

琼教高〔2024〕16号

海南省教育厅关于公布海南省第三批一流本科课程的通知

各高等院校：

根据《海南省教育厅关于开展第三批省级一流本科课程认定工作的通知》（琼教高〔2023〕113号）要求，经学校申报、我厅组织专家评审并公示，认定“超临界流体萃取与沉香真假识别虚拟仿真实验”等78门课程为海南省第三批一流本科课程（见附件），现予以公布。

希望各高等院校要进一步加强课程建设，推进教学改革，充分发挥省级一流课程的引领示范作用，不断提高教学水平和人才培养质量。

联系人：李思润，联系电话：65339364。

序号	申报高校	申报类别	课程名称	课程负责人	其他成员
71	琼台师范学院	线上线下混合式课程	思想道德与法治	钟婧	李倩、钟平艳、魏彩虹、吴兴梅
72	海南大学	社会实践课程	植物生态学	龙文兴	王晶晶、肖楚楚、徐志华
73	海南大学	社会实践课程	思想政治教育工作实务课程实践	王善	吴朝阳、陈招万、温小平、王宇翔
74	海南大学	社会实践课程	创业管理	李伟娟	黎春燕、陈一华、王寅
75	海南热带海洋学院	社会实践课程	旅游大数据分析（赋能创新创业）	徐华峰	廖民生、黄学彬、杨亦祥、王涵
76	三亚学院	社会实践课程	旅游项目策划	开元	李昭、孟竹、张志辉、刘晓彪
77	三亚学院	社会实践课程	旅游目的地管理	闫静	王婕雪、巩慧琴、李如跃、卢新涵
78	三亚学院	社会实践课程	《毛泽东思想和中国特色社会主义理论体系概论》社会实践	陈道晶	王功名、王艳辉、许永华、李洪雪

优秀研究生导师和优秀研究生导师团队

荣誉证书

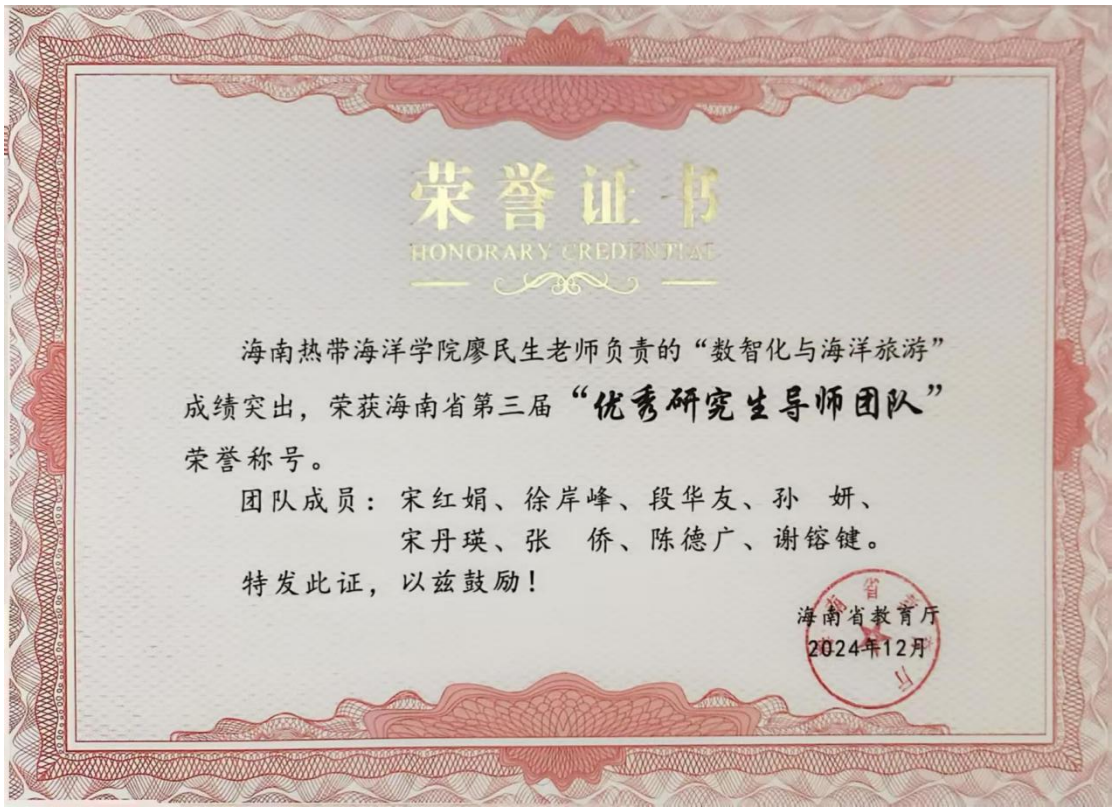
HONORARY CREDENTIAL

海南热带海洋学院徐岸峰老师在学位与研究生教育工作中取得了突出成绩，荣获海南省第三届“优秀研究生导师”荣誉称号。

特发此证，以兹鼓励！

海南省教育厅

2024年12月



荣誉证书

HONORARY CREDENTIAL

海南热带海洋学院廖民生老师负责的“数智化与海洋旅游”成绩突出，荣获海南省第三届“优秀研究生导师团队”荣誉称号。

团队成员：宋红娟、徐岸峰、段华友、孙　妍、宋丹瑛、张　侨、陈德广、谢镕键。

特发此证，以兹鼓励！

海南省教育厅

2024年12月

2025 年学校创新创业优秀团队

“热海星光”2025年海南热带海洋学院学生荣誉盛典

议程单

- 开场视频
- 群舞《热海励歌》
- 校领导致辞

青春闪光之敢闯会创篇

- 歌曲《就是哪吒》
- “创新创业”优秀团队代表 颁奖

1. “青春引领人”徐岸峰教授致颁奖词
2. 学生获奖感言

青春奋斗之追求卓越篇

- 朗诵《无奋斗 不青春》
- “国家奖学金”获得者代表 颁奖

1. “青春引领人”徐建玲教授致颁奖词
2. 学生获奖感言

青春笃志之砥砺前行篇

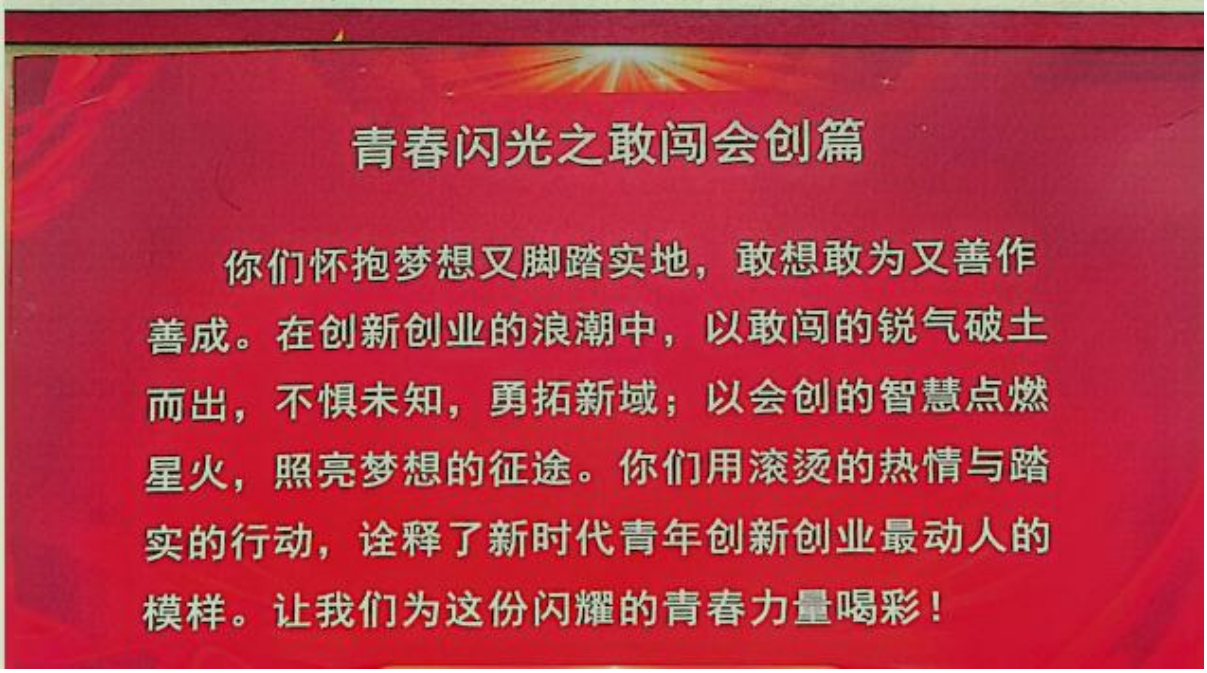
- 器乐演奏《Gypsy Dance》
- “考研录取学生”代表 颁奖

1. “青春引领人”杜梁教授致颁奖词
2. 学生获奖感言

青春担当之强国有我篇

- 歌曲《向光而行》
- “大学生年度人物提名奖”“大学生年度人物” 颁奖

1. “青春引领人”刘晶晶教授致颁奖词
2. 学生获奖感言
- 歌曲《星火青春》



青春闪光之敢闯会创篇

你们怀抱梦想又脚踏实地，敢想敢为又善作善成。在创新创业的浪潮中，以敢闯的锐气破土而出，不惧未知，勇拓新域；以会创的智慧点燃星火，照亮梦想的征途。你们用滚烫的热情与踏实的行动，诠释了新时代青年创新创业最动人的模样。让我们为这份闪耀的青春力量喝彩！

指导学生参加各类竞赛获奖

获奖证书

魏　威：

在第二届全国大学生职业规划大赛海南赛区竞赛中荣获

铜奖

指导教师：徐岸峰

特发此证，以资鼓励。

证书编号：2025HNCZGJ017

海南省教育厅

二〇二五年三月

第十三届全国海洋航行器设计与制作大赛

THE 13TH CHINA MARINE VEHICLE DESIGN AND CONSTRUCTION CONTEST

南海赛区

三等奖

团队名称：航向南海

作品类别：E1常规动力组

作品单位：海南热带海洋学院

作品成员：曾熙嘉、张亦弛、梁侨瑞、刘思昊

指导老师：陈浩、徐岸峰

主办单位：中国船舶集团有限公司　中国造船工程学会　国际船舶与海洋工程创新与合作组织

支持单位：中国高等教育学会

承办单位：海南热带海洋学院　海南科技职业大学

第十三届全国海洋航行器设计与制作大赛组委会主任

全国海洋航行器设计与制作大赛组委会

中国造船工程学会（代章）

二零二四年八月

获奖证书

哈尔滨理工大学

孙志鹏、张双迎、张天意、张新萌：

你(们)的作品在第十八届工商银行“挑战杯”黑龙江省大学生课外学术科技作品竞赛中荣获

三等奖

项目名称：基于光谱分析的透明液体浓度测量装置

指导教师：艾萌萌 徐岸峰

共青团黑龙江省委员会 黑龙江省委员会 | 黑龙江省科学技术协会 | 黑龙江省教育厅 | 黑龙江省科学技术厅 | 黑龙江省社会科学院 | 黑龙江省学生联合会

获奖证书

孙志鹏、吴美琪、孙凯歌：

你（们）的项目在黑龙江省第七届“知识产权杯”高校发明创新竞赛中荣获

三等奖

特发此证，以资鼓励。

项目名称：安游

组　　别：学生组　　学　　校：哈尔滨理工大学

指导教师：徐岸峰、艾萌萌

黑龙江省知识产权局 | 黑龙江省教育厅 | 黑龙江省科学技术厅 | 共青团黑龙江省委员会 黑龙江省委员会 | 黑龙江省科学技术协会

二〇二三年七月三日

海南热带海洋学院教学创新大赛校一等奖

荣誉证书

CERTIFICATE OF HONOR

徐岸峰 团队：

在海南热带海洋学院“第四届全国高校教师教学创新大赛校内选拔赛”新文科正高组竞赛中荣获：

一等奖

团队成员：廖民生、黄学彬、杨经梓

特发此证，以资鼓励！

海南热带海洋学院

二〇二四年三月

热带海洋学院旅游学院教学督导

聘 书

LETTER OF APPOINTMENT

徐岸峰 同志：

兹聘请您为旅游学院教学督导员。聘任期限为二〇二三年十一月一日至二〇二六年十月三十一日。

海南热带海洋学院

教学督导办公室

二〇二三年十月

全国中文核心期刊　　中国人文社科核心期刊　　山西省一级期刊

教育理论与实践

Theory and Practice of Education

15

总第866期
第 44 卷
C 2024
学 科

ISSN 1004-633X

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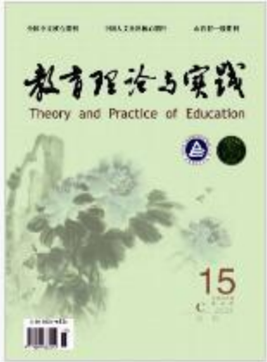

教育理论与实践

Theory and Practice of Education

网络首发 北大核心 AMI扩展

基本信息

主办单位：山西省教育科学研究院
出版周期：旬刊
ISSN：1004-633X
CN：14-1027/G4
出版地：山西省太原市
语种：中文;
开本：大16开
邮发代号：22-31
创刊时间：1981

出版信息

专辑名称： 社会科学II
专题名称： 教育理论与教育管理
出版文献量：17476篇
总下载次数： 10792147次
总被引次数： 244263次

评价信息

(2023版)复合影响因子：1.946
(2023版)综合影响因子：0.823
北京大学《中文核心期刊要目总览》来源期刊：1992年(第一版),1996年(第二版),2000年版,2004年版,2008年版,2011年版,2014年版,2017年版,2020年版,2023年版
《中国人文社会科学期刊AMI综合评价报告》：2018版A刊扩展;2022版A刊扩展
期刊荣誉：
Caj-cd规范获奖期刊;

收起

论文

教育理论与实践
Theory and Practice of Education

第44卷(2024年)
第15期(总第866期)
1981年创刊 1985年公开发行

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〔期刊基本参数〕
CN14-1027/G4 * 1981 * 8 * A4 * 64 * zh * P * ¥8.00 * 1400 * 12 * 2024-15
*如有印装质量问题请直接与印刷厂联系 电话 0351-7086996

第44卷 (2024年)
第15期 第57-60页

教育理论与实践
Theory and Practice of Education

Vol. 44 (2024)
No.15 P57-P60

线上线下混合智慧教育模式研究*

■徐岸峰[1],李 斌[2],李 玥[2]

摘 要:数字经济快速发展的背景下,人工智能推动教育信息化向纵深发展,智慧教育模式逐渐成熟并被各领域广泛应用。智慧教育不仅包括传统教学方法的数字化升级,更是一种整合了先进科技的教育创新形式。深度融合智慧教育模式中的线上线下环节,促使学生全面参与并提高学习效果。智慧教育模式的应用方式,要从理念融合、混合教学、整合课程设计、真实虚拟交互四个方面进行深层次应用。智慧教育模式的良性运行,应以课程思政引领模式运行的价值取向,以协同育人作为智慧教育模式的发展目标,以数字智能作为模式运行的技术支撑,运用多样政策确保模式无障碍运行。

关键词:智慧教育;线上线下混合;个性化;自适应性;智慧教育模式

引用格式:徐岸峰,李斌,李玥.基于线上线下混合智慧教育模式的研究[J].教育理论与实践,2024(15):57-60.

中图分类号:G642.0 **文献标识码**:A **文章编号**:1004-633X(2024)15-0057-04

近年来,随着数字经济的迅速发展,数字技术和人工智能已广泛渗透到教育领域。数字经济与教育的融合产生了智慧教育,它不仅丰富了教育理论和方法,还填补了数字技术应用的空白。智慧教育借助现代信息技术构建了一种智能教学模式,可为每位学习者提供个性化的学习体验,并随着环境变化自适应发展。这一模式的逻辑起点是课程教学,核心特点是将知识性与价值性有机融合,采用混合式教学,打造"个性自适应"的"智慧教学"模式。

以价值塑造为引领解决实际问题,以出口目标(OBE)为导向,以学生为中心,智慧教育加速推进数字智能对新文科教学的深刻改革。它促进了新文科与其他学科的交叉融合,使学生能够高效学习,更好促进学生心智的提升。这一过程初步塑造了以个性化知识为基础,以创新性知识生成为目标的"智慧教育"模式。

一、智慧教育的内涵

关于智慧教育的内涵,冯契(2011)认为,智慧教育的实质是把知识转变成智慧,使人获得自由、主动和自觉的发展[1]。彭文晓(2007)则指出,智慧教育是指在引导学生认识生活的过程中,通过师生之间的知识给予和接受,提高学生智慧的教育[2],它以问题为出发点,进而启发学生的智力,引导他们去思考,去解决问题。同时,祝智庭(2016)认为,智慧教育的整体架构是由智慧教育、智慧环境、智慧教学方法、智慧人才四个方面构成。这与教育观念、技术创新、方法创新、人才观念的变化是一致的,符合智慧教育的理念[3]。刘革平等(2021)则认为,"技术+教育"只代表了智慧教育的构成形式,智慧教育还必须通过外部手段回应社会需求,达到智慧教育的目标,通过内部手段塑造智慧教育的体系和方式,形成完整的智慧教育体系,从而培育生

*本文系2024年度海南省高等学校教育教学改革研究项目"跨学科融合视角下海洋型高校创新创业教学模式研究"(项目编号:Hnjg2024ZD-46)的研究成果。

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命智慧[4]。综上所述，智慧教育是在价值引领下的“个性自适应”。

智慧教育的内涵有两个基本内容：个性化和自适应。“个性化”是指，智慧教育旨在通过对大量学生所生成的大量数据中的隐性含义进行发掘，从而为评价学习过程、预测学生将来的表现以及发现潜在问题提供强有力的支持。智慧教育的“自适应”是指，具体指向修正自己以适应外部环境发生的变化，能够随着环境的变化而变化，这是一种以反馈和自动调整为特征的动态变化过程。而智慧教育的实质是把知识转变为智慧，进而培育智慧的主体，这也是数字技术与教育融合发展的趋势。

二、智慧教育模式的构成

智慧教育模式打破了传统教学的课堂知识传授模式的时空物理屏障，学生可以随时随地利用终端平台获得个性化的学习内容，自主规划学习路径，并与环境协同演进，促进个体心智不断升级。它通过线上线下的混合教学手段的内在机制，驱动整个模式达到个性化学习目标。

（一）智慧教育模式的含义

智慧教育模式包括个性化学习、互动性、多模式学习、实时反馈、跨时空学习、数据驱动决策、安全和隐私、可持续性、教育者培训以及社会参与。这些构成了一个综合性的概念框架，旨在借助先进的技术和教育方法，提供更加个性化、多元化、互动和高效的学习体验；通过整合创新技术和教育方法，实现个性化学习、提高教育质量、促进学生参与、扩大教育可及性、培养终身学习习惯、提供实时反馈和改进机会、推动教育创新以及提高教育效率，从而塑造适应现代社会需求的教育体系，为学生提供更优质的学习体验和更广泛的教育机会。同时，确保学生数据的安全、可持续性的教育资源和社会参与，以满足其学习需求，培养终身学习的习惯，并提高教育的质量和效果。

（二）智慧教育模式的组成要素

智慧教育模式是一种以先进的信息技术为支撑，致力于提升教学效果和学习体验的教育模式。该模式的组成要素涉及主体、客体和介体等方面，具体是主体（教师）、客体（学生）、介体（线上线下混合教学手段）。

在智慧教育模式中，教师充当着核心主体的角色，要求具备卓越的数字素养。这包括对信息技术的熟练操作、对网络应用的高效能力，以及对教育技术应用的深刻理解。在进行教学设计时，教师需要具备巧妙的创设能力，能够设计出线上线下混合的教学活动，以灵活应对各学科和学生的多样需求，同时实现学习目标的有效达成。在智慧教育中，教师的角色更侧重于引导和辅导，强调对学生个体差异的关注。教师需要根据学生的学习状况，提供个性化的引导，以更好地满足他们的需求。同时，教师还需具备对学生学习数据的敏锐分析能力，通过数据挖掘等手段深入了解学生的学习习惯、优势和不足，以便灵活调整教学策略。

在智慧教育模式的运作中，学生扮演着客体的角色。为适应这一模式，学生需要增强主动学习意识，通过智慧教育平台主动获取信息、展开自主学习，并积极参与在线讨论和协作。同时，他们应具备一定的技术应用能力，如电子设备的运用、教育软件的操作以及在线交流等方面的技能等。通过参与在线协作平台，学生需要培养团队协作和有效沟通的能力，以更好地完成课程和项目任务。智慧教育模式要求学生在学习过程中更为主动地管理自己，包括但不局限于时间管理、明确目标以及选择合适的学习方法。

线上线下混合教学手段在智慧教育模式中担任关键的介体角色。通过在线学习平台，提供多元化学习资源，如视频课程、电子教材和在线测验等，以满足不同学科和学习风格的需求。借助虚拟实验和仿真技术，学生得以在安全的环境中进行实验和实践，从而提升实际操作的技能水平。智慧教育模式通过智能化技术实现个性化学习路径的设计，根据学生的学习情况和兴趣，提供个性化、定制化的学习体验。此外，引入人工智能和大数据分析技术，为师生提供即时的学习建议、反馈和支持，推动学习过程更加个性化和差异化。

线上线下混合的智慧教育，实现了师生间在真实世界中显性知识的高效传递和隐性知识的有效转化。在这一模式下，平台的虚拟世界不仅形成了个性化的知识方案，还促进了创新知识的双向流通。学生通过参与平台的虚拟世界，不仅获得了实际能力的培养，还有助于激发创新思维。三者交织形成了丰富且灵活的线上线下混合的智慧教育体系。

（三）智慧教育模式的运行机制

智慧教育运行的核心机制是线上线下混合。智慧教育模式深度融合了线上和线下教育元素，为学生提供灵活性、个性化和互动强的学习体验。在线上教育阶段，学校借助学习管理系统和在线平台大规模收集学

生学习数据，构建了详实的学习档案，为后续的个性化教学提供了可靠的数据支持。而在线下教育阶段，尤其是在实践和互动体验方面，学生通过实验室、工作坊等方式进行具身体验，将所学知识实际应用，从而深化实践经验。

线上与线下的有机结合，不仅通过灵活的教学策略调整和持续的反馈循环不断优化教学流程，还能够提供全方位的学习支持，培养学生更广泛的学习技能，以适应未来知识和技能的不断演进，进而实现终身学习的目标。

三、智慧教育模式的应用方式

针对智慧教育的应用方式，从理念融合、混合教学、整合课程设计、真实虚拟交互四个方面进行加深应用。

在智慧教育模式中，理念融合方面可突出个性化学习。通过深入运用大数据分析学生的学习习惯和兴趣，系统化设计个性化学习路径，为每一位学生打造高度个性化的在线学习体验。这种强调个性的理念不仅贯穿于教学设计中，更在学生参与线上平台学习的始终得以实践，通过个性化教育路径的精准定制，激发学生积极投入学习。同时，智慧教育模式中的跨学科整合理念贯穿整个线上课程，致力于促进学科之间的深度交叉，为学生提供更为全面和多元的知识视角。这种综合性教育设计强调不仅限于单一学科的学习，更注重培养学生的全面思维和解决问题的能力。通过融合不同学科，学生得以建立更为完整和多层次的学科认知，以更好地迎接未来社会的复杂挑战。

在线上线下混合教学方面，智慧教育模式充分利用线上资源的多样性构建学习生态系统。以视频课程、电子教材以及灵活的在线测验等，适应广泛的学科需求和各异的学习风格。同时，将线上的多元资源与线下的实践活动，如实验和实地考察有机结合，形成了一种协同互补的教学模式，使学生在实际操作和理论学习中获得更为全面的发展。这种混合教学设计不仅让学生在虚拟学习环境中灵活获取多元知识，也通过实践活动激发了其实际操作能力。其强调理论与实践的结合，使学生在实际问题解决中更好地理解和应用所学内容，真实体现了线上线下混合教学的协同优势。

在整合课程设计方面，智慧教育模式通过将虚拟实验与实际应用有机结合，强化了多方资源的实用性。这种虚实融合使学生不仅在虚拟环境中进行实验，增强实际操作能力，同时，也提升了将理论知识应用于实际场景的能力。另外，智慧教育模式还引入了个性化评估方法，通过考察项目作业和实际表现，全面了解学生的综合能力。通过交互反馈，学生能够更好地调整学习策略，更有效地利用在线平台进行自主学习。

在真实虚拟交互方面，智慧教育模式通过搭建在线协作平台，有效实现了学生之间的深度互动。团队项目合作使学生能够在虚拟空间中建立实质性联系，促进了深度的学术交流与协同学习。与此同时，教育者通过实时互动工具和远程辅导，直接为学生面对面提供精准解答和支持，使师生在线上平台创造出真实而富有趣味的互动体验。

智慧教育模式在这些方面的应用方式凸显了线上线下混合教学的协同效应，为学生提供更为灵活、个性化和互动性强的学习体验。学生在这种模式下可以更灵活地选择学习路径，获得个性化的指导和反馈，并通过深度互动建立实质性的教学联系。这种协同效应使得学习不再受限于时间和空间，为广大学生提供了更为丰富、个性化且具互动性的学习体验。

四、智慧教育模式良性运行的保障机制

（一）以课程思政引领模式运行为价值取向

教育信息化发展的高级阶段是课程教育，智慧教育以先进的教育理念为指导，通过各种信息科技优化教育模式，课程思政也是促进智慧教育稳定发展的关键保障。由“思政课”向“课程思政”进行延伸拓展，做好课程思政既是高校发展的方向，也是立德树人的根本任务。同时，“课程思政”是把“思想政治”的教育模式与学科进行“融合”，与思想政治理论共同构建协同育人的创新。这是智慧教育的价值引导，只有在价值引领、精神塑造下，智慧教育才能有更好发展，进而提高教学质量，保证智慧教育的健康发展。

（二）以协同育人作为智慧教育模式的发展目标

要形成课程的互动培养体系，才能完成既定的人才培养目标。协同育人是指以培养人才为目的，坚持资源合理共享、相互协作、相互协调的有效互动，较之传统教学方法，这是极大的创新，具有鲜明的个性。通过创新方法和途径转变实践育人模式，有效促进了核心职业能力的培养，这为智慧教育的个性化发展奠定了良好的基础。有了协同育人的支撑，就使得智慧教育的发展有了依靠，有了稳定的科学支撑，又使得它保持着与传统模式不同的鲜明个性。

（三）以数字智能作为模式运行的技术支撑

目前，全球数字化经济发展不断成为主流，人类社会也正迈向数字化新时代，数字经济主导了目前的经济形态，这也是我国经济发展的主要推动力。与此同时，教育领域也正在向数字化转型，这是随着技术的发展必然产生的结果，也使得教育更加现代化。教学资源的整合多以数字化得以实现，促进优质教育资源共享，成为解决当前教育资源分配不均衡问题的关键。同时，可以持续跟踪学生的学习状况，通过对学生的行为分析设计适合他们的学习方式，强调教育的适应性，使每个学生都有适合自己的学习模式，学生可以随时和教师进行交互，便于因材施教，提高教学效率。数字化技术与教育教学的深度融合是教育的发展方向。

（四）运用多元政策确保模式无障碍运行

党的二十大强调，"要坚持教育优先发展、科技自立自强、人才引领驱动，加快建设教育强国、人才强国"，把教育、科技、人才的重要性摆在了突出位置。我国制定了一系列教育政策，对于发展智慧教育有了充分的保障。目前，各高校大力推进课程思政，提出要坚持科学理念、秉承系统思维，科学制定详细的规划与设计来鼓励智慧教育的进行。线上教育的模式丰富了教育的多样化，也为智慧教育的高质量发展提供了有力的保障。同时，随着整体经济飞速发展，国内经济总量已经位于世界第二，教育资金大幅增加，为智慧教育的顺利发展提供了坚实的资金基础。

总之，从智慧教育的内涵——个性自适应及模式设计着手，通过分析线上线下混合手段作为智慧教育模式的内在机制，设计了以"个性自适应"为核心的智慧教育模式，进一步拓宽了教育领域的研究，强调了模式在个性化学习、教育技术的理论意义。有望为未来教育研究和实践提供重要的指导，并促使教育领域更好地利用技术和数据来提高教育质量和效率。同时，需要综合考虑隐私和安全等问题，以确保智慧教育模式可持续发展并产生最大的正面影响。未来，智慧教育将继续在教育领域发挥重要作用，为学生和教育者创造更好的学习和教学机会。

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Research on Smart Education Model Based on Mixed Online and Offline Methods

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Abstract: Against the backdrop of the rapid development of the digital economy, AI has promoted the deepening of educational informatization, and the smart education model has gradually matured and been widely applied in various fields. Smart education not only includes the digital upgrade of traditional teaching methods, but also an innovative form of education that integrates advanced technology. By deep integrating the online and offline aspects of the smart education model, we can encourage students to fully participate and improve learning outcomes. For the application methods of smart education model, it is necessary to deepen their application from such four aspects as concept integration, blended teaching, integrated course design, and real-virtual interaction. The healthy operation of the smart education model should be guided by the value orientation of the curriculum ideological and political education, with collaborative education as the development goal of the smart education model, digital intelligence as the technical support for the operation of the model, and the use of various policies to ensure the barrier-free operation of the model.

Key words: smart education; mix online and offline; personalization; self-adaptability; smart education model

新商科新形态系列教材·市场营销专业

国家级一流专业(市场营销)建设成果教材

消费心理学(微课版)

◎主编 杨仲基 徐岸峰 刘凯然

北京理工大学出版社
BEIJING INSTITUTE OF TECHNOLOGY PRESS

内容简介

消费心理学是一门综合性学科，与心理学、管理学、市场营销学、公共关系学等多个学科领域密切相关。本书融合前沿理论与企业实践，突出实用性和可读性，构建形成了完善的消费心理学知识体系。

本书从影响消费心理的内外部因素入手，设计了十三个章节，内容涵盖消费者认识、情感、意志、个性特征、学习、记忆、态度、需要、动机、体验、自我概念、生活方式、消费文化、社会阶层、消费群体、产品、广告、营销沟通、消费情境等因素及其与消费心理和行为之间的关系，同时将大数据、人工智能等新技术与消费心理结合。本书既适用于高等院校应用型市场营销等专业人才培养的需要，还可以成为市场营销实践与管理人员的参考用书。

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图书在版编目(CIP)数据

消费心理学:微课版 / 杨仲基，徐岸峰，刘凯然主编. --北京:北京理工大学出版社，2023.11(2023.12重印)

ISBN 978-7-5763-3214-8

Ⅰ.①消… Ⅱ.①杨… ②徐… ③刘… Ⅲ.①消费心理学 Ⅳ.①F713.55

中国国家版本馆CIP数据核字(2023)第231959号

责任编辑：王晓莉　　**文案编辑**：王晓莉

责任校对：刘亚男　　**责任印制**：李志强

出版发行 / 北京理工大学出版社有限责任公司

社　　址 / 北京市丰台区四合庄路6号

邮　　编 / 100070

电　　话 / (010) 68914026 (教材售后服务热线)

(010) 68944437 (课件资源服务热线)

网　　址 / http://www.bitpress.com.cn

版 印 次 / 2023年12月第1版第2次印刷

印　　刷 / 河北盛世彩捷印刷有限公司

开　　本 / 787 mm×1092 mm　1/16

印　　张 / 12

字　　数 / 279千字

定　　价 / 42.00元

图书出现印装质量问题，请拨打售后服务热线，负责调换

的所有因素，希望本教材从因素视角构建的消费心理学课程体系能够为读者带来启迪和系统性思考。

为满足学生数字化学习需求，本教材的编写团队已经在学银在线开设了“消费者行为学”线上课程，并以微视频的全新形式呈现在本教材当中，这是本教材编写团队在数字教材建设与混合式教学模式改革中的一次新的探索，也是黑龙江省高等教育教学改革项目“‘课赛一体化’背景下市场营销专业社会实践一流课程建设模式研究”（SJGY20220325）和黑龙江省首批新文科研究与改革实践项目“数字经济时代理工科院校工商管理类专业新文科课程体系建设与实践”（2021HLJXWY043）的阶段性成果。

本教材由杨仲基和徐岸峰负责统稿和定稿工作，刘凯然参与编写。全书共十三章，徐岸峰负责第一章至第四章的编写工作，杨仲基负责第五章到第十章的编写工作，刘凯然负责第十一章到第十三章的编写工作。

本教材参考、吸收和借鉴了大量论文、著作和网络资料，教材编写也得到了北京理工大学出版社高等教育分社领导和编辑同志提供的全方位指导和服务，在此一并向各位表示感谢。限于编者时间和水平有限，书中疏漏与不当之处，恳请各位读者批评指正。

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关于第十七届全国商科教育实践教学大赛和科研课题大赛评审结果的公告

各有关单位:

由中国国际贸易促进委员会商业行业委员会、中国国际商会商业行业商会和中国商业经济学会主办的第十七届全国商科教育实践教学大赛和科研课题大赛评审工作已经完成，此次竞赛活动历时 8 个月，吸引了来自全国 27 个省、市、自治区高校、企业和机关单位的 487 家单位报名参赛，此次活动共提交参赛作品 2368 项。按照竞赛评审实施细则及竞赛章程要求，经院校、企业和机关单位推荐，部分赛区选拔，组委会初评、评选专家组复评、评审委员会审核，最终共有来自全国 256 家单位，共计 1225 项作品获奖，其中评选出全国商科教育实践教学大赛获奖项目 948 项（详见附件 1），一等奖 256 项；二等奖 390 项；三等奖 302 项。科研课题大赛获奖项目 277 项（详见附件 2），一等奖 86 项；二等奖 137 项；三等奖 54 项。现予以公布。

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中国国际贸易促进委员会商业行业委员会　中国国际商会商业行业商会　中国商业经济学会

2025 年 6 月 18 日

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海南热带海洋学院：

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中国国际贸易促进委员会商业行业委员会　中国国际商会商业行业商会　中国商业经济学会

2025年6月18日

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来源：教务处 发布时间：2024年04月15日

各二级学院：

为持续推进信息技术与教育教学深度融合，转变教学方式，提高教学质量，根据《海南热带海洋学院教务处关于开展2024年度校级精品在线开放课程立项建设申报工作的通知》（热海大教〔2024〕9号）要求，教务处组织了本年度校级精品在线开放课程建设项目申报、评审工作，遴选出拟立项课程并公示无异议。现对《旅游接待业（全英）》等7门课程立项（见表1）的相关事宜通知如下：

一、课程建设

（一） 立项课程按照《海南省高校课程共享联盟共享课程建设质量标准及管理办法》进行建设。

（二） 课程负责人合理安排教学进程与拍摄时间，于2024年11月20日前保质保量完成视频录制工作，并上线网络教学课程平台面。

（三） 上线后应在校内开设课程，服务学校教学，积极探索翻转课堂教学模式，主动参与省级精品在线开放课程的认定。

二、课程管理按照我校发布的《海南热带海洋学院在线开放课程建设管理办法（试行）》（热海大办〔2018〕120号）执行。

表1 2024年校级精品在线开放课程建设立项表

序号	课程名称	课程类型
1	旅游接待业（全英）	专业基础课
2	船舶防污染管理	专业基础课
3	女性学	通识课程
4	旅游接待业	专业课
5	定向运动	专业课
6	旅游目的地管理	专业基础课
7	中国文化概论	专业课

海南热带海洋学院教务处

2024年4月15日

海南热带海洋学院教务处文件

热海大教〔2024〕65 号

海南热带海洋学院教务处
关于给予 2024 年行业企业课程资源库、真实项目案例库和虚拟仿真实验课程项目结题的通知

依据《海南热带海洋学院教务处关于开展 2024 年行业企业课程资源库、真实项目案例库和虚拟仿真实验课程项目申报工作（含附件）》（热海大教〔2024〕36 号），经教务处组织评估和验收，决定给予“新媒体运营与设计”等行业企业课程资源库和真实项目案例库 16 项、虚拟仿真实验课程项目 2 项结题，详见附件。

附件：2024年行业企业课程资源库、真实项目案例库和虚拟仿真实验课程项目结题名单

海南热带海洋学院教务处

2024年12月20日

送：校领导

海南热带海洋学院教务处　　2024年12月20日印发

序号	项目类型	所属学院	合作企业名称	课程名称	负责人/电话	项目校内参与人	企业方参与人
序号	项目类型	所属学院	项目名称	课程名称	负责人/电话	项目校内参与人	
1							
2	虚拟仿真实验课程项目	旅游学院	自贸港跨境电商虚拟仿真实验	国际贸易实务	徐岸峰	宋红娟、李墨也、杨经梓、刘颖、薛芮	

海南热带海洋学院教务处文件

热海大教〔2024〕39 号

海南热带海洋学院教务处
关于公布 2024 年校级课程思政示范项目
立项名单的通知

各二级学院：

为深入贯彻落实《高等学校课程思政建设指导纲要》，根据《海南热带海洋学院教务处关于开展校级课程思政示范项目申报工作的通知》（热海大教〔2024〕22 号）和《海南热带海洋学院办公室关于印发海南热带海洋学院课程思政建设工作方案的通知》（热海大办〔2020〕142 号）要求，教务处组织开展了 2024 年校级课程思政示范项目（课程、案例）申报评审工作。经个人申报、学院推荐、教务处审核、公示无异议等程序，决定立项 2024 年校级课程思政示范课程 28 门，校级课程思政示范案例 15 项，校级课程思政优秀教师直接从此次立项的校级课程思政示范项目中产生，优秀

教师所在团队自动认定为校级课程思政优秀教学团队。现将立项名单予以公布（见附件1、2）。

一、学校立项的课程思政示范项目建设时间原则上为一年；每门示范课程资助1万元，每项示范案例资助0.5万元，经费当年划拨；视频录制及费用由学校统一安排；经费管理参照《海南热带海洋学院教学建设与改革项目经费使用管理办法（试行）》（热海大办〔2019〕55号）规定执行，请项目负责人及时做好工作安排，严格遵守财务相关规定，确保项目按期保质完成。

二、请项目负责人按照课程思政教学要求和结项成果要求（附件3），开展课堂教学等工作，发挥课程思政示范项目的引领作用；结合本项目的实际情况填写《海南热带海洋学院2024年课程思政示范项目建设任务书》（附件4），于6月25日（周二）下午下班前以学院为单位统一报送任务书（纸质版1份）至教务处（行政楼416室），电子版发至邮箱：472978364@qq.com，联系人：王昭旭，联系电话：88651874。

三、请各二级学院高度重视课程思政建设工作，进一步强化课程思政建设主体责任，落实立德树人根本任务，强化示范引领，积极支持该项目负责人及团队开展建设任务,强化每一位教师的立德树人意识，精心做好教学内容及方法设计，结合不同课程特点、思维方法和价值理念，深入挖掘课程思政元素，有机融入课程教学，将课程思政元素具体到教学章、节或知识模块、知识点和学业评价等教育教学全过程

和各环节。

四、学校视情采用听课、评课等方式对立项项目开展评估。

附件：（教务处网页下载）

1. 海南热带海洋学院2024年课程思政示范课程立项名单
2. 海南热带海洋学院2024年课程思政示范案例立项名单
3. 海南热带海洋学院2024年课程思政示范项目结项成果要求
4. 海南热带海洋学院2024年课程思政示范项目建设任务书

海南热带海洋学院教务处

2024年6月21日

送：校领导

海南热带海洋学院教务处　　2024年6月21日印发

海南热带海洋学院2024年课程思政示范课程立项名单

项目编号	课程名称	课程负责人	团队成员	所在学院
RHKSsk2024-13	旅游接待业	徐岸峰	周扬、薛芮、刘颖、王永挺、杨东伟	旅游学院

热海大教〔2025〕26号 海南热带海洋学院教务处关于2025年度校级教材建设项目立项名单的通知

时间：2025-09-15

各二级学院及相关单位：

根据《海南热带海洋学院教材建设与管理办法（修订）》（热海大办〔2021〕108号）和《海南热带海洋学院教务处关于开展2024年校级教材建设工作的通知》（热海大教〔2021〕19号）要求，教务处组织开展了2025年校级教材建设工作。经自主申报、资格审查、专家评审和学院教材审核工作组初审，学校教材建设与选用审核委员会评选及教材工作领导小组审定，公示无异议后，2025年校级教材建设共立项5项，现予以公布（见附表）。

海南热带海洋学院2025年校级教材建设立项名单

序号	教材名称	主编姓名	主编职称	学院
1	食用菌栽培	袁学军	教授	民族学院
2	海岸带生态工程	彭宗波	副教授	生态环境学院
3	AIGC基础应用教程	汪文彬	教授	计算机科学与技术学院
4	数字经济时代的旅游接待业	徐岸峰	教授	旅游学院
5	实用商务英语口语	王颖	教授	外国语学院

请各二级学院及时通知主编认真核对书稿，确保教材编写的质量，并于2025年11月15日前签订出版合同。

海南热带海洋学院教务处

2025年9月15日

海南热带海洋学院教务处文件

热海大教〔2024〕24 号

海南热带海洋学院教务处
关于公布 2024 年校级新工科、新农科、新文科研究与实践项目立项名单的通知

各二级学院：

为推进我校“四新”建设，不断提高人才培养质量，按照《海南热带海洋学院教务处关于开展 2024 年校级新工科、新农科、新文科研究与实践项目申报工作的通知》(热海大教〔2024〕11 号)要求，我校组织开展了新工科、新农科、新文科研究与实践项目的申报工作。经校外专家计分评审，遴选出拟立项项目并公示无异议。现对“数智时代面向海南自贸港产业生态构建的新商科人才培养路径研究”等 20 个项目予以立项（详见附件），现就有关事项通知如下：

一、经费资助

（一）项目研究经费是校内项目经费，每项资助 1 万元，项目经费按 2024、2025 两个年度资助。

（二）资助经费主要用于“四新”建设相关研讨活动费(会议费、专家咨询费、差旅费等)、资料费、预期成果(研究报告、论文、案例集等)出版费。

（三）各项目负责人应及时做好工作安排，严格遵守财务相关规定，按时确保项目经费年度内全部支出。

二、项目管理

（一）项目研究期限为 2024 年 4 月至 2026 年 4 月。

（二）各项目组应统筹规划，按照研究期限和工作进程合理开展研究工作。

（三）结题验收。根据项目预期成果提交相关研究报告、论文、案例集，或其他研究成果。论文、研究报告等研究成果必须在显著位置标注“海南热带海洋学院 2024 年校级新工科、新农科、新文科研究与实践项目资助”及“项目编号”，研究成果必须与项目内容相关，不相关或未标注的不能计入该项目研究成果。

（四）各二级学院应加强项目研究的过程管理，强化对项目的指导，确保项目研究取得预期实效。

RHYxgnw2024-05	数字经济时代下海洋类高校工商管理类专业新文科建设实践	徐岸峰	无	2024.4-2026.4	（1）专业建设方案（1份）（2）专业人才培养方案（1份）（3）线上课程（1门）（4）本土化教材(1部)(5)教学改革研究报告（1份）	新文科

海南热带海洋学院教务处

2024 年 4 月 24 日

送：校领导

海南热带海洋学院教务处　　2024 年 4 月 24 日印发

关于公布2024年度海南热带海洋学院“三全育人”综合改革专项课题立项名单的通知

各部门、各单位:

根据我校《关于申报2024年度海南热带海洋学院“三全育人”综合改革专项课题的通知》，经个人申报、二级单位推荐、校外评审以及学校综合审定等环节，15个课题获得立项。学校决定给予10000元/项的经费支持，按照2024、2025两个年度资助。2024年资助3000元课题经费，2025年资助7000元课题经费。经费报销需符合学校财务管理规定，当年学校资助经费需当年用完，学校将未使用完的经费予以收回，不结转至下一年。请各课题负责人结合申报书内容，以“三全育人”课题研究为引领，将中华优秀传统文化融入“三全育人”综合改革建设，认真做好课题管理工作，全面提升立德树人成效。

联系人：刘老师，联系电话：0898-88651808。

附件：2024年度海南热带海洋学院“三全育人”综合改革专项课题立项名单

海南热带海洋学院

“三全育人”综合改革领导小组办公室

2024年11月12日

附件：

2024年度海南热带海洋学院
“三全育人”综合改革专项课题立项名单

序号	课题名称	课题负责人	课题编号
[redacted]			
6	以中国优秀传统文化为课程思政融入点的一流课程创新模式	徐岸峰	RHDSQYR-2024-06
[redacted]			

热海大教〔2025〕26号 海南热带海洋学院教务处关于2025年度校级教材建设项目立项名单的通知

时间：2025-09-15

各二级学院及相关单位：

根据《海南热带海洋学院教材建设与管理办法（修订）》（热海大办〔2021〕108号）和《海南热带海洋学院教务处关于开展2024年校级教材建设工作的通知》（热海大教〔2021〕19号）要求，教务处组织开展了2025年校级教材建设工作。经自主申报、资格审查、专家评审和学院教材审核工作组初审，学校教材建设与选用审核委员会评选及教材工作领导小组审定，公示无异议后，2025年校级教材建设共立项5项，现予以公布（见附表）。

海南热带海洋学院2025年校级教材建设立项名单

序号	教材名称	主编姓名	主编职称	学院
1	食用菌栽培	袁学军	教授	民族学院
2	海岸带生态工程	彭宗波	副教授	生态环境学院
3	AIGC基础应用教程	汪文彬	教授	计算机科学与技术学院
4	数字经济时代的旅游接待业	徐岸峰	教授	旅游学院
5	实用商务英语口语	王颖	教授	外国语学院

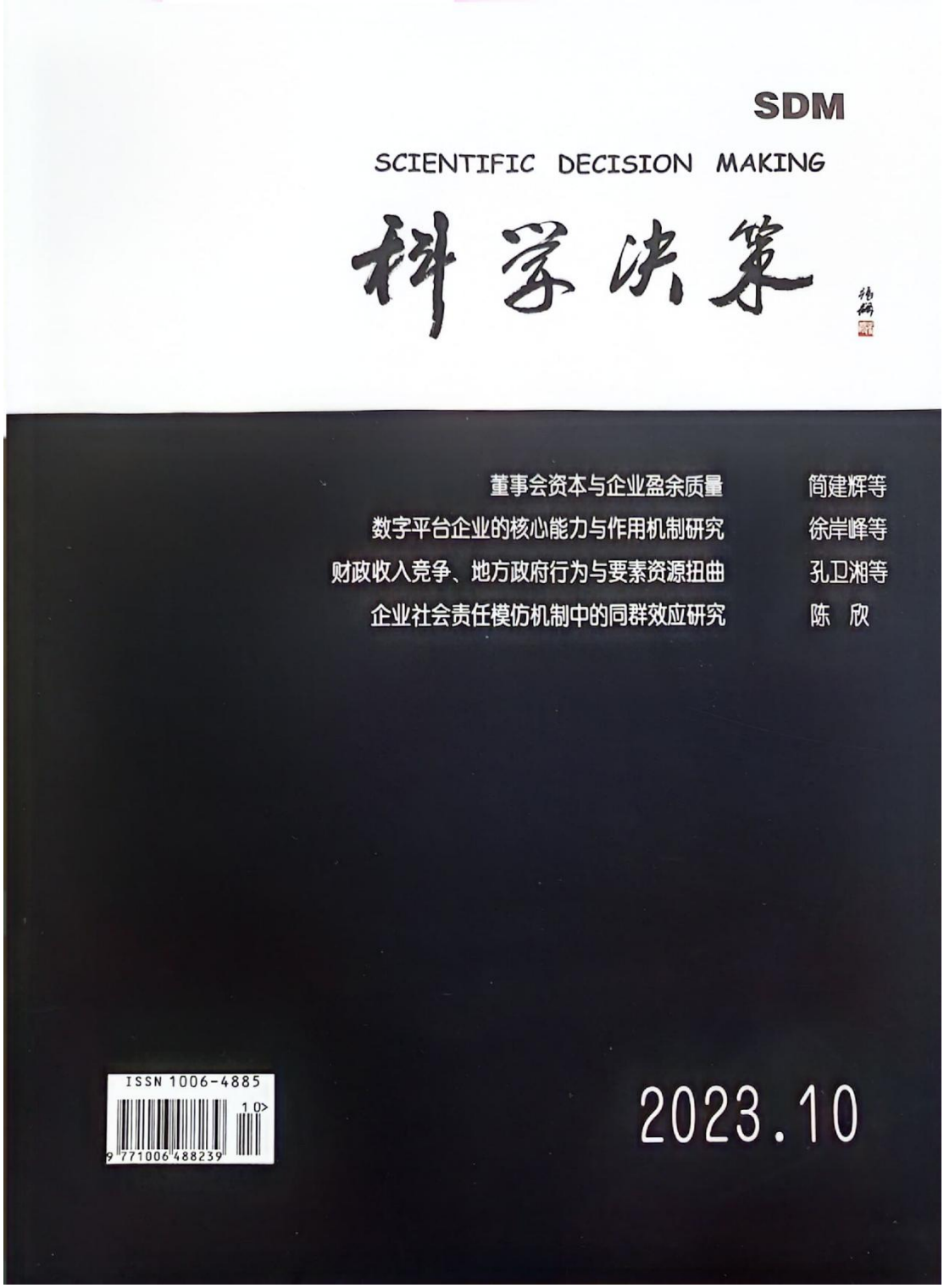
请各二级学院及时通知主编认真核对书稿，确保教材编写的质量，并于2025年11月15日前签订出版合同。

海南热带海洋学院教务处

2025年9月15日

论文

[1] 徐岸峰,陈继明,李玥.数字平台企业的核心能力与作用机制研究[J].科学决策,2023,(10):17-33.



证书编号：242630C23

CSSCI

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Chinese Social Sciences Citation Index

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南京大学中国社会科学研究评价中心

Center for Chinese Social Sciences Research and Assessment

南京大学 中国社会科学研究评价中心

2023年6月

科学决策

SCIENTIFIC DECISION MAKING
（1994 年 12 月创刊）
2023 年第 10 期
月刊（总第 315 期）每月 20 日出版

主　管：中国航天科技集团公司
主　办：中国航天系统科学与工程研究院
　　中国社会经济系统分析研究会
　　欧亚系统科学研究会
出　版：《科学决策》杂志社
社　长：吕文栋
名誉主编：蒋正华
主　编：于景元
副主编：张新民
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国际标准连续出版物号：ISSN 1006-4885　　中国标准连续出版物号：CN11-3472/G3　　邮发代号：82-941
杂志社地址：北京市海淀区阜成路 14 号　　邮　编：100048
《科学决策》杂志网址：www.kxjcm.com
《科学决策》编辑部邮箱：kxjcm1@126.com
定价：40.00 元人民币　　海外及港澳地区定价：40.00 美元

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数字平台企业的核心能力与作用机制研究

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摘　要：数字经济背景下，为应对当前“UACC”的管理环境，平台型企业已呈现激烈竞争的发展态势。越来越多的平台企业开始寻求企业获得持续竞争优势的途径。本文以企业综合优势的战略管理理论为指导，以综合优势形成的前因和机制为科学问题，通过结构方程对假设进行实证研究，研究发现市场细分机制、平台定价策略、社会网络、数字技术以及平台生态互补性等会对数字平台型企业综合优势形成产生积极正向的影响，同时网络效应在数字平台型企业综合优势形成中起着中介效应。

关键词：网络效应；平台型企业；企业综合优势

DOI：10.3773/j.issn.1006-4885.2023.10.017

中图分类号：C931　**文献标识码：**A　**文章编码：**1002-9753（2023）10-0017-17

1　引　言

数字经济时代的管理环境可以用四个关键词进行总结，分别是“不确定性（Uncertainty）、模糊性（Ambiguity）、复杂性（Complexity）以及快变性（Changeability）”，简称为“UACC”（席酉民和张晓军，2012[1]）。近年来，亚马逊、阿里巴巴、腾讯等互联网商业巨头已逐步确立了世界垄断地位，平台型企业已呈现激烈竞争的发展态势。越来越多的平台企业开始寻求企业获得持续竞争优势的途径。相比于传统企业，平台型企业成功运营的关键在于网络效应，数字经济背景下的平台组织打破物理界限，使海量主体参与其中，没有时空边界，实时交互。数字平台型企业不仅可以达成交易，联结双边用户，而且可以形成平台化的商务模式，利用数字技术和算法吸引更多用户参与，将网络效应释放得更加极致，确立了平台企业的市场优势地位，从而产生更多规模性经济效益，赢得更大的市场份额。

互联网背景下，作为新兴行业的数字平台型企业，在技术、管理以及制度方面还存在较大的不确定性。面临动态环境的威胁，企业仍需获得持续竞争力，需不断整合内部和外部资源，通过动态协调重新组合内外部结构，增加数字平台型企业自身战略柔性，以适应外部环境变化。

基金项目：国家自然科学基金项目（项目编号：72174045）；黑龙江省哲学社会科学研究规划项目（项目编号：21GLB064）；海南重点新型智库海南热带海洋学院海上丝绸之路研究院项目。

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纵观国内外文献，以往学者对数字平台企业的研究成果较为丰富，大多对数字平台型企业的研究焦点是经济视角下，如何更好的制定价格吸引用户参与，扩大用户使用规模；如何管理多边用户，促进协同演化；以及通过制定平台准入政策，促进平台系统内有序推进。但从平台企业现有能力与外部结构和环境相结合的角度进行研究相对较少。同时，学者们对企业综合优势的研究大多集中于实体企业，针对虚拟经济的企业综合优势研究较少。据此，本文通过对以往文献的梳理，基于核心能力理论和产业组织理论，对数字平台型企业综合优势影响因素进行了提取，构建了数字平台型企业综合优势影响因素机理模型，分析了网络效应作为中介变量，数字技术、平台生态互补性、价格补贴机制、市场定位以及社会网络作为潜变量对数字平台型企业综合优势形成的积极正向影响。

2 文献综述和理论框架

2.1 数字平台型企业

平台是依据“模块化”架构起的一个整体系统或组织结构，它可以将各方用户或群体连接起来，提高了产品或服务的交易率。平台组织不仅可以携带资源和能力，还可以将组织内的资源和能力进行快速的、灵活的整合和重组。以往学者对平台内涵的研究基于不同视角，魏江和刘洋（2020）[2]从工程技术的角度认为，平台是通过技术而形成的模块化架构，平台是由技术、产品和设备多因素组成的，以实现“技术创新和范围经济”为目标建立的系统框架；刘洋等（2020）[3]以竞争战略为视角，将平台视为一种商业模式；部分学者也从双边理论视角，将平台看成是连接产品、服务或者信息的交互双方或多方，为交易降低门槛，从而提高交易的效率。Dougherty 和 Dunne（2011）[4]将平台视为一种组织，可以促进进行经济交易以及多方信息交互，可以为用户和供应商提供产品或服务，平台应重点关注价格和网络效应。

尽管学者们从不同的视角对平台进行界定，但双边市场、网络效应和开放性等特征均被大多数学者所认可。Gawer 等（2014）[5]认为双边市场作为平台特征之一，需要有多个市场群体或者利益相关者进行参与，因此，双边 / 多边市场是一种经济组织结构；网络效应作为平台组织的关键特征，Boudreau 和 Jeppesen（2015）[6]认为，网络效应是平台中只要一边的规模减少或者增加，其他边规模也会随之变化；Donald 等（2018）[7]将平台视为一个系统，为组织不同群体间信息的交换和沟通提供支持，因此，平台具有开放性特征。

Gawer（2014）[8]以及 Um 和 Yoo（2016）[9]提到，数字平台企业将边界资源加以利用，通过数字技术和算法将平台的核心连接起来，是平台具备互补功能，突破物理视为限制，作为提供产品或服务的载体，吸引双方或多方参与其中。忻榕等（2019）[10]后续研究表明，未来平台所做的不只是简单的连接，也不是进行简单交易，而是会管理整个行业，将行业进行唯利化解构，再被它相连。李晓华（2019）[11]也认为，数字经济时代下平台型企业组织形态已逐渐成为占据主导地位的。与传统的平台型企业相比，数字经济的快速发展使信息交互、传播的速度变得更快，企业面临动态的外部环境，难以预测环境风险，管理过程混乱，企业无法提高价值，企业目标很难实现。钱雨等（2018）[12]认为平台型企业作为一种商业模式，探究其如何捕获价值更为重要，能更大限度帮助企业应对挑战，迎来机遇，为企业资源和能力的创新提供助力，从而促进企业实现更多价值。

综上，本文认为数字平台型企业是联结了产品或服务的多方并促使多方互动和交易的载体，并利用数字技术和算法连接平台内部，推动群体间直接互动，降低交易门槛，提高交易效率，促进平台参与者间协同发展，组织结构发生变革，为激发和释放网络效应提供了条件，带动了顾客消费指数级增长，创造出更具规模的平台价值。

2.2 网络效应

数字经济背景下，需求特性驱使平台组织产生网络效应获得更大效益，用户不同需求之间的相互依赖性可以使用户规模增加，因此，用同样的成本帮助用户提高感知价值，吸引更多用户参与，平台便产生了更高的价值。基于平台组织特性和需求特性，网络效应的本质就是指需求侧规模经济。与之相对应的是工业条件下，供应商的成本结构及经济特征决定了生产厂商要通过提高销售规模、降低单位成本来提升规模经济，高

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固定的资产投入使工厂以最低的成本满足同样的需求，由此产生了供给侧规模经济。可见，数字经济时代规模效应仍然重要，依据价值主张激发和扩大网络效应更加重要。

“网络”是由若干节点所构成的，通过节点间的互动和连接形成链路，从而增加每个节点的活跃链接数，并表现出诸多对象间的相互联系。“效应”是一种特定的科学现象，是因为某种动因或者原因所产生的，同时可以衡量人欲望的满足度以及商品和行为程度。网络效应产生于产业组织理论，双边市场理论是由产业组织理论发展而来，指的是平台的价格一旦发生变化会对交易总量和总需求产生影响（Rochet，2004[13]）。基于双边市场理论，Armstrong (2006)[14]率先界定了网络效应，即网络中的一边会因其他边的规模和特征而获益，并随着规模的递增，网络对一个潜在用户的效用也随之递增，从而吸引更多潜在用户加入网络，因此，网络效应也称需求侧规模效应。

学者们普遍认为，网络效应是平台企业的本质特征，平台型企业通过价值创造而获益，并让平台用户对其产生依赖性，也叫做“用户粘性”。网络效应有两种类型，分别是直接网络效应还有间接网络效应。Armstrong（2007）[15]当用户需求来自在同一群体间，便产生的是直接网络效应，也叫做同边网络效应。比如：微信的网络电话的连通功能性很强，通过视频和语音的聊天功能进行互动产生的就是直接网络效应；若用户需求出现在截然不同的群体间，便产生的是间接网络效应，也称为跨边网络效应（Afuab，2013[16]）。比如：自动售货机使用微信二维码进行支付，不受场景传统的限制并被广泛使用，产生的就是网络效应。无论直接还是间接网络效应，二者都统一于规模经济，即需求规模越大，效应越强。平台模式之所以可以创造商业指数级增长，造就了消费者寡头格局，很大程度上是因为它暗示着“大者恒大，赢家通吃”（侯宏，2019[17]）。

2.3 数字平台企业的核心能力

20 世纪 70 年代，在美日竞争日益加剧的背景下，美国率先提出了战略管理，并进行了应用。与此同时，经济学者们也开始从微观经济的角度，研究企业效率低下的内在原因，战略管理理论应运而生。伴随着战略管理理论的发展，20 世纪 80 年代，战略管理分为三大学派：战略规划学派、定位学派以及资源学派，核心能力学派包含于资源学派。

企业核心能力理论是管理学与经济学两个学科相互交融的成果。从经济学的角度，最早可以追溯到学者们对“如何产生并发展企业持续性竞争优势？”这一现实问题的深入研究；从管理学角度，则是西方企业战略管理的研究焦点（20 世纪 50 年代的年度财务预算 -60 年代的长期计划 -70 年代的多方案规划矩阵 -80 年代的企业外部环境分析 -90 年代的独特内部资源和能力的评价）逐步转变的结果（吴小立，2002[18]）。

哈默尔和普拉哈拉德（1990）[19]是核心能力学派的主要代表，他们认为企业核心能力是企业特有的并很难被模仿的知识或能力，这些知识与能力还能为企业创造竞争力。孙昌玲等（2021）[20]将企业核心能力分为内部资源和能力两方面。企业资源是基础，能力是对核心能力的深度要求。企业稀缺的或者很难模仿的资源或能力是培育核心能力的基础。

后续研究认为，核心能力在维持现有竞争的同时也抑制了企业创新的发生，面对企业外部环境动态性和复杂性特征，负面作用不断放大，企业核心能力要具备更刚性化特征才能匹配外部环境获取竞争优势（Helfat 和 Peteraf，2003[21]），于是，学者们开始研究动态情境下企业如何利用内部资源与能力获取竞争优势，Teece 等（2007）[22]率先表示动态能力理论是由企业中独特技能、程序、流程、纪律、组织结构、决策规则等方面构成的，并且这些因素可以帮助企业应对动态环境的不断变化。简兆权和刘念（2019）[23]认为，企业动态能力已成为企业获取持续竞争优势的重要能力，其作用是整合内外部资源、实现资源的构建和重组，从而达到应对甚至塑造外部环境变化的目的。王伟楠等（2020）[24]提出，平台企业进行价值创造和演化的重要基础是形成动态能力。

数字经济背景下，市场竞争已经由传统的企业间的竞争转变成为了以数字平台为核心的生态系统之间的竞争（Stonig 等，2022[25]），企业要想获得成功必须坚持开放性，与环境持续交换物质、信息和能量，同时，数字技术和数据能力也极大改变了企业获取外界资源和形成自身核心能力的方式。学术界与企业家们也都就

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数字时代企业应该具备什么样的核心能力以及其核心能力发生了怎样的改变展开了具体的研究，如吴义爽和昝振宇（2023）[26]从资源基础观出发，分别从数字平台企业的资源属性、成长逻辑以及企业边界重塑基本路径等方面进行文献分析，研究发现数字经济时代与工业经济时代相比，企业的核心能力从对有形资源的掌控转化为对数字资源的共享；吴群和韩天然（2023）[27]通过对608家平台型电商企业的问卷调差进行实证分析，发现数字化能力能够对平台型电商企业创新生态系统韧性产生显著的正向影响；万成涛和胡永铨（2023）[28]则以制造业企业西门子为案例研究的对象，分析得出企业数字核心能力、平台整合能力、平台拓展能力和开放共享策略是数字经济背景之下促进制造业企业高质量平台化转型的核心因素。同步于学术界，2020年，IBM Services在对中国进行数字化转型的企业进行研究之后，提出企业不仅要以客户体验为中心，更要以科技赋能的方式获得赢得未来的核心竞争力，这些能力可以概括为洞察的决策力、智者的应变力、持续的创新力、永续的运营力以及敏捷的执行力。

基于核心能力理论的蓬勃发展，学术界还形成了整合视角下，统筹考虑企业内外因素保持企业持续竞争优势的综合优势理论。王宏起（2005）[29]首次提出了企业综合优势理论，认为企业的发展速度和水平取决于企业内外部因素，即综合优势的大小和水平，面临复杂多变的动态环境，企业需要结合内部、外部的资源和机遇，发展综合优势，其思想主线是：识别主导优势—培育核心能力—发展综合优势。企业的发展是各因素间系统综合的过程，企业最初要对内部独特的资源和能力进行识别，形成自身的主导优势，主导优势是动态核心能力培育和发展的关键因素，而核心能力反过来也会影响主导优势的发展（王宏起和武建龙，2010[30]）。企业综合优势突出的重点是除了考虑企业核心资源外，还充分考虑了外部资源、环境、机遇等因素，综合优势讨论是内部资源与能力和外部环境及结构的匹配问题，充分将各类资源进行整合，实现各种资源的协同，利用外部环境提升企业快速发展的资源基础，综合优势考虑的不仅是提升现有的竞争优势，还有面向未来竞争优势的积累，实现现有竞争和未来资源和能力间的长期的、持久的发展战略（武建龙，2010[31]）。

对近些年国内学者的研究进行梳理发现，部分学者在对企业经营活动进行研究时，出发点都趋向于企业内部与外部多因素协同和系统综合的角度，力求在复杂快变的、不确定性以及模糊性的市场环境中，协调和整合企业内部优质的资源，优化企业的外部适应能力，提高企业战略管理柔性，最终形成和发展企业的综合优势。

据此，本文认为数字平台型企业在“UACC”环境影响下，想要获得持久竞争力和可持续性发展，建立一套系统的科学管理理论方法是关键。由此，本文依据产业组织理论以及核心能力理论，从企业外部环境与结构和企业内部资源与能力两个角度展开研究，对数字平台型企业综合优势的影响因素进行探讨。

2.4 理论框架

2.4.1 外部环境与结构和数字平台型企业综合优势

基于产业组织理论，企业战略的制定、企业目标的确定、企业绩效的提升都与企业外部环境密不可分，企业目标的实施过程就是企业自身与外部经营环境相适应的过程。学者王宏伟和张东生（2021）[32]的研究表明，企业外部环境主要是指市场和政策环境。可见，外部环境与结构对数字平台型企业综合优势的形成具有重要影响。

以波特为主要代表的定位学派认为，市场定位对数字平台型企业综合优势的形成具有重要影响作用。Weber和Slywotzky（2011）[33]提出平台型企业想要发展成更大规模，便不能粗放成长，应设计出适合双边和多边用户的细分框架，真正且有效的引导各边用户找到自己所需，建立丰富多元的市场细分框架能使企业用户得以增加，扩大需求侧规模。比如，携程网为了精确引导顾客，将自己的业务细分为酒店、旅游、机票和火车票、订餐、合作卡、商旅等多类别，这种细分框架使大众对其服务项目产生重视，同时吸引更多具有旅游爱好的追随者，用户使用量不断增多，为企业发展带来更大竞争优势。可见，数字平台型企业制定差异化的市场定位策略，建立合理有效的市场细分机制会激发平台产生网络效应，从而促进数字平台型企业综合优势的形成。数字平台型企业形成综合优势的重要支撑离不开对异质性、互补性资源和能力进

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行获取和利用，并最终提高资源的转化和利用（Barney 等，2011[34]；Fang 和 Kim，2018[35]）。平台企业互补性将平台参与者聚焦于同一个生态，为用户提供更多元化的产品和服务，从而满足平台及平台参与者的需要，从而提升整个平台生态系统的网络效应（Tavalaei 和 Cennamo，2020[36]）。学者王节祥等（2021）[37]提出平台的互补性越高，越能为平台进行生态化创造价值，越能为平台获得更多绩效。据此，本文提出以下假设：

假设 H1: 外部环境与结构对形成数字平台型企业综合优势具有正向影响。

假设 H1a. 市场细分机制有助于数字平台型企业综合优势的形成。

假设 H1b. 平台生态互补性有助于数字平台型企业综合优势的形成。

2.4.2 内部能力与资源和数字平台型企业综合优势

企业动态核心能力是数字平台型企业形成综合优势重要一环，而企业培育核心能力的来源离不开企业自身资源和能力，依据孙昌玲等（2021）[20]的研究，本文认为，企业内部能力与资源是影响企业综合优势形成的重要因素。

Teece 等（2007）[22]认为，企业独特的技术或技能对企业能力的构建具有重要作用。作为一种通用的技术，数字技术包括硬件、软件技术以及网络技术，新一代数字技术分别是人工智能、大数据、云计算以及物联网等。在数字技术应用下，平台型企业产生的网络优势可能成为了一种有别于传统平台型企业，不仅能帮助平台企业在交易和资产上获得独有的资源和优势，还标志着一种新的组织形态的诞生，网络效应已成为平台价值创造和超额绩效的关键来源。

张红彬等（2019）[38]研究表明，平台通过制定价格策略来吸引更多的用户使用，使用户“粘附”在平台上，从而激发网络效应的产生，提升平台型企业的竞争优势。“定价竞争”是双边市场理论的两大竞争策略之一，合理的定价竞争策略可以增加企业竞争优势，使企业获得持续竞争力。数字平台型企业在形成综合优势初期，通过制定定价机制吸引更多用户参与，促进顾客间交流与沟通，从而激发、扩大网络效应，以此提升企业的竞争力。

张红彬等（2019）[38]认为，社交网络是企业获取信息和沟通的重要渠道，社交网络的虚拟特性是虚拟经济发展的必然产物，对数字平台型企业而言，社交网络发挥着重要作用，用户通过社会网络的连接可以产生直接网络效应。俞兆渊等（2020）[39]学者认为平台型企业正处于动态的社会网络中，更多的平台型企业需要与厂商和用户等利益相关者建立联系，社交网络则在其中扮演着信息和资源的交互和共享的角色。据此，本文提出如下假设：

假设 H2: 内部能力与资源对形成数字平台型企业综合优势具有正向影响。

假设 H2a. 数字技术有助于数字平台型企业综合优势的形成。

假设 H2b. 平台定价策略有助于数字平台型企业综合优势的形成。

假设 H2c. 社会网络有助于数字平台型企业综合优势的形成。

2.4.3 内部能力与资源和网络效应

以 Teece 为代表的核心能力学派观点认为平台企业内部独特资源、技术与能力是企业获得竞争优势的主要来源之一，平台的竞争优势之一是定价策略，通常平台制定价格补贴机制激发产生网络效应，吸引更多用户参与，再通过数字技术的应用，通过独特的算法使更多的用户依赖于平台，用户形成的社交网络促进用户间交流与沟通，形成更大的需求规模，从而扩大网络效应，提升平台交易率。

Bresnahan 和 Greenstein（2014）[40]认为技术手段的转化扩充了用户和合作伙伴，从而促进了价值活动的快速扩张，并构建了“赢者通吃”的平台企业竞争优势。Kude 等人（2019）[41]研究提出平台是依托数字技术向双 / 多边用户提供交易与互动的运行空间，且具有多边架构和网络效应两大关键特征。在此研究之上，Melville 和 Kohli（2019）[42]认为数字技术能力能够拉动平台企业数字资源的传递增值、促进网络效应的激发，催生出新的价值创造途径，也能带动数字经济领域新业态新模式的迅速涌现。罗兴武等（2021）[43]提出数字技术的利用和探索能力能够为企业的资源进行重构、整合，甚至带来变革，从而实

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现新的复杂资源重组能力。

Armstrong 和 Wright（2004）[44]对平台定价和网络效应进行研究发现，平台对一边用户的定价与另一边用户带来的交叉网络外部效应大小有关，并认为双边市场中的倾斜性定价现象会影响网络效应的强弱。史丽丽和林军（2020）[45]后续研究也证实了双边平台定价研究的关键在于网络外部性。

吴春旭等（2015）[46]用过演化博弈方法提出，社交网络是指为用户提供交流和交往服务，并认为社会网络的连接可以为平台带来收益。张红彬等（2019）[38]后续研究，发现作为虚拟经济产物的社会网络，连接了平台中参与者，参与者们可以通过交流和互动产生直接网络效应，叶琼伟和康巍耀（2021）[47]的研究也证实了，数字平台型企业以社交网络为纽带连接双边用户，在通过用户或者消费者进行消息的传播与推广，从而提升平台交易量和购物转换效率。据此，本文提出如下假设：

假设 H3：内部能力与资源对网络效应产生正向影响

假设 H3a：数字技术有助于网络效应的产生。

假设 H3b：平台定价策略有助于网络效应的产生。

假设 H3c：社交网络有助于网络效应的产生。

2.4.4 外部环境与结构对网络效应有积极影响

在数字平台型企业发展综合优势过程中，往往通过网络效应的产生和扩大提高企业竞争力，比如建立丰富市场细分机制的框架，可以将用户需求进行准确捕获，从而提升用户使用规模，促进网络效应的激发和扩大；又或者是平台企业通过与参与者进行资源、服务和信息的互补性提升平台企业的能力，使得资源充分的转化，激发平台更大的价值，吸引更多用户，扩大需求侧规模经济。

Fang 和 Kim（2018）[35]以及 Tavalaei 和 Cennamo（2020）[36]提出，平台聚焦参与者，提升平台企业互补性，帮助平台为用户提供更多元化的产品或服务，从而提升平台生态系统的网络效应。平台对资源和信息进行互补和整合，便能提升平台企业资源转化和能力提升，扩大网络效应的规模。

Rong 等（2019）[48]认为双边市场竞争的两种模式其一就是定位竞争，通过差异化定位，允许双方免费接入，宣传吸引更多用户参与，用户间的联系和沟通激发网络效应产生。在此研究基础上，周迪等（2019）[49]认为平台定位竞争核心在于平台应对多边用户提供差异化的定位，在于通过社交网络效应所产生的流量获得竞争力。据此，本文提出如下假设：

假设 H4：数字平台外部环境与结构对网络效应产生正向影响。

假设 H4a：平台生态互补性有助于网络效应的产生。

假设 H4b：市场细分机制有助于网络效应的产生。

2.4.5 网络效应和数字平台型企业综合优势

曲振涛等（2010）[50]研究发现网络效应已成为平台竞争的重要影响因素，还能积极促进平台绩效的提升。后续研究中，王法涛（2019）[51]认为，网络效应既是平台型经济体的一个基本特征，也是影响企业竞争策略的关键因素，平台网络效应指某种产品或服务的价值会随其用户数量的增加而增加，对平台具有正向反馈作用，平台往往也因网络效应的显著具有垄断势力。数字平台型企业综合优势的价值主张在于提升数字平台型企业的竞争优势，从而获得持久竞争力。因此，本文提出如下假设：

假设 H5：网络效应对数字平台型企业综合优势有积极影响。

假设 H6：网络效在外部环境与结构、内部资源与能力和数字平台型企业综合优势之间发挥中介作用。

基于以上假设，本文研究建立的理论框架如下图 1 所示。

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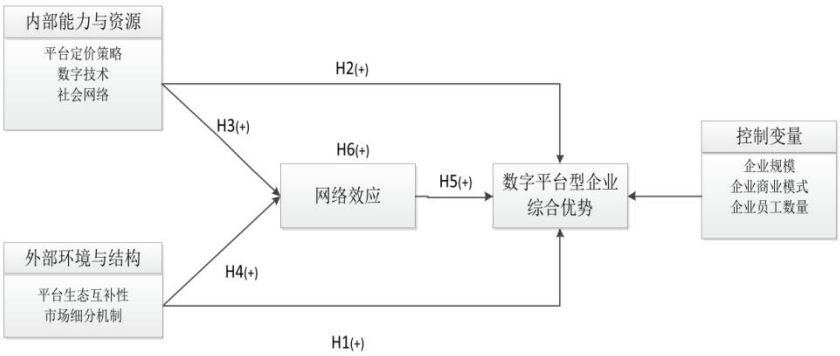

图 1　本文的研究框架

3　研究方法与数据收集

3.1　研究方法与样本收集

本研究通过设计和发放问卷收集数据，并运用结构方程模型（SEM）进行相关假设的检验。依据 Churchill（1979）[52]对设计问卷的要求，预先选取 80 名作者所在学校管理专业研究生为预调研对象，后续跟进修改问卷，最后确定正式问卷。

本次正式调研累计收回问卷 330 份，问卷发放方式为问卷星发放和自己发放两种。通过将研究对象范围划定为数字平台型企业，以及对调研对象所在企业的商业模式、职业和岗位以及企业员工数量和规模等变量设置成甄选题，从而筛选出不完整和明显无效问卷后，有效问卷一共是 302 份，无效问卷 28 份，有效率为 91.5%，可以进行接下来的研究。同时，采用李克特 7 点量表法进行调研，分为七个层次规则：非常不同意、比较不同意、不同意、一般同意、同意、比较同意、非常同意，以保证问卷调查的科学性。

本研究的“网络效应”为变量参考了曲江涛（2010）[50]、王法涛（2019）[51]等的研究，测量题项包括“网络效应是平台型企业综合优势形成的关键要素”以及“网络效应是平台型企业综合优势形成的关键要素”等题项；“数字平台型企业综合优势”作为测量依据王宏起（2005）[29]、武建龙（2010）[30]的研究，测量题项包括“市场细分通过刺激网络效应，能提升本企业的竞争优势”以及“平台型企业构建社会网络对企业综合优势的发展起促进作用等题项”；“数字技术”作为测量变依据陈冬梅和王俐珍（2020）[53]的研究，测量题项包括“广泛应用数字技术可以提升网络效应”以及“平台技术算法对发展企业综合优势具有重要作用”等题项；“社会网络”作为测量变依据张红彬等学者（2019）[38]的研究，测量题项包括“社会网络有助于吸引更多用户参与其中”以及“社会网络为企业综合优势发展提供助力”等题项；“平台定价策略”作为测量变依据史丽丽和林军（2020）[45]的研究，测量题项包括“完善的平台定价策略有助于企业更具竞争力”等题项；“平台生态互补性”作为测量变依据王节祥等（2021）[37]的研究，测量题项包括“平台生态互补性能够促进用户规模性增加”等题项；“市场细分机制”作为测量变依据的研究，测量题项包括“价格补贴机制对网络效应的提升有促进作用”以及“精确的市场细分能为本企业建立综合优势提供基础”等题项。

3.2　信效度分析

3.2.1　信度分析

为确保问卷设计的有效性和数据收集质量，对问卷信效度进行了检验，信度检验如下表 1 所示检验结果表明，平台定价策略、数字技术、社会网络、平台生态互补性以及市场细分机制的 Cronbach’s α 系数分别为 0.890、0.874、0.816、0.901、0.842、0.910 和 0.899，其内部一致性系数（Cronbach’s α）大于 0.76，表

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明所有构建体的内部一致性均可接受。

表 1　量表信度检验

变量	题项	Cronbach’s α 系数
PPS	3	0.890
DE	4	0.874
SN	3	0.816
PEC	4	0.901
MSM	3	0.842
NE	6	0.910
DECA	6	0.899

注：PPS 表示平台定价策略；DE 表示数字技术；SN 表示社会网络；PEC 表示平台生态互补性；MSM 表示市场细分机制；DECA 表示数字平台型企业综合优势。

3.2.2　效度分析

效度是对问卷调查准确性进行衡量的指标，问卷结果代表要测验的行为效度效度越高，问卷结果真实度越高。以往研究认为，效度分为内容效度和收敛效度两种。本文采用 AMOS23.0 进行验证性因子分析，对量表的内容效度和收敛效度进行测量。

本文对模型的拟合优度进行检验，如下表 2 所示，$\chi 2/df$ 的值是 1.675，小于 3；RMSEA 的值是 0.047，小于 0.08；IFI、CFI、NFI、TLI 的值分别为 0.957、0.957、0.901、0.950，均高于 0.9，模型拟合结果均符合适配标准，由此可知，所有相关值均处于可接受范围之内，说明各变量之间区分效度较好。

表 2　测量模型的拟合优度

适配指标	评价标准	结果	是否适配
$\chi(^{2/df})$	通常认为适配范围为1~5	1.675	是
RMSEA	越接近0越好，一般要求RMSEA<0.08	0.047	是
NFI	越接近1越好，通常认为NFI>0.9	0.901	是
CFI	越接近1越好，通常认为CFI>0.9	0.957	是
TLI	越接近1越好，通常认为TLI>0.9	0.950	是
IFI	越接近1越好，通常认为IFI>0.9	0.957	是

聚敛效度（Convergent validity）也称为收敛效度，即不同测量方式应在相同特征的测定中聚合在一起。为确保问卷的效度，在对量表进行拟合优度测量后，通过聚敛效度分析了数据的聚合度，分析结果如下表 3 所示。结果表明：所有变量因子系数都大于 0.5，AVE 和 CR 的值均大于 0.7，说明平台定价策略、数字技术、社会网络、平台生态互补性、市场细分机制、网络效应、数字平台型企业综合优势的聚敛效度（convergent validity）理想，说明整体规模组合可靠性较强。

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表 3　验证性因子分析结果

变量	题项	因子载荷	AVE	CR
PPS	PPS1	0.860	0.734	0.892
	PPS2	0.873		
	PPS3	0.837		
DE	DE1	0.885	0.636	0.874
	DE2	0.706		
	DE3	0.779		
	DE4	0.809		
SN	SN1	0.948	0.645	0.842
	SN2	0.681		
	SN3	0.757		
PEC	PEC1	0.838	0.698	0.902
	PEC2	0.851		
	PEC3	0.789		
	PEC4	0.861		
MSM	MSM1	0.740	0.646	0.845
	MSM2	0.819		
	MSM3	0.849		
SN	SN1	0.864	0.635	0.911
	SN2	0.870		
	SN3	0.890		
	SN4	0.611		
	SN5	0.845		
	SN6	0.652		
DECA	DECA1	0.763	0.601	0.900
	DECA2	0.853		
	DECA3	0.820		
	DECA4	0.718		
	DECA5	0.744		
	DECA6	0.744		

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3.3 相关性分析

由下表 4 可知，平台定价策略、数字技术、社会网络、平台生态互补性、市场细分机制、网络效应与数字平台型企业综合优势之间具有明显相关性（$P < 0.01$）。同时，各潜变量相关系数小于 AVE 的平方根，并均小于 0.6，说明潜变量间存在一定相关性和区分度，说明潜变量的区分效度良好。

表 4　Pearson 相关矩阵（n=302）

	PPS	DE	SN	PEC	MSM	NE	DECA
PPS	0.857						
DE	0.374**	0.797					
SN	0.237**	0.315**	0.803				
PEC	0.319**	0.489**	0.298**	0.835			
MSM	0.231**	0.357**	0.137**	0.367**	0.804		
NE	0.463**	0.556**	0.367**	0.477**	0.375**	0.797	
DECA	0.492**	0.59**	0.377**	0.527**	0.408**	0.565**	0.775

注：* 表示 $P < 0.05$、** 表示 $P < 0.01$、*** 表示 $p < 0.001$，对角线表示各变量 AVE 的值。

4　数据分析与验证假设

本研究用 Amos.24 软件验证所提出的假设，根据表 4 整体模型拟合优度可知，本文构建的假设模型在适配范围内，通过结构路径分析，进一步明确了自变量与因变量之间的作用路径系数，路径结果如图 2 和表 5 所示。

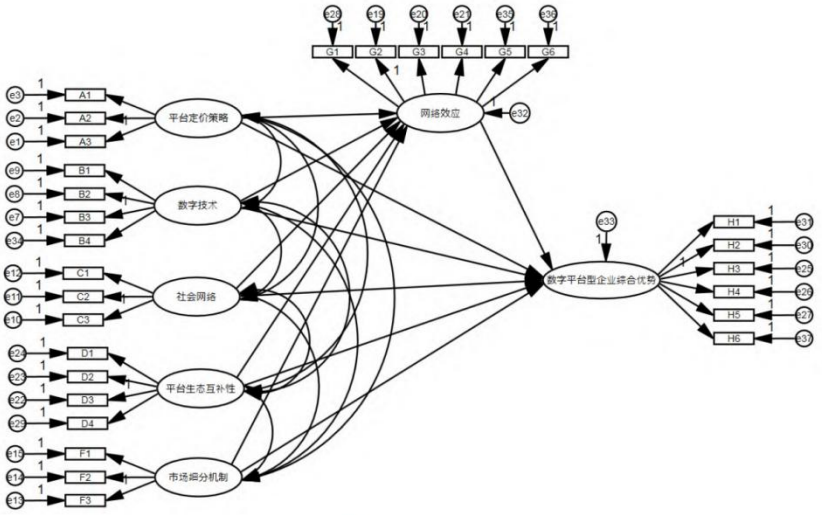

图 2　路径检验图

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表 5　结构方程路径系数分析结果

关系路径	标准化路径系数	T	P值	检验结果
PPS→DECA	0.213	3.778	***	成立
DE→DECA	0.258	3.923	***	成立
SN→DECA	0.121	2.329	0.020	成立
PEC→DECA	0.180	2.983	0.003	成立
MSM→DECA	0.130	2.326	0.02	成立
PPS→NE	0.234	4.173	***	成立
DE→NE	0.292	4.508	***	成立
SN→NE	0.152	2.860	0.004	成立
PEC→NE	0.165	2.686	0.007	成立
MSM→NE	0.135	2.365	0.018	成立
NE→DECA	0.144	2.186	0.029	成立

由表 5 可知：平台定价策略、数字技术、社会网络、平台生态互补性、市场细分机制对数字平台型企业综合优势的标准化路径系数分别为 0.213、0.258、0.121、0.180、0.130，且 P 值都小于 0.05，说明平台定价策略、数字技术、社会网络、平台生态互补性、市场细分机制都与数字平台型企业综合优势相关，并呈现出显著的正向影响关系，假设 H1a~H1c 以及 H2a~H2b 成立；平台定价策略、数字技术、社会网络、平台生态互补性、市场细分机制对网络效应的标准化路径系数分别为 0.234、0.292、0.152、0.165、0.135，且 P 值小于 0.05，说明平台定价策略、数字技术、社会网络、平台生态互补性、市场细分机制与网络效应相关，并呈现出显著的正向影响关系，假设 H3a~H3c、H4a~H4b 成立；网络效应对数字平台型企业综合优势的标准化路径系数为 0.144，且 P 值小于 0.05，说明网络效应与数字平台型企业综合优势相关，并呈现出显著的正向影响关系，假设 H5 成立。

本研究通过 Bootstrap 法检验了网络效应的中介作用，检验结果为显著，对原始数据随机反复的取样，共计 2000 次，并计算 95% 的置信区间，中介效应的标准值及置信区间如表 6 所示。

表 6　中介模型检验结果

路径关系	间接效应值	95%的置信区间	
		上限	下限
PPS→NE→DECA	0.034	0.003	0.085
DE→NE→DECA	0.042	0.004	0.100
SN→NE→DECA	0.022	0.002	0.062
PEC→NE→DECA	0.024	0.001	0.075
MSM→NE→DECA	0.019	0.001	0.058

由表 6 所示，网络效应在平台定价策略、数字技术、社会网络、平台生态互补性以及市场细分机制与数字平台生态系统关系中的中介效应值分别为 0.034、0.042、0.022、0.024、0.019。可见，网络效应在平台定价策略、数字技术、社会网络、平台生态互补性、市场细分机制与数字平台型企业综合优势关系中存在中介作用，因此，假设 H6 成立。

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5 结论与展望

本研究基于产业组织理论和核心能力理论，分析了数字平台型企业综合优势形成的影响因素。参照定位学派和核心能力学派对企业竞争优势的来源进行了探讨，提取出数字平台型企业综合优势形成的关键影响因素并构建假设模型，再采用问卷调查方法和结构方程模型加以验证。研究表明，市场定位、价格补贴机制、社会网络、数字技术以及平台生态互补性等都会对数字平台型企业综合优势形成产生积极正向的影响，且网络效应在各关键要素和数字平台型企业综合优势中发挥中介作用。

5.1 研究结论

第一，数字平台型企业综合优势的形成受多重因素的影响，基于产业组织理论与企业核心能力理论，本文通过对所获取的 302 份有效问卷的数据进行实证分析，发现可以将这些对数字平台型企业起到显著促进作用的因素概括为外部环境与结构和内部能力与资源两个方面。

第二，基于产业组织理论，外部环境对平台型企业的发展产生重要影响，对市场准确定位有利于提升企业竞争优势；基于核心能力理论，平台型企业内部独特资源、技术与能力是企业获得竞争优势的主要来源之一。具体地，在平台外部环境与结构方面，市场细分机制与平台生态互补性均对数字平台型企业建立综合优势产生显著的正向影响；从企业内部能力与资源的角度出发，数字技术、平台定价策略以及社会网络正向促进数字平台型企业综合优势的建立。

第三，数字经济背景下产生的平台组织，其需求特性驱使网络效应的产生，并获得持续竞争力和更大效益，如同大工业经济条件下，成本结构及经济特征决定了生产厂商要提高销售规模、降低单位成本提升规模经济。实证研究的结果显示，网络效应能够积极促进数字平台型企业综合优势的建立，同时在此过程中起中介效应，也就是说，数字平台企业外部环境和内部能力资源通过网络效应的激发和扩大，最终形成综合优势。

5.2 理论贡献与管理启示

本研究验证了网络效应的中介作用，并且讨论了影响数字平台型企业综合优势形成各因素交互状态。科学揭示了数字平台型企业获得持续竞争优势的内在机理，围绕主导优势 - 核心能力 - 综合优势这一脉络框架，深入分析了数字平台型企业综合优势的形成机制，以往学者对企业综合优势的研究集中于实体经济，本文重点研究了虚拟经济，丰富了企业综合优势理论的内容，本文通过对数字平台型企业综合优势的影响因素进行提取，构建数字平台型企业获得持续竞争力的假设模型，为数字平台型企业战略制定具有一定的实践指导意义。

数字平台企业在应对环境的迅速变化和客户需求多变的情况时，构建企业综合优势，提高企业战略管理的柔性尤为重要。其次，网络效应作为数字平台企业的本质特征，在数字平台型企业综合优势形成中起中介作用，因此，激发和扩大网络效应是企业获得竞争优势的关键。最后，数字平台企业要整合企业内部独特的资源与能力，协调企业外部的环境与结构，优化资源配置，增强企业综合竞争力。

5.3 研究不足与展望

本文对数字平台型企业综合优势的内在机理进行了研究，对平台企业战略制定和实施具有一定实践指导意义，但在研究中还存在一些不足。比如本文在探讨数字平台型企业综合优势形成的影响因素，还会有其它层面的限制因素，例如平台生态治理层面中，平台治理能力和生态化治理政策也会对数字平台企业综合优势产生影响。同时，在对内部和外部主要影响因素进行提取时，只是针对部分因素进行研究，内外部影响因素涵盖不全，比如平台技术接受能力和外部风险管理能力也影响数字平台企业综合优势的形成，未来可以考虑采用案例研究，尤其是多案例对比研究的方式来识别相关影响因素。此外，本文的数据来源于针对数字平台型企业进行的问卷调查，主观性较强，目前针对数字平台型企业的研究，也大多为质性研究，未来可以用上市企业所披露的客观数据来对数字平台型企业综合优势的形成机制进行进一步的研究，或者以此研究为基础开发出科学衡量数字平台型企业综合优势的量表。

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Analysis on the Influencing Mechanism and Core Competency of Digital Platform Enterprises

XU An-feng, CHEN Ji-ming, LI Yue

Abstract: Under the background of digital economy, platform-based enterprises have shown the development trend of fierce competition to cope with the current " UACC " management environment. More and more platform enterprises begin to seek ways to obtain sustainable competitive advantage. This paper, guided by the strategic management theory of enterprise's comprehensive advantages and taking the antecedents and mechanism of the formation of comprehensive advantages as a scientific problem, conducts an empirical study using SEM. It is found that market segmentation mechanism, platform pricing strategy, social network, digital technology and ecological complementarity of platforms would have a positive impact on the formation of digital platform-based enterprises' comprehensive advantages, and the network effect plays a mediating effect in the formation of digital platform-based enterprises' comprehensive advantages.

Keywords: the network effect; platform enterprise; comprehensive advantages of enterprises

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国内统一连续出版物号：CN 10－1286／F
国际标准连续出版物号：ISSN 2095-9397

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专辑名称：经济与管理科学
专题名称：贸易经济
出版文献量：43695篇

评价信息

(2023版)复合影响因子：2.616
(2023版)综合影响因子：1.261
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——基于注意力经济视角

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内容摘要：本文根据SOR理论，探究直播带货模式影响消费者注意力留存进而提高购买率的作用机制，探索直播带货营销模式影响消费者购买意愿的因素，构建消费者购买决策模型。在此基础上，采用问卷调查方法收集数据进行实证研究，研究结果表明直播电商中交互性与意见领袖对网络信任、感知价值与情感价值均具有显著正向影响；优惠促销正向影响感知价值与情感价值，负向影响网络信任；娱乐性正向影响情感价值，负向影响网络信任；内容优质正向影响感知价值。同时，网络信任、感知价值、情感价值对消费者购买意愿具有显著正向影响。

关键词：直播带货；注意力经济；消费者购买决策；SOR理论

中图分类号：F713 **文献标识码：**A **文章编号：**2095-9397（2024）01-0083-04

文章著录格式：徐岸峰，刘紫辉．直播带货情境下消费者购买决策的影响因素——基于注意力经济视角[J]．商业经济研究，2024（1）：83-86

研究背景与理论基础

2020年，人力资源和社会保障部发布《关于对拟发布新职业信息进行公示的公告》，并提出“互联网营销师”这一新兴职业，将其定义为在数字化信息平台上，运用网络的交互性与传播公信力，对企业产品进行多平台营销推广的人员。直播带货是名人或网红以直播的形式，基于其流量变现的能力，对商品进行介绍与展示，并与消费者互动，为消费者提供引导、咨询与答疑，以激发消费者购买行为的一种营销方式。直播带货打破了传统营销的局限，极大提升了产品的曝光程度，让消费者的选择更具有多样性和针对性。在直播带货情境下，如何在发挥消费者主体能动性的基础上吸纳其注意力，并将这种注意力转化成直播场景中的消费行为，是直播电商建构直播营销策略的重要内容。

消费认同的本质是消费者通过对某种商品和服务的时间与金钱交易，来构建、维系与强化自己所认同的某种特定社会身份，其目的在于让自己能够呈现出目标社会身份拥有者所具备的一系列特征。消费者在直播间的购买行为是体现消费者认同的表现形式，通过购买消费行为表明其所认同的社会身份。关于直播带货情境下的消费认同研究，现有学者指出在观看直播过程中，可信性会使消费者对主播所讲解的内容产生一种在现实生活中购物聊天的亲切熟悉感、信任感。价值感知表明用户在感知能满足自己需求的基础上形成一种价值认同的心态。观看直播能够激发消费者社会临场感，使消费者在情感上与其产生深层联结，通过唤起对网红及其推荐产品的认同感提高对产品的购买意愿。总结、梳理相关文献发现，信任、感知价值、情感价值等因素可以促进消费者机体的认知变化，形成消费认同，产生购买意愿。

注意力经济下直播带货过程的内在机制表现为流量驱动，其是直播带货发展的关键因素，高流量值与转化率是迅速发展的基础。直播带货的高流量可以拉动消费力量，进而增加产品销量。直播带货的内在机制即通过主播或直播内容来吸引流量，并借助一系列营销方式或手段让消费者注意力留存，从而让消费者停留在当前的直播间。停留在直播间的消费者会根据自身的需求及价值认知产生消费者认同感进而萌生购买欲望。简言之，直播带货内在营销机制的核心是吸引流量后将消费者注意力留存，使其停留在直播间，并通过主播或直播内容让消费者对主播以及直播产生认同感，刺激其购买意愿进而产生购买行为，以此来提高电商直播企业整体的营销效率。

SOR理论表明环境刺激会影响人的认知、情感及行为。S（Stimulus，刺激）代表外界对个体的影响。O（Organism，机体）代表个体内部的状态，包括感觉、情感和认知。R（Response，反应）是个体受环境刺激和内部心理影响后的行为结果。SOR模型关注人的情感、认知，已经被广

基金课题：国家自然科学基金项目（72174045）；黑龙江省自然科学基金项目（LH2021G013）；黑龙江省哲学社会科学研究规划项目（21GLB064）

泛地应用于人类行为意向系统分析。有学者将刺激视为消费者在直播带货中视觉与听觉获得的体验总和，在机体的调节作用下，刺激会影响机体反应，使消费者出现接近或回避行为。直播带货影响消费者购买决策行为的机理即吸引消费者注意力留存－消费认同－购买行为的过程。根据SOR理论，个体受到直播间内的外界刺激，在心理或情感上会发生反应，进而影响购买意愿。因此，本文基于SOR（刺激－有机体－反应）理论模型，探究直播带货情境下消费者购买决策的影响因素具有一定的契合性。

变量定义与研究假设

交互性对网络信任、感知价值与情感价值的影响。直播作为一种可以实现双向交流的交流形式，改变了传统电商平台上图文单向交流的模式。在直播带货中，消费者可以通过弹幕形式与主播进行互动，这使得他们能够处于一个交互性较强的环境中。研究证明直播间内主播与消费者即时信息交流的高效性有助于消费者建立信任感。社交互动在社会化商务环境下会对消费者信任造成影响。交互性作为一种网红特质，相关研究发现网红个人特质越强，消费者对其推荐产品的感知价值与情感价值越高。基于此，提出假设：

H1a：直播带货中交互性正向影响网络信任。

H1b：直播带货中交互性正向影响感知价值。

H1c：直播带货中交互性正向影响情感价值。

优惠促销对网络信任、感知价值与情感价值的影响。在优惠促销与消费者信任的关系中，发现价格折扣对消费者信任有显著影响。价格折扣会给消费者带来更高的感知价值。在电商直播中，价格折扣可以激发消费者的愉悦感与唤起感。基于此，提出假设：

H2a：直播带货中优惠促销正向影响网络信任。

H2b：直播带货中优惠促销正向影响感知价值。

H2c：直播带货中优惠促销正向影响情感价值。

娱乐性对网络信任、感知价值与情感价值的影响。伴随人们生活水平的提高，消费者购物不单是自身购物的需求，更是多元化娱乐体验的获得方式。研究表明消费者的感知娱乐性会显著增强感知到的信任。对感知价值分析时指出，社会娱乐性会对感知价值产生正向影响。直播间增设娱乐性环节，可以增强消费者的心流体验，形成情感共鸣。基于此，提出假设：

H3a：直播带货中娱乐性正向影响网络信任。

H3b：直播带货中娱乐性正向影响感知价值。

H3c：直播带货中娱乐性正向影响情感价值。

优质内容对网络信任、感知价值与情感价值的影响。内容优质指消费者在直播带货中获取到的与产品相关的大量信息，这有助于增强消费者对产品某些方面的了解。输出高质量的直播内容可以展示商家的能力，从而获取消费者的信任。主播可以直观、立体、全方位地展示商品，并根据用户的提问与需求相应地进行专业回答，让消费者直观感受产品的功能价值。通过不断为消费者提供优质内容，直播电商可以与消费者之间建立起一定的情感关系。基于此，提出假设：

H4a：直播带货中内容优质正向影响网络信任。

H4b：直播带货中内容优质正向影响感知价值。

H4c：直播带货中内容优质正向影响情感价值。

意见领袖对网络信任、感知价值与情感价值的影响。直播带货中不乏一些具有影响力和专业知识的明星、网红与权威人士，这些人可被称为意见领袖。意见领袖不仅能够通过自身专业性的知识，以及与消费者的持续互动获得他们的信任，还可以提升消费者的感知价值。同时，意见领袖的知名度有助于增强消费者的情感价值感知。基于此，提出假设：

图1 理论模型

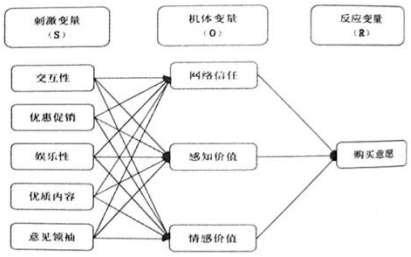


表1 信度与效度检验结果

变量	测量项	Cronbach's α	KMO	因子载荷
交互性	A1	0.882	0.789	0.896
	A2			0.922
	A3			0.872
优惠促销	B1	0.843		0.852
	B2			0.879
	B3			0.883
娱乐性	C1	0.858		0.851
	C2			0.884
	C3			0.904
内容优质	D1	0.886		0.872
	D2			0.914
	D3			0.918
意见领袖	E1	0.883		0.901
	E2			0.897
	E3			0.885
网络信任	F1	0.884	0.738	0.897
	F2			0.920
	F3			0.896
感知价值	G1	0.845		0.836
	G2			0.925
	G3			0.861
情感价值	H1	0.829		0.823
	H2			0.907
	H3			0.858
购买意愿	I1	0.814	0.714	0.860
	I2			0.837
	I3			0.867

H5a：直播带货中意见领袖正向影响网络信任。

H5b：直播带货中意见领袖正向影响感知价值。

H5c：直播带货中意见领袖正向影响情感价值。

网络信任、感知价值与情感价值对购买意愿的影响。直播带货中消费者和商家无法面对面地沟通会造成信息不对称问题，进而增强消费者感知到信息的不确定性和风险性。而观看直播的消费者可全面地了解产品，这会增强他们对产品的信任感，从而提升消费者的购买意愿。既有研究证明，网络商家与消费者建立信任能增加消费者购买意愿。感知价值定义：顾客在获得产品或服务过程中，衡量感知的努力和收获，综合评价感知到的实际效用。整个直播过程中，消费者通过主播介绍与自我观察对产品的功能价值进行感知。基于 SOR 理论，直播带货的刺激会使消费者情感发生变化，进而影响购买意愿。鉴于此，提出假设：

H6：直播带货中网络信任正向影响购买意愿。

H7：直播带货中感知价值正向影响购买意愿。

H8：直播带货中情感价值正向影响购买意愿。

综上所述，本文构建了直播带货情境下消费者购买决策影响因素理论模型，如图 1 所示。

实证研究

（一）问卷设计

本文应用问卷调查方法收集数据，正式调研前小规模发放了 89 份问卷进行预调研，以发现问卷设计中的不合理之处，包括语言畅通、词意理解等方面，保证问卷的科学性和有效性。同时，本文邀请 8 位受访者，并与他们进行交流，以防止问卷项目设计造成他们语言理解上的误解。此外，本文调整了相关用语以使问卷符合网购情境。最后，本文设置了筛选题，用于排除不符合研究情境的调查者，确保数据的可靠性。

（二）数据收集

本文借助在线问卷，通过微信、QQ、购物群、朋友圈等线上渠道转发传播以收集数据，保证样本多样性。共回收问卷 325 份，有效问卷 276 份，有效率为 85%。在被调查者中，男女占比分别为 48.55% 和 51.45%，女性占比相对更高，整体数据符合网络直播购物的基本情况，因为现实情境中观看网络直播与购物的多为女性。年龄方面，20 岁以下占比 12.32%，21–30 岁占比达 44.93%，31–40 岁占比 28.62%，40 岁以上占比 14.13%。在教育程度上，高中及以下学历占 16.30%，专科占 36.96%，本科占 39.13%，硕士及以上学历占 7.6%。样本分布合理，符合直播购物受众情况。职业方面，学生占 25.36%，上班族占 51.09%，这两个群体都有一定的消费能力，同时自由职业者、失业者和其他人的占比较小。消费水平方面，月消费水平 1000 元以下占 12.32%，1001–3000 元占 45.29%，3001–5000 元占 32.25%，5000 元以上占 10.14%。

（三）信度与效度检验

本研究采用 SPSS20.0 进行信度与效度检验，如表 1 所示。在信度检验中，本文各变量的 Cronbach' s α 系数都超过了 0.7 标准，显示出指标信度较为理想；同时，本研究对样本数据进行了 KMO 和 Bartlett 检验，结果表明样本数据达到显著水平，可以进行因子分析。通过因子分析获得各变量对应题项的因子载荷值都大于 0.8，累计方差贡献率大于 70%，表明本文各变量测量指标具有较好的效度。

（四）实证分析与假设检验

本研究应用 AMOS24.0 建立如图 2 模型，并将数据输

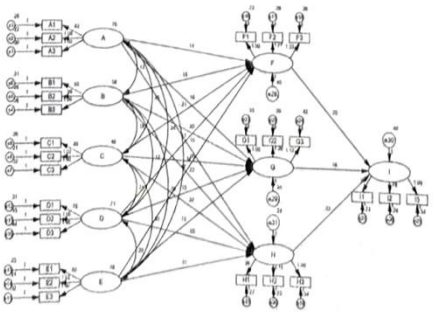
表 2 模型拟合度结果

指标类型	指标名称	评价标准		结果数值	是否符合
		好	可接受		
绝对适配度	CMIN/DF	1< CMIN/DF <3	3< CMIN/DF <5	2.312	符合
	GFI	>0.9	0.7–0.9	0.839	符合
	RMSEA	<0.05	<0.1	0.069	符合
增值适配度	CFI	>0.9	0.8–0.9	0.910	符合
	IFI	>0.9	0.8–0.9	0.911	符合
	TLI	>0.9	0.8–0.9	0.893	符合
简约适配度	PGFI	>0.5		0.657	符合
	PNFI	>0.5		0.719	符合
	PCFI	>0.5		0.767	符合

表 3 假设检验结果

			Estimate	P	检验结果
网络信任	←	交互性	0.135	0.025	支持
网络信任	←	优惠促销	–0.169	0.014	支持（负向）
网络信任	←	娱乐性	–0.205	0.002	支持（负向）
网络信任	←	内容优质	–0.086	0.106	不支持
网络信任	←	意见领袖	0.412	***	支持
感知价值	←	交互性	0.198	***	支持
感知价值	←	优惠促销	0.195	0.002	支持
感知价值	←	娱乐性	–0.110	0.057	不支持
感知价值	←	内容优质	0.173	***	支持
感知价值	←	意见领袖	0.144	0.018	支持
情感价值	←	交互性	0.205	***	支持
情感价值	←	优惠促销	0.257	***	支持
情感价值	←	娱乐性	0.114	0.036	支持
情感价值	←	内容优质	–0.073	0.100	不支持
情感价值	←	意见领袖	0.186	0.001	支持
购买意愿	←	网络信任	0.248	***	支持
购买意愿	←	感知价值	0.180	0.014	支持
购买意愿	←	情感价值	0.330	***	支持

图 2 结构方程模型



入模型，检验模型拟合度，分析变量间的关系，并验证研究假设是否成立。

在检验整个理论模型的拟合程度时，需要考虑绝对适应度指数、增值适应度指数和简单适应度指数。由理论模型矩阵和实际数据矩阵推导绝对适配度，一般用 CMIN/DF、GFI、RMSEA 评价绝对适配度；用 CFI、IFI、TLI 对比假设模型与独立模型的增值适配度；用 PGFI、PNFI、PCFI 评价简约适配度指标，评价结果如表 2 所示。用各指标的评价标准衡量研究结果显示，研究数据结果符合标准，研究理论模型可接受。

用路径系数对应的显著性概率 P 值验证假设关系。$p<0.05$，证明显著相关，假设成立。各变量间验证路径、路径系数及显著性概率 P 值如表 3 所示。结果显示，交互性正向显著影响网络信任、感知价值与情感价值，假设 H1a、H1b、H1c 得到验证；优惠促销正向显著影响感知价值与情感价值，H2b、H2c 得到验证。优惠促销与娱乐性负向影响网络信任，与提出的假设相悖；娱乐性与网络信任、感知价值间无相关，假设 H3a、H3b 未得到验证。娱乐性正向影响情感价值，假设 H3c 成立；内容优质、网络信任、情感价值不存在相关，假设 H4a、H4c 不成立。内容优质与感知价值正向相关，假设 H4b 验证成立；意见领袖积极影响网络信任和感知价值，假设 H5a、H5b 成立。意见领袖与情感价值不相关，假设 H5c 不成立；网络信任、感知价值、情感价值均正向影响购买意愿，假设 H6、H7、H8 得到验证。

结论与启示

本文基于 SOR 理论模型，分别从直播带货平台吸引流量留存消费者注意与消费者认同两个维度挖掘消费者购买意愿的影响因素，通过实证检验直播带货情境下消费者购买决策的内在机制，研究发现：

第一，交互性对网络信任、感知价值和情感价值均有正向影响。在直播带货中，消费者与主播的实时沟通有助于建立起彼此间的信任关系；通过互动，消费者还可以了解产品特性，进而感知产品价值；实时互动还可以满足消费者的陪伴体验与情感需求。因此，直播带货应以提升消费者购买体验为出发点，促进双方积极互动。第二，优惠促销正向影响感知价值与情感价值，负向影响网络信任。直播带货中适当的优惠促销有助于吸引消费者注意力，让其感知到产品的价值。另外，高性价比的产品会激发消费者内在的情感，释放其情感能量。但过度的优惠促销会负向影响消费者对商家的信任，对产品的质量产生怀疑。因此，直播带货时应制定适当的优惠促销力度，以此提升直播间消费者的购买转化率。第三，娱乐性正向影响情感价值，负向影响网络信任，而对感知价值没有影响。轻松有趣的直播内容有助于消费者放松身心，但消费者并不能感受到产品价值，甚至过分的娱乐会让消费者对主播与产品产生抵触心理。因此，直播带货应在增强直播间娱乐性的同时，回归产品本身和主播本身的专业性。第四，内容优质正向影响感知价值，对网络信任和情感价值没有影响。直播带货应统一商品质量标准，给商家或主播提供质量参照，确保商品符合质量标准。商家或主播可根据大数据，在直播间上架销量大的优质商品，增强消费者粘性，培养客户忠诚度。第五，意见领袖对网络信任、感知价值、情感价值均有正向影响。主播影响力强，有利于消费者感知到更高的价值，提高消费者对产品的信任度，使消费者更强烈地感受产品价值，提高成交转化率。注重培养主播专业知识，了解产品领域，并通过媒体网络宣传，提升主播影响力，促进直播收益最大化。第六，网络信任、感知价值、情感价值均正向影响购买意愿。网络信任、感知价值与情感价值是直接影响消费者购买意愿的因素，也是激发消费者认同感的要素。因此，直播电商企业应通过各种直播营销手段促使消费者对产品与主播产生认同感，进而激发消费者购买意愿，提升直播带货营销效率。

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[5]Xu, AF; Jin, L; Yang,JZ Balancing tourism growth, Fintech, natural resources, and environmental sustainability: Findings from top tourist destinations using MMQR approach RESOURCES POLICY 2024, 89: 104670.

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						合计	1

第 **1** 条，共 **1** 条：
标题：Balancing tourism growth, Fintech, natural resources, and environmental sustainability: Findings from top tourist destinations using MMQR approach
作者：Xu, AF (Xu, Anfeng); Jin, L (Jin, Lei); Yang, JZ (Yang, Jingzi)
来源出版物：RESOURCES POLICY 卷：89 文献号：104670 提前访问日期：JAN 2024 出版年：2024 FEB 2024
入藏号：WOS:001162512700001
文献类型：Article; Early Access 出版物类型：J
作者地址：[Xu, Anfeng; Jin, Lei; Yang, Jingzi] Hainan Trop Ocean Univ, Key Lab Isl Tourism Resource Data Min & Monitoring, Minist Culture & Tourism, Tourism Sch, Sanya 572022, Peoples R China.
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电子邮件地址：xuanfengcn@126.com; j_dick0212@163.com; jyang@hntou.edu.cn
出版商：ELSEVIER SCI LTD 出版商城市：London 出版商地址：125 London Wall, London, ENGLAND
Web of Science 类别：Environmental Studies
研究方向：Environmental Sciences & Ecology
IDS 号：HW3T3
ISSN: 0301-4207 **eISSN:** 1873-7641
基金资助机构和授权号：Social science Foundation of Heilongjiang Province [21GLB064]; Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism
基金资助致谢：This work was sponsored in part by 1.Social science Foundation of Heilongjiang Province (21GLB064) ; 2.Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism (KLITRDMM 2024)
JCR 影响因子：

期刊	**JCR** 影响因子	指标年份

RESOURCES POLICY	10.2	2022

JCR 期刊分区：

数据库	**JCR** 学科类别	类别排序	类别分区	指标年份
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1	**Xu, AF**; Jin, L; Yang, JZ	Balancing tourism growth, Fintech, natural resources, and environmental sustainability: Findings from top tourist destinations using MMQR approach	***RESOURCES POLICY*** 2024, 89: 104670.	Y	J Article	WOS:001 16251270 0001
					合计	1

第 1 条，共 1 条：

标题： Balancing tourism growth, Fintech, natural resources, and environmental sustainability: Findings from top tourist destinations using MMQR approach

作者： **Xu, AF** (**Xu, Anfeng**); Jin, L (Jin, Lei); Yang, JZ (Yang, Jingzi)

来源出版物： RESOURCES POLICY **卷：** 89 **文献号：** 104670 **提前访问日期：** JAN 2024 **出版年：** FEB 2024

入藏号： WOS:001162512700001

文献类型： Article **出版物类型：** J

作者地址： [Xu, Anfeng; Jin, Lei; Yang, Jingzi] Hainan Trop Ocean Univ, Key Lab Isl Tourism Resource Data Min & Monitoring, Minist Culture & Tourism, Tourism Sch, Sanya 572022, Peoples R China.

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出版商： ELSEVIER SCI LTD **出版商城市：** London **出版商地址：** 125 London Wall, London, ENGLAND

Web of Science 类别： Environmental Studies

研究方向： Environmental Sciences & Ecology

IDS 号： HW3T3

ISSN: 0301-4207 **eISSN:** 1873-7641

基金资助机构和授权号： Social science Foundation of Heilongjiang Province [21GLB064]; Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism

基金资助致谢： This work was sponsored in part by 1.Social science Foundation of Heilongjiang Province (21GLB064) ; 2.Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism (KLITRDMM 2024)

ESI 高被引论文： Y

ESI 热点论文： Y

End

Resources Policy 89 (2024) 104670

Contents lists available at ScienceDirect

Resources Policy

journal homepage: www.elsevier.com/locate/resourpol

Balancing tourism growth, Fintech, natural resources, and environmental sustainability: Findings from top tourist destinations using MMQR approach

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ARTICLE INFO

Keywords:
Environmental sustainability
Fintech
Natural resources
Tourism
MMQR

ABSTRACT

There have been unprecedented efforts from various countries to address the precarious condition of the environment. Despite the efforts, there have been very insignificant results as natural calamities continue to rise and cause severe destruction all around the world, from China to all the way to Australia. This study used an MMQR to identify the impact of Fintech (FNT), Natural Resources (NTR) and Tourism (TOR) on Environmental Sustainability (ENS)in top tourist destination countries, including China, Japan, Australia etc. The results indicate that the FNT can address the rising environmental problems, while using NTR and TOR would increase pollution and negatively affect the ENS. Tourist activity can help boost foreign reserves but result in increased CO2 emissions. The study recommends the use of CO2 emission standards for the TOR industry to ensure that firms within the hospitality industry are forced to shift towards sustainable practices. The use of sustainable practices must be seen as an attractive proposition over unsustainable differentiation over its rivals in the hospitality market. Furthermore, FNT can be used to finance green tourism projects to attain sustainable economic growth in the long run.

1. Introduction

There has been an intense focus on the emissions and pollution related to industrial activity. Governments all around the world are focusing on the development of renewable energy to ensure that there is a reduction of greenhouse gases. Industries are being levied with carbon tax and carbon emission limits to tackle the environmental crisis which is engulfing the world. The example of Inflation Reduction Act in the USA is an ideal example of different legislation being used to promote the use of renewable energy and reduce dependence on fossil fuels (Rajagopalan and Landrigan, 2023). There has been serious development from China, which is widely regarded as one of the top contributors towards CO2 emissions all around the world, to tackle environmental damage. The efforts include increased use of renewable energy, development of green cities and a host of other initiatives (Orru et al., 2017).

Despite efforts from different countries, the environmental calamities due to global warming continue to mount all around the world (You and &Kakinaka, 2021). The recent floods in Libya resulted in more than 11000 deaths, with human bodies seen shoring up on oceans. There is widespread concern about the spread of other water-related diseases, which can affect hundreds and thousands of people in the country (Michaelson, 2023; Ali et al., 2022; Esmaeil et al., 2020; Arfaoui and Yousaf, 2022). Similarly, the floods in the southern hemisphere of Australia also resulted in an insurance payout of more than $6 billion to cover the damage of floods in Queensland and New South Wales (Hannam & correspondent, 2023). In addition, the earthquake in Morocco caused severe devastation across the country. The calamity resulted in the death of more than 2000 people, and the damage to homes and shelters resulted in families spending their lives under open skies (Eljechtimi, 2023). The biggest implications of the environmental problems are not region-centric but are affecting the whole world. All countries, irrespective of their location, are being harmed due to the falling standards of ENS, and it is high time that the issue is addressed for the good of mankind and future generations.

Countries all around the world are focusing on increasing their economic growth, which helps to bankroll their development in their economy (Malik et al., 2019). The increase in money supply in the form

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https://doi.org/10.1016/j.resourpol.2024.104670
Received 17 October 2023; Received in revised form 25 December 2023; Accepted 8 January 2024
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of increased investments would result in enhanced commercial activity. This improves the productivity of the company. The rise in the production levels results in a rise in the level of pollution (Yan et al., 2022; Ramzan, 2021; Dilanchiev and Taktakishvili, 2021; Saungweme and Odhiambo, 2021; Gohar et al., 2022; Adebayo et al., 2022). Production increase is coupled with increased consumption levels, which increases the pollution levels. GDP growth can have a detrimental impact on the ENS level of a country. Governments all around the world are looking for ways to tackle the environmental issues related to economic growth and maintain economic harmony. There is a strong need to develop a mechanism that can help maintain overall economic growth and ensure that it does not have an everlasting effect on the environment. Due to the importance of economic development for a country, there must be a mechanism to help develop the economy and ensure that ENS is achieved (Zeng and Zhou, 2021).

TOR is often seen as a saviour for the development of the economy in many countries. The arrival of foreign tourists from all around the world helps to have a positive impact on the economy, as Fig. 1 suggests the rise in the level of TOR. The hospitality sector can help to reinvigorate the economy through the arrival of tourists. Providing services to tourists helps improve employment levels in the economy and raises government consumption levels and taxes for the government (Xiong et al., 2022; Tiwari et al., 2021; Ali et al., 2022; Noman et al., 2023; McAleer, 2021; Naqvi et al., 2022; Yang et al., 2022; Yıldız et al., 2023). All these directly benefit the government coffers, which can then be used for the development of infrastructure and grow the economy in the long run. The economic benefits of TOR are numerous, and governments all around the world are investing in promoting tourism through various mechanisms, including destination marketing and even sponsoring the destinations to promote the overall tourism sector of the economy (Adebayo et al., 2022a,b).

In the quest for the development of the economy, governments all around the world are trying to attain financial growth. The financial growth results in firms allowing greater money supply in the economy. The rise in the money supply means increased investments, which eventually results in enhanced production and consumption (Al Hammadi and &Nobanee, 2019). The cost of increasing the economic output of the economy results in serious environmental damage related to production and consumption as the people have a greater amount of funds to spend. However, the ill effects of financial growth can be mitigated through the efficient use of FNT in an economy (Lv, et al., 2019; Li, et al., 2021; Rjoub et al., 2021; Yang et al., 2022; Ly, et al., 2022; Nguyen et al., 2021; AwosusiLiu et al., 2023). Using technological advancements to channel the funds for green growth and investment can be one of the key ways the ENS can be achieved in an economy. The use of blockchain, AI, and IOT can be game changers in the banking industry regarding financial services and inclusion. FNT advances to fuel sustainable growth can be one of the best ways an economy can reduce its CO2 emission levels and achieve greater sustainability in the long run (Chueca Vergara &FerruzAgudo, 2021).

The use and extraction of NTR can be considered as one of the root causes of pollution and rising levels of greenhouse gases. The use of fossil fuels to generate power for running factories and the fuel used by vehicles for the transportation of goods and people all lead to a rise in a tremendous amount of harmful gases, which would have a detrimental impact on the ENS levels of countries (Arslan et al., 2022). For the case of top tourist destinations, the extraction and use of NTRs becomes an even more acute problem as the tourist activity would lead to exhaustion of NTR. The arrival of tourists would also lead to increased levels of consumption, which could then lead to greater waste, too. Thus, the rivers and oceans, which are an integral part of NTR, would also be affected severely. The problem becomes even more complicated when NTR-dependent countries use NTR rent to fuel their economy. The use of unsustainable energy results in increased environmental issues for a country. The dependence on funds from the export of NTR is one of the key reasons why countries are looking for alternative revenue to fund their expenses (Theodoridis et al., 2023).

The top tourist destination countries, including Australia, Japan, China and many others, face the cauldron of maintaining ENS standards and ensuring their tourist industry is not negatively affected. Energy usage from the tourist industry in China has increased at an alarming rate (Wu et al., 2023). The increasing use of energy usage would directly lead to an increase in the level of carbon emissions. The issue of preserving the natural habitat in tourist destinations is another complex problem, as the rise in commercial activity can lead to the extinction of rare animals and plants. Tourist transportation, including the emissions related to air travel, transporting from one place to another, can be significant as far as the pollution levels are concerned. There is a strong need to develop a mechanism to ensure tourism growth without hampering the ENS of top tourist destination countries. The contribution to the economy of TOR is a major stumbling block as a huge portion of the population comes from income generated from TOR. Curbing TOR might be an ideal solution for eradicating ENS issues, but the financial impact might be difficult for many economies (Adebayo et al., 2022a,b).

The main contribution of this study has been to identify the impact of FNT, NTR and TOR on ENS in top tourist destinations. This can help the countries develop meaningful practices that can help maintain robust growth in their tourism and attain ENS objectives, too. The tourism activity is one of the top revenue earners for these countries. The contribution of environmental pollution related to tourism can have a

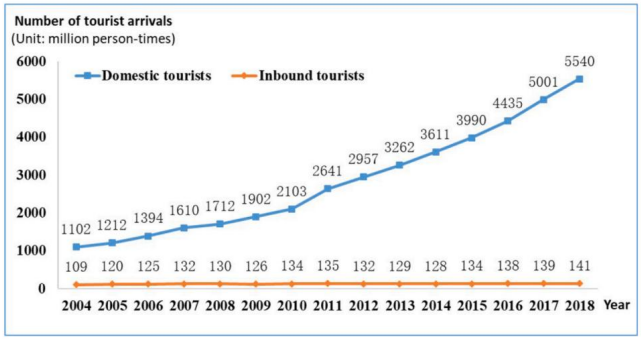

Fig. 1. Rising number of tourists in China source (Dong et al., 2019).

negative long-term impact on the ecological balance of the countries but can also affect their future revenues if the natural areas are negatively affected by tourist activity. The focus on top tourist destination countries can help to reduce the emissions and environmental problems associated with tourism to be addressed and can play a vital role in the achievement of ENS in the long run. The use of the MMQR approach would help to develop strong and impactful recommendations which can help businesses and policymakers alike in their quest for ENS (Jahanger et al., 2023).

The rest of the research is designed with Section2 consisting of a thorough analysis of the literature, Section3 includes the methodology, Section 4 comprises the results of the study,and the concluding Section 5 includes a summary and recommendations.

2. Literature review

2.1. Fintech and environmental sustainability

The role of FNT in promoting green finance and green investment has been widely accepted. Using cutting-edge technology like AI, IoT, and Big data helps financial institutions deliver the finance needed for green growth in a much-reduced lead time (Muganyi et al., 2021). Technology can help speed up the process of assessing the creditworthiness of the customers and ensure that the finance required for sustainable projects is improved. Thus, using FNT within an economy might help promote green growth in the economy (Ren et al., 2020). The use of digital payments, digital signatures, etc.,is acting as a game-changer for the financial industry as far as the reduction in carbon footprint and the transition towards improved efficiency of energy use (Liu and You, 2023). The state-of-the-art technology is reducing the use of physical travel of customers as the online payment system can handle all the transactions (Xu et al., 2022). Similarly, the use of digital signature can also help facilitate payments to ensure that businesses can transfer and receive payment with minimal hassle (Afonasova et al., 2019).

According to Chueca Vergara and FerruzAgudo (2021), FNT is revolutionizing the traditional financial system through digitalization. The use of FNT can help to achieve sustainability through the use of green finance. Similarly, Al Hammadi and &Nobanee (2019) state that using FNT can help improve the efficiency and cost-effectiveness of financial institutions. This can contribute to increased sustainability of financial institutions of the economy. There has been increased focus from firms to employ FNT to improve their operational efficiency and ensure that they are able to maintain innovation and competitiveness in their operations. Toumi et al. (2023) studied 48 FNT-based companies and 140 non-FNT companies. The results showed that FNT firms had a 78.4% better performance when compared to the firms who have not been using FNT. Furthermore, the use of environmental disclosure is an important cue as far as the market performance is concerned.

Tian et al. (2023), who conducted their study on more than 280 firms in Bangladesh, state that implementing FNT and promoting green transformational leadership can help improve a company's sustainability practices. The authors underlie the importance of technological innovation in a firm's quest for sustainability. FNT can help to raise green finance through the development of the green investment market. The use of technology can play a vital role in ensuring that fraud and other types of problems are eradicated. Crowdfunding, which focuses on collecting small amounts from many people, can be an ideal way to find investments for green growth projects like the transition to renewable energy, green cities, etc. (Böckel et al., 2020). The less-tapped market of small investors can be incorporated into the financial industry, which can be used to ensure that an economy is not only able to achieve economic development but also achieve ENS in the long run (Maehle et al., 2020). Thus, based on the above discussion, FNT affects ENS.

H1. Fintech Affects Environmental Sustainability

2.2. Natural resources and EnvironmentalSustainability

The use of NTR is often seen as one of the primary causes of environmental degradation. Non-renewable energy sources like coal and oil emit harmful gases into the environment, increasing global pollution and putting a severe strain on the quest to achieve ENS (Glynn et al., 2017). To address this concern, there has been a global shift towards the use of renewable energy like solar power, wind power, etc. The environmental Kuznet curve might be seen as an explanation for the degradation of the environmental standards in developing countries (Iqbal et al., 2023a, 2023b). However, the biggest question is whether the environment can withstand any further damage (Arslan et al., 2022).

The issue of NTR rent is an important reason behind the continued rise in the extraction and the use of NTR. The finances generated from the use of the extraction of NTR can be one of the key sources of government revenue. Furthermore, the NTR extraction would be providing employment opportunities for a major portion of the population. This is one of the major reasons why governments are not able to transition towards renewable energy in fear of an economic catastrophe. On the other hand, with the view of economic development, governments are taking steps to expand the economy by promoting firms' productivity and production capacity. This has led to increased demand for energy, which is fulfilled by NTRs like oil or coal (Glynn et al., 2017). The consumption of these sorts of fuels would lead to severe GHG emissions and would have a detrimental impact on ENS levels (Theodoridis et al., 2023). Similarly, the extraction of metals also leads to contamination of water resources, which would cause drinking water shortages and can lead to the extinction of marine animals. Thus, based on the discussion, it can be stated that NTR has an impact on ENS.

H2. Natural Resources Affect Environmental Sustainability

2.3. Tourism and EnvironmentalSustainability

According to Gössling et al. (2015), the amount of CO2 emissions by the tourism industry is clearly outweighed by the efforts made to offset the environmental issues. This is one of the key issues which must be considered due to the rising levels of pollutants worldwide. Global tourism is expected to contribute nearly 5% of the total worldly pollution or environmental degradation. Similarly, Sun et al. (2022) state that TOR increases CO2 levels and suggests ways to reduce pollution related to TOR. Most international tourists arrive by air, which can be a major contributor to CO2 emissions. A single flight from Europe to Australia would result in 2 tons of CO2 emission. Thus, as far as the impact on the environment is concerned, the role of TOR can be detrimental towards ENS (Gössling et al., 2015). Perch-Nielsen et al. (2010) based their study on Switzerland, which can be considered one of the top tourist destinations in the world. The state that the tourism sector in Switzerland emits four times more greenhouse gases than all the industries combined in the country.Meng et al. (2016), who studied the emissions related to the Chinese tourism industry, also found that the emissions from the tourist-related industry are on an increasing trend. There have been similar results from G7 economies.

Ghosh et al. (2022), based their study on G7 countries and used the FOMLS method, state that TOR would have a detrimental impact on ENS levels in the countries. Similarly, Higham et al. (2016) state that the ancillary services like catering, transportation, hotel accommodation, etc., which are essential for providing quality TOR services, are detrimental to ENS due to their contribution towards emitting greenhouse gases. This trend is also evident in China. According to Zeng et al. (2021), the tourism tourism-induced economic growth can lead to a negative impact on ENS in the country. They claim that the development of infrastructure and other related facilities can lead to poor air quality in the long run. In the same vein, Xiong et al. (2022), who used the ARDL approach and based their study on the USA, state that the tourism and hospitality industry contributes toward CO2 emissions can be one of the

key determinants of pollution in the country. They further concluded that the food and drink sector was a bigger contributor towards GHG emissions when compared to the hotel industry. There is considerable evidence to suggest that TOR can lead to increased use of NTRsand increased consumption, which would have a direct impact towards falling ENS in countries (Zhang and Lu, 2022). Thus, it can be stated that TOR affects ENS.

H3. Tourism affects Environmental sustainability

3. Methodology

Whenever there is a study that follows the methodology of panel data, such studies are highly influenced by the presence of heterogeneity, which is extremely normal because of the difference in the panel data's cross sections. However, capturing and recognizing such heterogeneity during the analysis is extremely important so that the generated outcome is considered free from any biases and inflation that may be caused by such heterogeneity. This is one of the major limitations that most statistical techniques have in that they fail to capture and recognize such heterogeneity, leading to misleading outcomes. Besides, when it comes to Quantile-based methodologies, because of the operational framework where the relationships coefficients are generated due to drawn connection with the quantiles, the possibility of inflated outcome due to heterogeneity reduces significantly (Sarkodie&Strezov 2019). Historically, studies involving quantile estimations in panel settings can be found from the 1970s (see Koenker and Bassett, 1978). Since then, continuous improvisation, innovation and advancements in the Quantile-based methodologies have proven their legitimacy and robustness. Besides, even if the dataset has the presence of outliers, the Quantile-based methodologies, irrespective of being grounded on the Ordinary Least Square (OLS) framework, due to operational linkage through quantiles, remain capable of generating insightful, reliable, robust and consistent findings.

Within the Quantile-based methodologies, there are a number of alternatives that can be selected, along with having different pros and cons. Among them, one of the most innovative, recent and latest alternatives is the "Method of Moments Quantile Regression" (MMQR), which is operationalized by Machado and Silva (2019). This technique is unique because of its foundational framework, rooted in the co-variance-based methodology that further expands the statistical competency of a technique in handling data operational issues like heterogeneity and outliers (Canay, 2011; Koenker, 2004). Besides, this technique is superior in situations where the final outcome is heavily influenced by fixed effects. Moreover, during the estimations of quantiles, the overlapping among the parameters becomes obvious, further strengthening the legitimacy and validity of the generated outcome. The generated outcome of the Quantile estimations, which are subjected to $Q_y(\tau/X)$ can be mathematically expressed as shown in Equation (1).

$$Y_{it} = \alpha_i + X_{it}^{'}\beta + \left(\delta_i + Z_{it}^{'}\gamma\right) U_{it} \tag{1}$$

Referring to Equation (1), the parameters that are estimated and their respective probability levels can be further explained as $P\{\delta_1 + Z_{it}^{'}\gamma > 0\} = 1.(\alpha, \beta^{'}, \delta, \gamma^{'})^{'}$. Moreover, the fixed effects which are computed due to the cross sections are represented by i, which is further explained as $(\alpha_i, \delta_i), i = 1, \ldots, n$. In addition, the studied components are represented by X, which will generate of certain vectors represented by k. Although these vectors are assumed to be known, they are generated through differentiation at the module level l, which is why they are explained by Z. Mathematically, they are reflected as Equation (2).

$$Z_l = Z_l(X), l = 1, \ldots, k \tag{2}$$

Here, it is crucial to note that the distribution followed by X_{it} is similar to the distribution of the cross sections (i) in the given time period (t).Similarly, the distribution followed by U_{it} is similar to the distribution of the cross sections (i) in the given time period (t). Through these types of estimations, the outcome remains more generalized, whereas the conditions of the momentary characteristics are also satisfied without disturbing the legitimacy of any predictor variable(s) that breaks and trends could have influenced. Moreover, the integration of the parameters with X_{it} lead to the nature of orthogonal characteristics. Based on these, the equation is reconfigured and is shown as Equation (3).

$$Q_y(\tau / X_{it}) = (\alpha_i + \delta_i(\tau)) + X_{it}^{'}\beta + Z_{it}^{'}\gamma q(\tau) \tag{3}$$

Referring to Equation (3), $X_{it}^{'}$ represents the vector of thepredictor variable(s). In addition to this, to improve the consistency among the generated outcomes, a natural log of the variables was taken, which ensures that the variable remains standardized. Moreover, the quantile of the dependent variable is reflected by $Q_y(\tau/X_{it})$. The natural log form is represented by Y_{it}, which are subjected to the order of thepredictor variable(s). Furthermore, during the computation of the quantiles, the fixed effects and scalar coefficients are also constructed for the cross sections (i) in the given time period (t). This is further elaborated through $X_{it}^{'} - \alpha_i(\tau) \equiv \alpha_i + \delta_i q(\tau)$. Besides, MMQR is different from the conventional OLS-based estimation techniques on the ground of intercepts of the adjusted cross sections, whereas, in MMQR, there is no such adjustment. This is because the studied factors in MMQR are kept flexible. On the other hand, the heterogeneity, which serves as a statistical issue, assists in quantile-based estimations, especially in the integration assessment and development. The sample quantile for τth that is represented by $q(\tau)$ are estimated by optimizing the generated outcome through:

$$min_q \Sigma_i \Sigma_t \rho_\tau \left(R_{it} - \left(\delta_i + Z_{it}^{'}\gamma\right) q\right) \tag{4}$$

Referring to Equation (4), the evaluation function is estimated through $\rho_\tau(A) = (\tau - 1)AI\{A \leq 0\} + TAI\{A > 0\}$.Besides, Table 1 summarizes the description of the studied variables and their respective sources.

4. Estimations and results

The initial step in any time series-based study is the exploration and understanding of the characteristics of the data, as well as its behaviour. For that reason, the Descriptive Statistics, Normality and the strength of pairwise correlations are assessed. In the outcome of Descriptive Statistics, there was no abnormality found except for the normality itself, which reported the data to fail the condition of the normality. Nevertheless, such failure justifies the case for the application of quantile-based estimation. In terms of the strength of pairwise correlations, none of the combinations reported any serious strengths, which also clarified the possibility of getting influenced by the variables themselves. The outputs of Descriptive Statistics, Normality and pairwise correlations are mentioned in Tables 2 and 3.

The next step involves the assessment of Cross-Section Dependence" (CD) and the presence of unit roots among the data. Whenever there is a study on panel data, the exploration of CD becomes crucial because of

Table 1
Variables description.

Variables	Description	Source
Fintech	Number of Internet users, Domestic credit to the bank sector, and Mobile phone subscribers	WDI
Natural Resources	Natural Resources rent (% of GDP)	WDI
Tourism	The number of international tourist arrivals	United Nations World Tourism Organization
Economic Growth	Gross domestic product- constant at 2015 $US	WDI
Carbon Emissions	CO2 emissions (in metric tons)	WDI

Table 2
Results of descriptive statistics.

Variables	FNT	NTR	TOR	ECG	CO2
Mean	2.030	3.059	4.704	3.024	4.756
Minimum	1.872	1.833	15.948	2.239	4.159
Maximum	2.817	6.724	6.663	6.088	6.036
Std. Dev.	0.501	0.695	1.013	0.684	0.884
J-B Stats	11.841	19.186	18.694	12.674	14.745

Source: Author Estimation.

Table 3
Results of pairwise correlation.

Variables	FNT	NTR	TOR	ECG	CO2
FNT	1.000				
NTR	−0.359	1.000			
TOR	0.354	0.244	1.000		
ECG	0.263	0.338	0.312	1.000	
CO2	−0.274	0.302	0.374	0.241	1.000

"Source: Author Estimation".

the cross-section involvement, which possesses various kinds of similarities. Such similarities or dissimilarities can be due to economic policy, infrastructure, economies' nature, and so on. If such similarity or shared variance is not explained, then the final outcome may not comply with the principles of accuracy and legitimacy (Aziz et al., 2021). Moreover, for the unit root, the selection of "Cross-sectional IPS" (CIPS) is due to its capability of handling and absorbing heterogeneity(Phillips and Hansen, 1990). The CD test's hypotheses propose the presence of CD when the outcome is found statistically significance. On the other hand, for the CIPS test, the statistically significant outcome states that the dataset follows the stationarity. In any unit root test, it is a routine procedure to evaluate the stationarity at the level. In a situation where the outcome at the level is found to be insignificant, which means the presence of unit root, then the analysis should be repeated after taking the first difference (Razzaq et al., 2021). This routine is accordingly followed in the CIPS test. The outcomes for CD and CIPS tests are reported in Table 4.

The presence of stationarity, though, is confirmed by the CIPS test, but the findings were validated through the application of an additional test by Im et al. (2003). This test also follows similar hypotheses as the CIPS test, whereby the operational routine in ascertaining stationarity is also the same. The outcome of the test validates the CIPS test's outcome and is listed in Table 5.

After the confirmation of the stationarity of the data, Pedroni's (2004) test is applied, with the objective to ascertain the presence of cointegration in the dataset. This test enables the assessment of cointegration at the group level as well as the panel level. For the group level, the tests utilized are "group rho," "group PP," and "group ADF". For the panel level,the tests utilized are"panel v," "panel rho," "panel PP," and "panel ADF". The outcome of these tests confirms the presence of cointegration in the dataset in the long run. The outcome is listed in Table 6.

Table 4
Results of cross-sectional dependence and CIPS unit root test.

Variables	CD Test	p-value	CIPS test	
			Level	1st difference
FNT	22.460	0.000	−0.187	−9.518***
NTR	20.654	0.000	−0.899	−5.524***
TOR	17.030	0.000	−0.561	−12.962***
ECG	20.186	0.000	−0.830	−9.644***
CO2	8.089	0.000	−0.869	−14.013***

"***, ** and * represent significant level at 1%, 5% and 10% respectively."
Source: Author Estimation.

Table 5
Results of stationary analysis.

Variables	Im, Pesaran and Shin			
	I(0)		I(0)	
	C	C&T	C	C&T
FNT	−0.876	−0.508	−3.190***	−6.098***
NTR	−1.093	−1.093	−4.511***	−6.662***
TOR	−1.010	−0.884	−4.589***	−4.157***
ECG	−0.965	−0.912	−4.452***	−4.052***
CO2	−0.592	−1.156	−5.077***	−4.466***

"***, ** and * represent significant level at 1%, 5% and 10% respectively."
Source: Author Estimation.

Table 6
Results of Pedroni (Engle-Granger based) Panel Cointegration in Top Tourist Destinations.

Estimates	Stats.	Prob.
CO2= *f*(FNT - NTR - TOR - ECG)		
Panel v-statistics	15.250	0.000
Panel rho-statistics	15.048	0.000
Panel PP-statistics	−7.835	0.000
Panel ADF-statistics	−6.086	0.000
Alternative hypothesis: individual AR coefficient		
Group rho-statistic	13.842	0.000
Group PP-statistic	−6.667	0.000
Group ADF-statistic	−6.923	0.000

"The null hypothesis of Pedroni (2004) panel cointegration procedure is no cointegration."
Source: Author Estimation.

In addition to Pedroni's (2004) test, the findings related to the presence of cointegration were also validated through the application of an additional test by Westerlund's (2007) test. This test is unique in terms of its foundational grounding, which is on bootstrapping methodology. Such methodology enhances the validation due to the computation of significance after generating multiple subsamples from the same dataset. This test validates the findings by confirming the presence of cointegration in the dataset in the long run. The outcome is listed in Table 7.

After the satisfaction of the pre-requirements related to data characteristics and quality, the application of MMQR is made for the proposed hypotheses testing, which is in accordance with the earlier research (Jahanger et al., 2023).The current study has used CO2 to represent the ENS as the dependent variable. For the hypotheses stating the relationship between FNT and ENS, the nature of the relationships remains negative across all of the quantiles. This shows that through FNT, the CO2 will be reduced, which eventually means that FNT will complement the ENS. In terms of significance, the outcome was insignificant at the lower quantiles. However, as the linkage is forwarded towards the higher quantiles, the relationships start becoming statistically significant. For instance, at the middle-lower quantiles, the relationships were significant at a 10% significance level, but for the

Table 7
Results of Westerlund's (2007) bootstrap panel cointegration.

Statistics	Value	Z value	p-value	Robust p-value
Gt	−16.703	−23.740	0.000	0.000
Ga	−11.312	−17.120	0.000	0.000
Pt	−13.379	−22.022	0.000	0.000
Pa	−21.140	−20.192	0.000	0.000

"The null hypothesis of Westerlund's (2007) panel cointegration procedure is no cointegration. The number of replications is 1000.The p-values are for a one-sided test based on normal distribution. The robust p-values are for a one-sided test based on 1000 bootstrap replications."
Source: Authors' estimation.

middle-higher and higher-lower quantiles,the relationships were significant at a 5% significance. These relationships become significant at a 1% significance level at the higher level. This could be due to the response of FNT towards ENS, as the initiatives taken through FNT will take time to contribute towards the eradication of CO2 emissions.

For the hypotheses stating the relationship between NTR and ENS, the nature of the relationships remains positive across all of the quantiles. This shows that through NTR, the CO2 will be further enhanced, which eventually means that NTR will have a destructive role towards ENS. In terms of significance, the outcome was significant at the lower quantiles at a 10% significance level, whereby as the linkage is forwarded towards the higher quantiles, the relationships started becoming statistically significant further. For instance, at the middle quantiles, the relationships were significant at a 5% significance. These relationships become further significant at a 1% significance level at the higher quantiles. This could be due to the response of NTR towards ENS, as more consumption of NTR will lead to more pollution and environmental destruction, thus distressing the ENS.

For the hypotheses stating the relationship between TOR and ENS, the nature of the relationships remains positive across all of the quantiles. This shows that through TOR, the CO2 will be further enhanced, which eventually means that TOR will have a destructive role towards ENS. In terms of significance, the outcome was significant at the lower quantiles at a 5% significance level, whereas at the middle quantiles, the relationships were significant at a 1% significance. These relationships remain significant at a 1% significance level at the higher quantiles. This outcome leads to the understanding that when TOR has an increment, that will lead to more pollution and environmental destruction, thus distressing the ENS.

For the relationships between the control variable ECG and ENS, the relationships remain positive across all of the quantiles. This shows that the CO2 will be further enhanced through ECG, which eventually means that ECG will have a destructive role towards ENS. The outcome was significant at the lower quantiles at a 1% significance level, and these relationships remain significant at a 1% significance level at the middle and higher quantiles. This outcome leads to the understanding that when ECG has an increment, that will lead to more pollution and environmental destruction, thus distressing the ENS.The results of MMQR are listed in Table 8.

Lastly, the direction of the causality is assessed through the application of Dumitrescu and &Hurlin (2012) test. Although, one side of the causality can be inferred from the outcome generated through MMQR. However, in the economic variables, there is a possibility that the relationships between the independent variable and dependent variables could have a spillover effect, which can lead to bi-directional causality. The application of the test reported the presence of bi-directional causality between all independent variables and the dependent variable.The results are listed in Table 9.

Table 9
Results of heterogeneous panel causality test.

Null Hypothesis	Stats	Prob.
FNT does not homogenously cause CO2	18.456	0.000
CO2 does not homogenously cause FNT	21.681	0.000
NTR does not homogenously cause CO2	10.353	0.000
CO2 does not homogenously cause NTR	22.503	0.000
TOR does not homogenously cause CO2	13.672	0.000
CO2 does not homogenously cause TOR	10.041	0.000
ECG does not homogenously cause CO2	16.390	0.000
CO2 does not homogenously cause ECG	22.959	0.000

Source: Author Estimation.

5. Conclusion and recommendations

There has been a genuine concern from some of the major economies all around the world to bring a positive change towards the environment. The shift towards green energy and sustainability efforts from the global heavyweights. Countries like the USA, one of the biggest emitters of greenhouse gases, have passed laws in congress to promote renewable energy transitions for commercial and domestic purposes. Similarly, China has invested heavily in the development of renewable energy and is making drastic efforts to move away from the dependence on energy generated from coal. Despite their efforts to curb pollution levels and address precarious global warming, there has been little development as far as the benefits are concerned (Kelishadi, 2012).

Natural calamities continue to rise, which causes distress to people of lower-income countries. The recent flooding in Libya is an ideal example where the deaths of thousands were reported. A similar issue was seen in Australia, which is now facing storms and typhoons with increasing levels of intensity. The damage caused by the recent natural calamities might take years to recover. One of the primary reasons behind this phenomenon is the lack of proper coordination among the sustainability efforts and the fact that the use of fossil fuels to power the factories and CO2 emissions continue to rise at an alarming rate. There is an urgent need to address environmental issues as the damage done to the environment might be irreversible and can cause severe distress in the coming days (Zhao et al., 2022).

The research focused on identifying the role of FNT, NTR and TOR on ENS. The focus on top tourist destinations meant that the countries which are contributing the highest as far as tourism-related pollutants were studied to develop meaningful recommendations specifically customized and be beneficial for the policymakers and the individual firms alike. The use of the MMQR approach helped to validate the findings. The top tourist destinations, including China, Australia, and Japan, find themselves in greater levels of environmental problems due to the amount of TOR in their countries.

According to the findings of the research, FNT can be the gateway for the development of a sustainable economy. FNT can play a vital role in providing the finance needed for bankrolling sustainable products. The use of technological innovation within the financial industry would mean a greater level of clarity and communication using the technology to assess the feasibility of investments, which means that financial institutions would be able to release the funds for investment in a very cost-effective and swift manner (Al Hammadi and &Nobanee, 2019). This would help to nurture and grow the green economy. The use of crowdfunding can be another way FNT can prove to be effective in providing the much-needed finance for green projects. The use of blockchain, IoT, can be an ideal choice in providing the much-needed

Table 8
Results of panel quantile estimations (MMQR).

Variables	Quantiles								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
FNT	−0.228	−0.286	−0.309	−0.337*	−0.342*	−0.348**	−0.321**	−0.199***	−0.227***
NTR	0.207*	0.211*	0.315*	0.377**	0.381**	0.225**	0.267***	0.356***	0.224***
TOR	0.398**	0.200**	0.274**	0.222***	0.343***	0.246***	0.338***	0.385***	0.358***
ECG	0.338***	0.332***	0.247***	0.358***	0.364***	0.328***	0.306***	0.207***	0.219***

"The statistics value of location and scale arrived from MMQR can be available upon request. ***, ** and * represent significant level at 1%, 5% and 10% respectively."
Source: Author Estimation.

security to ensure that financial transactions can be conducted using the internet, and the technological advances can make the collection of small amounts of funds from a large number of people at a swift pace (Chueca Vergara &FerruzAgudo, 2021). This can help to ensure that financial growth and inclusion can be achieved in an economy along with the rise in sustainable growth. In short, the use of FNT can be used to meet the needs of economic development without hampering the environment (Ellili, 2022).

Based on the findings of the research, the use and extraction of NTR is found to be detrimental to ENS in top tourist destination countries. The extraction of NTR results in the loss of ecological balance. The extraction of NTR like metals, coal, and oil can lead to a significant amount of contamination of water resources, which would not only have a negative impact on marine life but would also result in the emission of CO2, which would have a negative impact on the environment (Glynn et al., 2017). The NTR rent makes the transition towards renewable energy difficult due to the employment opportunities associated with NTR extraction and the revenue from exporting the NTR. The amount of funds generated through the export of NTR drives the motives behind increased extraction levels, which eventually leads to environmental issues across the top tourist destination countries (Arslan et al., 2022).

TOR is considered to be an integral part of revenue for the government, particularly for top tourist destinations. The TOR industry provides employment for millions and acts as a source of revenue for the government in terms of taxation (Ghosh et al., 2022). Based on the study, the rise in TOR is accompanied by increasing levels of CO2 emissions and is detrimental to ENS as far as top tourist destination countries are concerned. The rise in tourist activities means increasing air travel, development of infrastructure, transportation, water and energy use, etc. (Gössling et al., 2015). All these factors would increase the level of CO2 emissions and contribute towards the falling standards of ENS in the countries. The damage caused by TOR is further orchestrated by the increasing level of waste caused by the tourists. The rising waste can be one of the key reasons behind the contamination of water. For example, the rise in tourist visits might mean a rise in urbanization and a fall in forests. This might further speed up the environmental damage for the countries (Meng et al., 2016).

The first recommendation for top tourist destination countries is to employ a common sustainability standard, which should be followed by all the member states. This would mean that the hospitality industry must adhere to sustainable standards while serving tourists. In providing exemplary services, hotels should not be allowed to use unsustainable methods. Some examples of sustainable methods could include limiting the use of plastic, using renewable energy, green buildings, ecologically friendly hotel rooms, and conservation of natural tourist attractions in the countries (Butowski, 2017). This can be made possible through the development of annual emission limits. Failure to adhere to those limits should result in hefty fines and taxes, which can help to ensure that firms within the tourism industry find it attractive to adhere to the environmental guidelines rather than differentiate from their competitors.

Governments of top tourist destination countries are recommended to develop policies and encourage the private sector to promote sustainable tourism. The development of sustainable tourism can include the use of the development of green infrastructure. The whole hospitality industry would be based on the development of sustainable practices (Han, 2021). An example of sustainable development could be the construction of green buildings. The hotels and other entertainment activities would be provided from green buildings. FNT can be used to provide funding for the development of hotels, which would eventually help to make the financing easier for firms. The government can also allocate funds to develop such projects to reduce the CO2 emissions of the TOR industry.

Regulations must be developed to make the use of renewable energy mandatory for hotels and firms within the hospital industry. Based on its capacity, each hotel would need to use a particular portion of renewable energy within its overall energy consumption. This would be specific to the energy consumption to ensure that the transition of the TOR industry towards green energy is improved. This regulation should be coupled with the provision of low-cost finance for renewable energy to ensure that firms see this as an ideal way to increase their bottom line rather than taking the environmental initiative as a cost centre (Liu et al., 2021).

The study has used the MMQR approach to validate its findings, whereby the use of CSARDL to validate the findings of the research would be among the future research directions. Furthermore, factors affecting ENS are not limited to FNT, NTR and TOR. Green finance can be one of the major determinants of ENS. The use of green finance can prove to be an important tool to promote sustainable growth as the provision of funds for the development of projects which help to increase the use of green energy or even improve energy efficiency can play a vital role in the development of ENS in any country (Bhutto et al., 2021). Similarly, urbanization can be an important factor for assessing TOR's role. The development of hotels and other infrastructure in tourist attractions can have a major say in the ENS levels (Clavé& Wilson, 2016). Future research considering these factors can help develop a meaningful outlook.

CRediT authorship contribution statement

Anfeng Xu: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Software, Supervision. **Lei Jin:** Formal analysis, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Jingzi Yang:** Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Resources, Writing – review & editing.

Declaration of competing interest

Authors has declared that there is no conflict of interest.

Acknowledgement:

This work was sponsored in part by 1.Social science Foundation of Heilongjiang Province (21GLB064) ; 2.Key Laboratory of Island Tourism Resource Data Mining and Monitoring , Ministry of Culture and Tourism (KLITRDMM 2024)

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[6]Xu,AF; Li, Y; Donta,PK.Marketing Decision Model and Consumer Behavior Prediction With Deep Learning.OURNAL OF ORGANIZATIONAL AND END USER COMPUTING 2024, 36 (1): 336547.

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第 **1** 条，共 **1** 条：
标题：Marketing Decision Model and Consumer Behavior Prediction With Deep Learning
作者：Xu, AF (Xu, Anfeng); Li, Y (Li, Yue); Donta, PK (Donta, Praveen Kumar)
来源出版物：JOURNAL OF ORGANIZATIONAL AND END USER COMPUTING 卷：36 期：1 文献号：336547 出版年：2024
入藏号：WOS:001185409200010
文献类型：Article 出版物类型：J
作者地址：[Xu, Anfeng] Hainan Trop Ocean Univ, Key Lab Isl Tourism Resource Data Min & Monitoring, Minist Culture & Tourism, Tourism Sch, Sanya, Peoples R China.; [Li, Yue] Harbin Univ Sci & Technol, Econ & Management Sch, Harbin, Peoples R China.; [Donta, Praveen Kumar] TU Wien, Vienna, Austria.; Technology; Technische Universitat Wien
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研究方向：Computer Science; Information Science & Library Science; Business & Economics
IDS 号：LF6P2
ISSN: 1546-2234 **eISSN:** 1546-5012
基金资助机构和授权号：National Natural Science Foundation of China [72174045]; Social science Foundation of Heilongjiang Province [21GLB064]; Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism [KLITRDMM 2024]
基金资助致谢：This work was supported by 1. National Natural Science Foundation of China (No. 72174045) ; 2. Social science Foundation of Heilongjiang Province (21GLB064) ; 3. Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism (KLITRDMM 2024) .

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第 1 条，共 1 条：

标题： Marketing Decision Model and Consumer Behavior Prediction With Deep Learning

作者：Xu, AF (Xu, Anfeng); Li, Y (Li, Yue); Donta, PK (Donta, Praveen Kumar)

来源出版物： JOURNAL OF ORGANIZATIONAL AND END USER COMPUTING **卷：** 36 **期：** 1 **文献号：** 336547 **出版年：** 2024

入藏号： WOS:001185409200010

文献类型： Article **出版物类型：** J

作者地址： [Xu, Anfeng] Hainan Trop Ocean Univ, Key Lab Isl Tourism Resource Data Min & Monitoring, Minist Culture & Tourism, Tourism Sch, Sanya, Peoples R China.; [Li, Yue] Harbin Univ Sci & Technol, Econ & Management Sch, Harbin, Peoples R China.; [Donta, Praveen Kumar] TU Wien, Vienna, Austria.

通讯作者地址： Xu, AF (corresponding author), Hainan Trop Ocean Univ, Key Lab Isl Tourism Resource Data Min & Monitoring, Minist Culture & Tourism, Tourism Sch, Sanya, Peoples R China.

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Web of Science 类别： Computer Science, Information Systems; Information Science & Library Science; Management

研究方向： Computer Science; Information Science & Library Science; Business & Economics

IDS 号： LF6P2

ISSN: 1546-2234 **eISSN:** 1546-5012

基金资助机构和授权号： National Natural Science Foundation of China [72174045]; Social science Foundation of Heilongjiang Province [21GLB064]; Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism [KLITRDMM 2024]

基金资助致谢： This work was supported by 1. National Natural Science Foundation of China (No. 72174045) ; 2. Social science Foundation of Heilongjiang Province (21GLB064) ; 3. Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism (KLITRDMM 2024) .

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检索类型	数据库	年份范围	记录数
SSCI 收录	SSCI	2024	1
JCR 影响因子	JCR	1900 - 2024	1
JCR 期刊分区	JCR	1900 - 2024	1

检索人员：刘青春

哈尔滨工业大学科技查新站

教育部科技查新站（L39）

2024年3月27日

附件一：**SSCI** 收录

#	作者	标题	来源出版物	**JCR**影响因子	**JCR**分区	文献类型	入藏号
1	**Xu, AF**; Li, Y; Donta, PK	Marketing Decision Model and Consumer Behavior Prediction With Deep Learning	***JOURNAL OF ORGANIZATIONAL AND END USER COMPUTING*** 2024, 36 (1): 336547.	• 6.5 (2022);	• MANAGEMENT **[SSCI-Q2]** 61/227 (2022); • COMPUTER SCIENCE, INFORMATION SYSTEMS **[SCIE-Q1]** 28/158 (2022); • INFORMATION SCIENCE & LIBRARY SCIENCE **[SSCI-Q1]** 12/84 (2022);	J Article	WOS:001185409200010
						合计	1

第 **1** 条，共 **1** 条：
标题：Marketing Decision Model and Consumer Behavior Prediction With Deep Learning
作者：Xu, AF (Xu, Anfeng); Li, Y (Li, Yue); Donta, PK (Donta, Praveen Kumar)
来源出版物：JOURNAL OF ORGANIZATIONAL AND END USER COMPUTING　卷：36　期：1　文献号：336547　出版年：2024
入藏号：WOS:001185409200010
文献类型：Article　出版物类型：J
作者地址：[Xu, Anfeng] Hainan Trop Ocean Univ, Key Lab Isl Tourism Resource Data Min & Monitoring, Minist Culture & Tourism, Tourism Sch, Sanya, Peoples R China.; [Li, Yue] Harbin Univ Sci & Technol, Econ & Management Sch, Harbin, Peoples R China.; [Donta, Praveen Kumar] TU Wien, Vienna, Austria.; Technology; Technische Universitat Wien
通讯作者地址：Xu, AF (corresponding author), Hainan Trop Ocean Univ, Key Lab Isl Tourism Resource Data Min & Monitoring, Minist Culture & Tourism, Tourism Sch, Sanya, Peoples R China.
出版商：IGI GLOBAL　出版商城市：HERSHEY　出版商地址：701 E CHOCOLATE AVE, STE 200, HERSHEY, PA 17033-1240 USA
Web of Science 类别：Computer Science, Information Systems; Information Science & Library Science; Management
研究方向：Computer Science; Information Science & Library Science; Business & Economics
IDS 号：LF6P2
ISSN: 1546-2234　**eISSN:** 1546-5012
基金资助机构和授权号：National Natural Science Foundation of China [72174045]; Social science Foundation of Heilongjiang Province [21GLB064]; Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism [KLITRDMM 2024]
基金资助致谢：This work was supported by 1. National Natural Science Foundation of China (No. 72174045) ; 2. Social science Foundation of Heilongjiang Province (21GLB064) ; 3. Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism (KLITRDMM 2024) .

JCR 影响因子：

期刊	**JCR** 影响因子	指标年份
JOURNAL OF ORGANIZATIONAL AND END USER COMPUTING	6.5	2022

JCR 期刊分区：

数据库	**JCR** 学科类别	类别排序	类别分区	指标年份
SSCI	MANAGEMENT	61/227	Q2	2022
SCIE	COMPUTER SCIENCE, INFORMATION SYSTEMS	28/158	Q1	2022
SSCI	INFORMATION SCIENCE & LIBRARY SCIENCE	12/84	Q1	2022

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Journal of Organizational and End User Computing
Volume 36 • Issue 1

Marketing Decision Model and Consumer Behavior Prediction With Deep Learning

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ABSTRACT

This article presents a study using ResNet-50, GRU, and transfer learning to construct a marketing decision-making model and predict consumer behavior. Deep learning algorithms address the scale and complexity of consumer data in the information age. Traditional methods may not capture patterns effectively, while deep learning excels at extracting features from large datasets. The research aims to leverage deep learning to build a marketing decision-making model and predict consumer behavior. ResNet-50 analyzes consumer data, extracting visual features for marketing decisions. GRU model temporal dynamics, capturing elements like purchase sequences. Transfer learning improves performance with limited data by using pre-trained models. By comparing the model predictions with ground truth data, the performance of the models can be assessed and their effectiveness in capturing consumer behavior and making accurate predictions can be measured. This research contributes to marketing decision-making. Deep learning helps understand consumer behavior, formulate personalized strategies, and improve promotion and sales. It introduces new approaches to academic marketing research, fostering collaboration between academia and industry.

KEYWORDS:

ResNet-50, GRU, Transfer Learning, Market Marketing, Predicting Consumer Behavior, Decision Models

1. INTRODUCTION

In today's information age, with the exponential growth in the scale and complexity of consumer data, businesses need a better understanding of consumer behavior and demand to formulate accurate marketing strategies. Traditional statistical methods and machine learning Alon et al. (2001) approaches may sometimes fail to capture the features and patterns present in the data adequately. Deep learning methods, with their powerful model representation and automatic feature learning capabilities, have emerged as effective tools to address these challenges.

DOI: 10.4018/JOEUC.336547

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The ResNet-50-GRU transfer learning method offers significant advantages and innovations compared to traditional methods. Firstly, traditional methods have limitations in handling large-scale and complex consumer data. With the exponential growth in consumer data in terms of scale and complexity, traditional statistical and machine-learning methods may fail to capture the features and patterns in the data adequately. This leads to an incomplete and inaccurate understanding of consumer behavior and demands.

In contrast, the ResNet-50-GRU transfer learning method utilizes the powerful model representation and automatic feature learning capabilities of deep learning algorithms to analyze and extract meaningful patterns and features from a large amount of consumer data. The ResNet-50 model, as a convolutional neural network, can automatically learn and extract visual features from image data, such as product preferences and brand preferences. This ability enables marketing decision-makers to gain more accurate insights into consumer preferences and tailor marketing strategies accordingly.

This study aims to leverage deep learning methods to construct a marketing decision model and predict consumer behavior. Specifically, we will utilize the ResNet-50 model to analyze consumer data containing images or visual content and extract visual features and patterns relevant to marketing decisions. Simultaneously, we will employ the GRU (Gated Recurrent Unit) model to model the temporal dynamics of consumer behavior, capturing time-related features such as purchase sequences and browsing histories. Furthermore, we will apply transfer learning techniques to leverage the knowledge from pre-trained models and build accurate models on limited data. We will collect and preprocess relevant data, including demographic information, browsing behavior, purchase history, and potential visual content of consumers. Next, we will train and evaluate deep learning models such as ResNet-50 and GRU using appropriate loss functions and optimization techniques. In the context of transfer learning, we will initialize the model with pre-trained weights and fine-tune it on specific market datasets.

Through experiments on real-world datasets, we will validate the effectiveness and accuracy of the proposed approach. Using the ResNet-50 model, we will successfully extract visual features relevant to marketing decisions, such as product preferences and brand preferences. Simultaneously, the GRU model will capture the temporal dynamics of consumer behavior and accurately predict future purchasing behavior and interests. The application of transfer learning will further enhance the model's performance, particularly in scenarios with limited data.

This research holds significant implications for marketing decision-making. Through deep learning methods, businesses can gain better insights into consumer behavior and demands, enabling them to formulate personalized marketing strategies and improve the effectiveness of product promotions and sales. Additionally, this study provides novel ideas and approaches for academic research in the field of marketing.

In the field of marketing, several deep learning or machine learning models are widely applied. Here are five common models along with their advantages and disadvantages:

1. Convolutional Neural Networks (CNN) He et al. (2017): CNN excels in processing image or visual data. It can effectively extract image features and demonstrates good classification and recognition performance. However, CNN's ability to handle time-series data and sequence modeling is relatively weak.
2. Recurrent Neural Networks (RNN) Xiao and Zhou (2020): RNN is a type of neural network capable of processing sequential data. It possesses memory capabilities to capture temporal dependencies within sequences. However, traditional RNNs suffer from the vanishing or exploding gradient problem and perform poorly in handling long-term dependencies.
3. Long Short-Term Memory (LSTM) Gers et al. (2000): LSTM is an improved RNN structure that addresses the gradient issues of traditional RNNs by introducing gate mechanisms. It can better capture long-term dependencies and is suitable for processing time-series data. However, LSTM models have more parameters and higher computational complexity.

4. Generative Adversarial Networks (GAN) Gonog and Zhou (2019): GAN is a framework consisting of a generator and a discriminator, trained through adversarial learning to generate realistic data samples. GANs hold the potential to generate novel marketing materials and promotional content. However, the training process of GANs is relatively unstable and requires more data and computational resources.
5. Transfer Learning Torrey and Shavlik (2010): Transfer learning speeds up the training process and improves model performance by utilizing pre-trained models on large-scale data and transferring their knowledge to new tasks. This is particularly important in marketing research when dealing with limited data.

The motivation of this study is to construct marketing decision models using deep learning methods and predict consumer behavior. To achieve this objective, we propose the following methodology:

Firstly, we will collect and preprocess relevant marketing data, including consumer demographics, browsing behavior, purchase history, and possible visual content. Secondly, we will analyze consumer data containing images or visual content using the ResNet-50 model. ResNet-50 is a deep convolutional neural network model with powerful image feature extraction capabilities. Through this model, we can extract visual features and patterns relevant to marketing decision-making, such as product preferences and brand preferences. Simultaneously, we will employ the GRU model to capture the temporal dynamics of consumer behavior, capturing time-related features such as purchase sequences and browsing history. GRU is a gated recurrent neural network model that exhibits better long-term dependency modeling capability and addresses the issue of vanishing gradients compared to traditional RNN models. Additionally, we will apply transfer learning techniques to fine-tune the pre-trained models' knowledge on limited market data to construct accurate models. Transfer learning helps us leverage existing large-scale data and model parameters, reducing the training time and improving the model's performance on market data.

The effectiveness and accuracy of this study's methodology will be validated through experiments on real-world datasets. Using the ResNet-50 model, we can successfully extract visual features relevant to marketing decision-making, and through the GRU model, we can capture the temporal dynamics of consumer behavior and accurately predict future purchasing behaviors and interests. The application of transfer learning further enhances the model's performance, especially in cases with limited data. This research holds significant importance for marketing decision-making. Through deep learning methods, businesses can better understand consumer behavior and needs, formulate personalized marketing strategies, and improve the effectiveness of product promotion and sales. Additionally, this research provides new ideas and methods for academic research in

- Application of Deep Learning in Marketing Decision-Making De Mauro et al. (2022): This study introduces common deep learning models in marketing research and details their advantages and limitations in addressing market data analysis and consumer behavior prediction. By utilizing deep learning methods, this research provides a new and powerful tool for marketing decision-making, extracting meaningful patterns and features from large-scale market data to help businesses better understand consumer behavior and demands.
- Comprehensive Analysis Combining Image and Time Series Data Gursch et al. (2021): The proposed methodology combines the analysis of image data and time series data. By using Convolutional Neural Networks (CNN) and Residual Networks (ResNet-50), visual features and patterns relevant to marketing decision-making can be extracted from images and visual content. Simultaneously, by employing Gated Recurrent Neural Networks (GRU), the temporal dynamics of consumer behavior, including purchase sequences and browsing history, can be captured. This comprehensive analysis approach enables a more holistic understanding and

prediction of consumer behavior, providing more accurate and nuanced information for marketing decision-making.

- Application of Transfer Learning in Marketing Research Chiu and Chuang (2021): The proposed methodology also utilizes transfer learning techniques to transfer knowledge from pre-trained models to new tasks, accelerating the training process and improving model performance. Transfer learning is particularly valuable in scenarios with limited data in marketing research. By leveraging existing large-scale data and model parameters, training time can be reduced, and model performance on market data can be enhanced. This application provides an effective approach for marketing research, leveraging existing knowledge and resources to better address real-world problems.

2. RELATED WORK

2.1 Sequence Models

Sequence models Keneshloo et al. (2019) have a wide range of applications in the field of marketing. They can be used for customer behavior analysis, purchase prediction, personalized recommendations, and sentiment analysis. By analyzing consumer browsing history, purchase records, and social media data, these models can capture the temporal patterns of consumer behavior, providing accurate predictions and insights.

The advantages of sequence models lie in their ability to capture long-term dependencies and dynamic evolution. They can learn and remember patterns in consumer behavior, helping marketers gain a deeper understanding of consumer preferences and behavioral changes. Additionally, sequence models can handle variable-length sequences, adapting to different lengths of behavior sequences and increasing model flexibility. Sequence models also have limitations. Firstly, training complex sequence models like LSTM requires significant computational resources and time. Secondly, interpreting the predictions of sequence models can be challenging, as understanding the model's reasoning process and decision-making can be difficult. Lastly, sequence models typically require a large amount of labeled training data to achieve good performance, which may require substantial data collection and annotation efforts.

2.2 Attention Mechanisms

Attention mechanisms Niu et al. (2021) have extensive applications in the field of marketing. Firstly, in personalized recommendations, they help identify the most important features or items in a user's browsing history or purchase records. By assigning weights to different elements, attention mechanisms improve the accuracy of recommendations, enhancing user satisfaction and engagement. Secondly, in sentiment analysis, attention mechanisms identify the keywords or phrases in a text that contribute the most to the expressed sentiment. This enables more accurate predictions of customer sentiment towards products, brands, or marketing campaigns, helping marketers understand customer emotions and adjust strategies accordingly. Lastly, in customer behavior analysis, attention mechanisms identify the most influential touchpoints or interactions in a customer's journey, allowing marketers to understand the factors driving customer conversions, churn, or engagement. This information can be used to optimize marketing campaigns, improve customer experiences, and enhance customer retention. Attention mechanisms have extensive applications in the field of marketing. Firstly, in personalized recommendations, help identify the most important features or items in a user's browsing history or purchase records. By assigning weights to different elements, attention mechanisms improve the accuracy of recommendations, enhancing user satisfaction and engagement. Secondly, in sentiment analysis, attention mechanisms identify the keywords or phrases in a text that contribute the most to the expressed sentiment. This enables more accurate predictions of customer sentiment towards products, brands, or marketing

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2.3 Generative Adversarial Networks

Generative Adversarial Networks (GANs) Creswell et al. (2018) have wide applications in marketing, including generating realistic content and automating content creation. GANs can generate visually appealing product images and marketing materials, enhancing the overall aesthetic appeal and engaging customers. Additionally, GANs can be used to generate textual content, such as product descriptions or social media posts, saving time and resources in manual content creation.

GANs also have limitations. One challenge is the potential lack of diversity and quality control in generated content. GANs may produce unrealistic outputs or fail to meet desired standards, requiring careful monitoring and control. Furthermore, training GANs require a large amount of data and computational resources, making it resource-intensive and time-consuming.

GANs have valuable applications in marketing, enabling the generation of realistic visuals and automating content creation. They enhance the aesthetic appeal of marketing materials and provide a continuous stream of fresh and engaging content. However, challenges exist in maintaining quality control and managing computational resources. Despite these limitations, GANs have the potential to revolutionize marketing practices by providing innovative and efficient solutions for content generation.

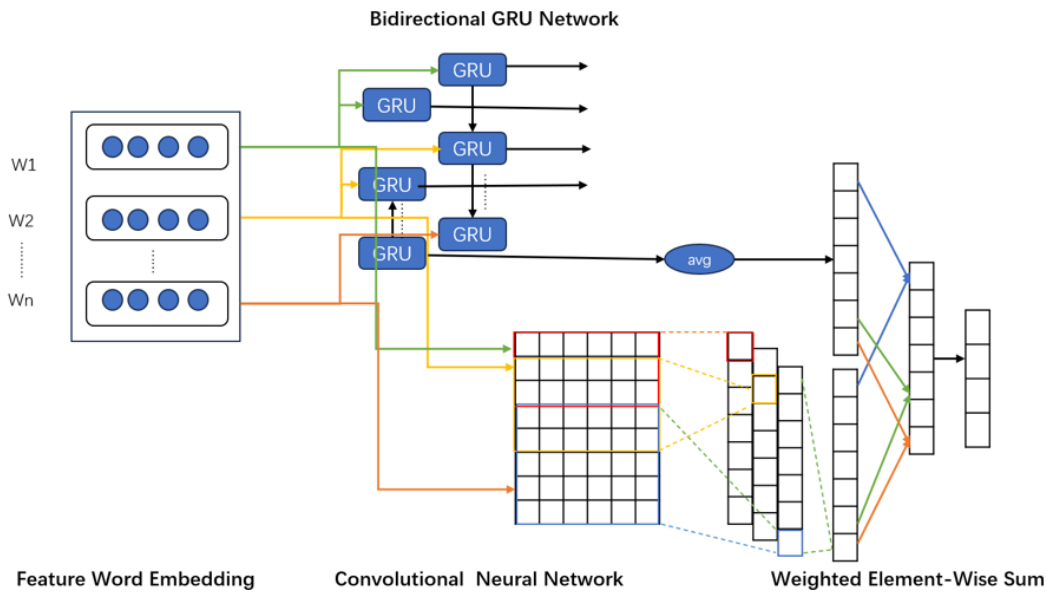
3. METHODOLOGY

3.1 Overview of Our Network

This study aims to construct a marketing decision model using ResNet-50, GRU, and transfer learning-based deep learning methods to predict consumer behavior. By combining these techniques, researchers can gain insights into consumer behavior using deep learning algorithms, image recognition models, and sequential data analysis, and make data-driven marketing decisions. Figure 1 shows the overall framework diagram of the proposed model:

Method Implementation Overview: 1. Data Collection and Preprocessing Famili et al. (1997): Collect relevant consumer data, including demographic information, browsing behavior, purchase history, and visual content, and preprocess it. This data will serve as input for the deep learning models. 2. Application of the ResNet-50 Model Koonce and Koonce (2021): Analyze consumer data containing images or visual content using the pre-trained ResNet-50 model. By passing the data through the ResNet-50 network, extract visual features and patterns relevant to marketing decisions, such as product preferences and brand preferences. 3. Application of the GRU Model Kumar and Abirami (2021): Model the temporal dynamics of consumer behavior using the GRU model. Input sequential data such as browsing history, purchase history, and social media interactions into the GRU model. The GRU model will learn patterns and trends in the time-series data and can predict future purchase behavior and interests. 4. Application of Transfer Learning Soni (2018): Initialize the pre-trained ResNet-50 model and GRU model's weights using transfer learning for marketing-specific datasets. Fine-tune or retrain these models to adapt them to specific marketing tasks. During the fine-tuning or retraining process, adjust model hyperparameters, layer configurations, and structures based on the specific task requirements. 5. Model Evaluation and Prediction Gauch et al. (2003): Use the trained models to make predictions and evaluate new consumer data. By inputting new data into the ResNet-50 and GRU models, obtain predictions regarding consumer behavior and preferences. Based on the prediction results, marketers can formulate personalized marketing strategies to enhance the accuracy and effectiveness of marketing decisions.

Figure 1. Overall flow char of the model

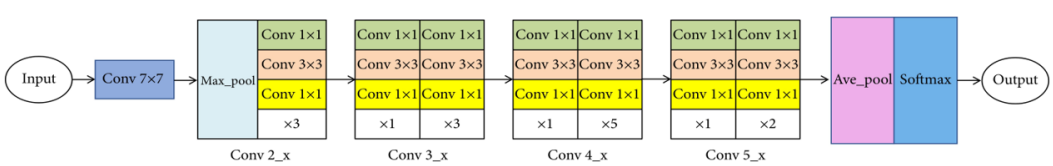


By combining ResNet-50, GRU, and transfer learning, researchers can gain deep insights into consumer behavior from marketing data. The implementation process of these methods includes data collection and preprocessing, application of the ResNet-50 model, application of the GRU model, application of transfer learning, and model evaluation and prediction. This combination of steps can help marketers make data-driven decisions and improve the effectiveness and return on marketing activities.

3.2 ResNet-50

ResNet-50 Alzubaidi et al. (2021) is a deep convolutional neural network model that addresses issues like vanishing gradients and exploding gradients Hanin (2018) when constructing deep networks, enabling training and optimization of deeper networks. ResNet-50 is based on the concept of residual learning He et al. (2016) and uses residual blocks to construct deep networks. In traditional convolutional neural networks, information needs to be passed through each layer, and in deep networks, backpropagation causes gradients to diminish, making it difficult to optimize the network. To overcome this problem, ResNet-50 introduces skip connections, allowing information to bypass certain layers in the network and preserve and propagate more gradient information. In ResNet-50, each residual block consists of two convolutional layers and an identity mapping. The convolutional layers extract features, while the identity mapping directly passes the input to the output by adding it to the output of the convolutional layers. This way, even with deeper networks, gradients can

Figure 2. Schematic diagram of ResNet-50



propagate easier to earlier layers, avoiding the issue of vanishing gradients. Figure 2 is a schematic diagram of the ResNet-50.

Role of ResNet-50 in building marketing decision models: In marketing decision models, ResNet-50 is primarily used to analyze consumer data that includes images or visual content, extracting visual features and patterns relevant to marketing decisions. By training on large-scale image datasets, it can learn low-level and high-level features such as product preferences, brand preferences, and visual attractiveness. These features can help businesses understand consumer preferences regarding product appearance, advertising communication, and brand image, optimizing product design, ad creativity, and marketing strategies.

Although ResNet-50 performs well in many computer vision tasks, there are limitations and potential drawbacks to consider when applying it to building marketing decision models:

1. Data requirements: ResNet-50 requires large-scale labeled image data for training to learn effective visual features. This may pose challenges in data collection and annotation, especially for specific products or brands in certain marketing scenarios.
2. Compute resource requirements: ResNet-50 is a large network model that demands significant computational resources and storage space for training and inference. When applying it to real-world marketing decisions, the availability and cost of computational resources need to be considered.
3. Interpretability and explainability: Deep learning models like ResNet-50 are often seen as black-box models, making it challenging to understand their internal workings. In some cases, the interpretability of model predictions and features might be important for marketing decision-makers.

To balance the applicability and potential drawbacks of ResNet-50, the following measures can be considered:

1. Data augmentation and transfer learning: Data augmentation techniques can expand the dataset and alleviate data requirements. Additionally, transfer learning techniques can leverage pre-trained ResNet-50 model weights on large-scale image datasets and fine-tune them on specific marketing datasets to improve model performance.
2. Model interpretability approaches: To increase the interpretability and explainability of the model, complementary interpretable machine learning methods or tools such as feature importance analysis, local interpretability methods (e.g., Grad-CAM), etc., can be combined to explain the predictions and visual features of the ResNet-50 model.
3. Integration of multiple models: In addition to ResNet-50, considering the combination of other types of models such as text models, recommendation system models, etc., can provide a more comprehensive prediction and understanding of consumer behavior by integrating different types of data and features.

The formula of ResNet-50 is as follows:

$$\mathbf{y} = \mathcal{F}\left(\mathbf{x}, W_i\right) + \mathbf{x} \tag{1}$$

In formula (1), we can see the following variables:

x: Input features, which can be images or other forms of data. y: Output features, obtained by extracting features from the input features using the ResNet-50 model. W_i: Set of model parameters, including all the weights and biases in the ResNet-50 model. (): Represents the residual block function

of the ResNet-50 model. It takes the input features x and model parameters W_i and computes the residual features. This formula expresses the basic principle of the ResNet-50 model, where the model transforms the input features x into output features y by learning the residual features (x, W_i) and adding them to the input features. ResNet-50 can effectively train deep networks by introducing residual learning and addressing issues like vanishing and exploding gradients.

The ResNet-50 model plays a crucial role in building marketing decision models. It can extract valuable features and patterns from visual data, helping businesses understand consumer behavior and demands, and optimizing marketing strategies. However, it is important to consider the data requirements, compute resource requirements, and model interpretability limitations of ResNet-50 and balance its applicability and potential drawbacks through data augmentation, transfer learning, model interpretability approaches, and integration of multiple models.

3.3 GRU

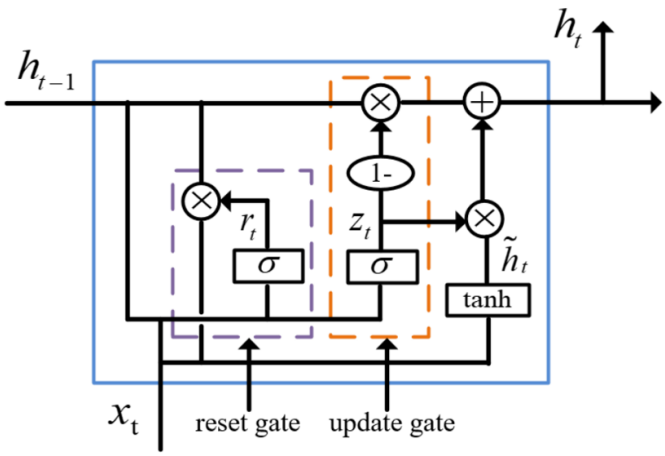
GRU (Gated Recurrent Unit) Dey and Salem (2017) is a variant of recurrent neural networks (RNNs) Salehinejad et al. (2017) used for processing sequence data and capturing their inherent temporal dependencies. Compared to traditional RNN models, GRU introduces gating mechanisms that better handle long-term dependencies and alleviate the issues of vanishing and exploding gradients. Figure 3 is a schematic diagram of the GRU.

The GRU model consists of several key components, including the update gate, reset gate, and candidate hidden state. Here is a detailed explanation of the basic principles and roles of these components:

1. Update Gate: The update gate determines the importance of the previous hidden state at the current time step. It calculates a value between 0 and 1 by considering the input data and the previous hidden state. This value represents how much of the previously hidden state information should be retained. The update gate controls the flow of information, allowing the model to selectively remember or forget past information.
2. Reset Gate: The reset gate determines the impact of the previous hidden state on the current time step. Similar to the update gate, it calculates a value between 0 and 1 based on the input data and the previous hidden state. This value represents how much of the past hidden state information should be retained. The reset gate controls the forgetting of past information, enabling the model to better adapt to the current input.
3. Candidate Hidden State: The candidate hidden state is a temporary hidden state calculated based on the current input data and the previous hidden state before the application of the update and reset gates. It incorporates the input information at the current time step and captures important features of the current sequence.
4. Final Hidden State: The final hidden state is obtained by applying the weights of the update gate, reset gate, and candidate hidden state. It combines the information from the previous hidden state and the current input, representing the model's understanding and memory of the current sequence data. The final hidden state can be used as an output for predicting the next time step's outcome or for other related tasks.

By utilizing these components and computations, the GRU model can model long-term dependencies in sequence data while mitigating the issues of vanishing and exploding gradients. Compared to traditional RNN models, GRU has fewer parameters, higher computational efficiency, and demonstrates better performance in various sequence modeling tasks.

Figure 3. Schematic diagram of GRU



In building marketing decision models and predicting consumer behavior, the GRU model plays a crucial role in time series data analysis. Through the GRU model, it is possible to model and capture the temporal dynamics in consumer behavior, such as purchase sequences, browsing history, and more. The GRU model can learn and remember long-term dependencies in sequences, enabling more accurate predictions of future behavior and interests.

Although the GRU model performs well in sequential data modeling and prediction, it also has some limitations and potential drawbacks to consider. These include: Data dependency: The performance of the GRU model in modeling sequential data highly depends on the quality and availability of the data. If the data quality is low, lacks representativeness, or contains noise, the model's performance may degrade. Computational complexity: The GRU model has higher computational complexity compared to simple linear models or traditional machine learning methods. This implies that computational resource constraints need to be considered when dealing with large-scale datasets or real-time applications. Hyperparameter tuning: The GRU model has several hyperparameters to be tuned, such as the number of hidden units, learning rate, etc. Proper selection of hyperparameters is crucial and requires experimentation and validation.

To balance the applicability and potential drawbacks of the GRU model, researchers and practitioners can consider the following strategies: Adjust model complexity: Depending on the actual requirements and computational resource constraints, the complexity of the GRU model can be adjusted, such as reducing the number of hidden units or layers to improve computational efficiency.

Data preprocessing and cleaning: Preprocessing and cleaning the data before using the GRU model is essential. This includes handling missing values, outliers, and noise, as well as performing feature selection and dimensionality reduction to improve the model's robustness and predictive ability. Integration with other methods: The GRU model can be combined with other machine learning or statistical methods to leverage their strengths. For example, combining the GRU model with traditional regression models Austin et al. (2001) or clustering methods Omran et al. (2007) can provide more comprehensive and accurate prediction results. Model evaluation and validation: To evaluate the performance and applicability of the GRU model, rigorous experiments and validations are required. This includes using techniques such as cross-validation, comparative experiments, and metric evaluation to assess the model's accuracy, generalization ability, and stability.

The formula of GRU is as follows:

$$z_t = \sigma(W_z \cdot [h_{t-1}, x_t]) \; r_t = \sigma(W_r \cdot [h_{t-1}, x_t])$$

$$\tilde{h}t = \tanh(W \cdot [r_t \odot ht - 1, x_t]) \quad (2)$$

$$h_t = (1 - z_t) \odot h_{t-1} + z_t \odot \tilde{h}_t$$

Here is the translation of the variables used in the equations:

z_t represents the update gate, which determines the importance of the previous hidden state's weight at the current time step.

r_t represents the reset gate, which determines the impact of the previous hidden state on the current time step.

$\tilde{h}_t$ represents the candidate hidden state, which is a temporary hidden state calculated based on the current input data and the previous hidden state before applying the update and reset gates.

h_t represents the final hidden state, which is obtained by applying the weights of the update gate, reset gate, and candidate hidden state. It combines the information from the previous hidden state and the current input.

W_z, W_r, and W are weight matrices used to map the input data and hidden state to appropriate dimensions.

$[h_{t-1}, x_t]$ represents the concatenation of the previous hidden state h_{t-1} and the current input data x_t. represents element-wise multiplication, σ represents the sigmoid function, and tanh represents the hyperbolic tangent function.

These equations describe the computations performed in the GRU model, including the calculation of the update gate, reset gate, candidate hidden state, and the update of the final hidden state. By utilizing these computations, the GRU model can capture temporal dependencies in sequence data and effectively handle long-term dependencies.

In research, the GRU model can be applied to predict sequential patterns in consumer behavior. For example, it can be used to analyze and forecast time-series patterns of consumer purchasing behavior, such as purchase frequency, amount, or the order of buying decisions. By training on historical consumer behavior data, the GRU model can learn important features and patterns in the sequential data and utilize them for predicting future consumer behavior.

3.4 Transfer Learning

Transfer learning is a machine learning technique that leverages knowledge gained from pre-trained models to improve the performance of a model on a target task or dataset. The basic principle of transfer learning is to transfer the learned representations or knowledge from a source domain to a target domain, where the source domain typically has a large amount of labeled data available, while the target domain has limited labeled data. Figure 4 is a schematic diagram of the Transfer Learning.

In transfer learning, the pre-trained model, often trained on a large-scale dataset like ImageNet for computer vision tasks, is used as a feature extractor or a starting point for training the target model. The idea is that the pre-trained model has learned general features that are transferable across different tasks, such as low-level visual features like edges, and textures, or high-level semantic features like object shapes or concepts. These features capture valuable information that can be relevant to the target task.

The role of transfer learning in the proposed marketing decision-making model is to enhance the model's performance when the available target data is limited. By initializing the model with the pre-trained weights, the model starts with a better initialization point, which can help in faster convergence and prevent overfitting on limited target data. Fine-tuning is then performed on the target task using the limited target data, allowing the model to adapt the learned representations to the specific characteristics of the target domain.

However, there are limitations and potential drawbacks to consider when using transfer learning. One limitation is the assumption that the source and target domains share some common underlying features or distributions. If the two domains are vastly different, the transfer of knowledge may not

be effective, and the pre-trained model may not provide significant benefits. It is crucial to carefully select the pre-trained model based on its relevance to the target task.

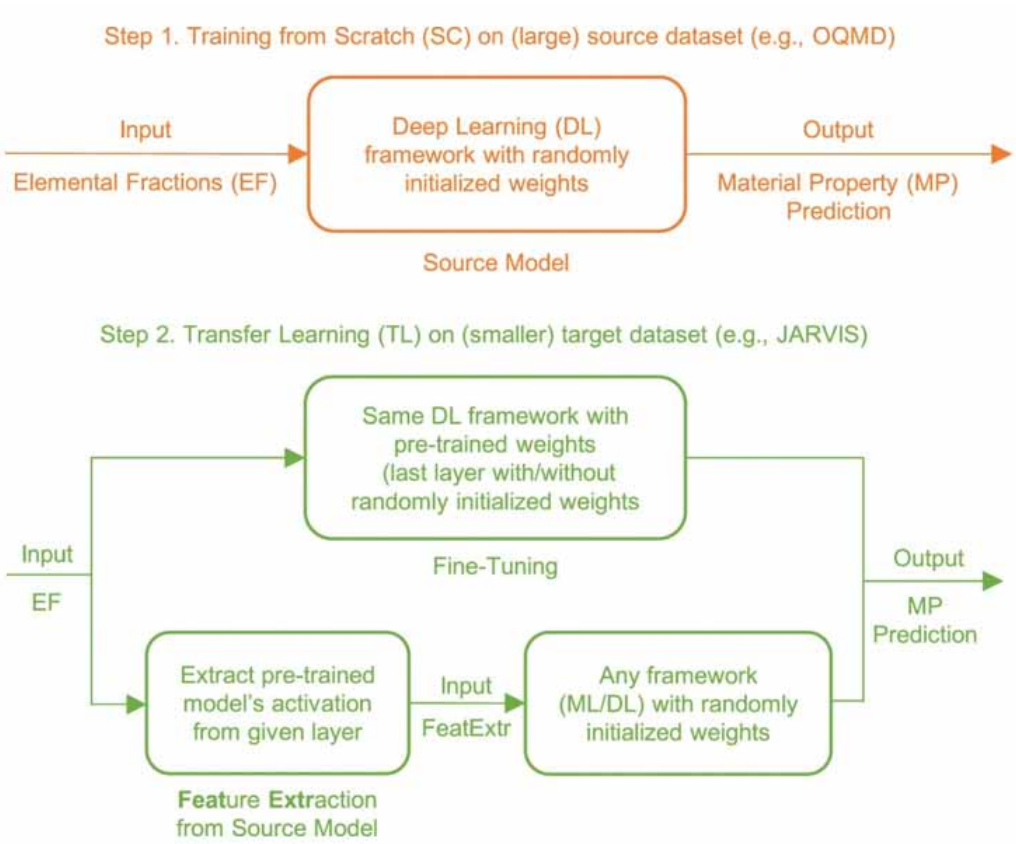
Another limitation is the risk of negative transfer, where the pre-trained model's knowledge may conflict with or hinder learning on the target task. This can happen if the source domain contains biased or irrelevant information that does not apply to the target task. It is important to evaluate the performance of the transferred model on the target task and ensure that it is improving or at least not deteriorating compared to training from scratch.

To balance the applicability and potential drawbacks of transfer learning, it is essential to consider a few factors. Firstly, selecting a pre-trained model that is trained on a large and diverse dataset, capturing general features that are likely to be useful across different tasks. Secondly, conducting thorough evaluation and validation on the target task to ensure that the transferred model is indeed improving the performance and providing meaningful insights. Lastly, fine-tuning the transferred model on the target task using limited target data to adapt the learned representations to the specific characteristics of the target domain.

The formula of Transfer learning is as follows:

$$\theta_f^* = \arg\min_{\theta_f} \left(\frac{1}{N} \sum_{i=1}^{N} \mathcal{L}\left(y_i, f\left(x_i, \theta_f\right)\right) + \lambda \cdot R\left(\theta_f\right) \right) \tag{3}$$

Figure 4. Schematic diagram of Transfer Learning



Where:

θ_f represents the optimized parameters of the target task model. θ_f denotes the parameters of the pre-trained source model. N refers to the number of samples in the target task dataset. x_i represents an input sample from the target task dataset. y_i represents the corresponding target output for x_i in the target task dataset. $f(x_i, \theta_f)$ represents the output of the model f given input sample x_i and parameters θ_f. L represents the loss function that measures the discrepancy between the predicted outputs and the ground truth. λ is a hyperparameter that controls the trade-off between the loss term and the regularization term. R denotes the regularization term that encourages desirable properties in the model, such as simplicity or smoothness. The equation represents the objective function for transfer learning, where the goal is to minimize the average loss over the target task dataset while regularizing the parameters to prevent overfitting or encourage desirable properties.

Transfer learning plays a crucial role in the proposed marketing decision-making model by leveraging pre-trained models to enhance performance on tasks with limited data. However, it is important to carefully select the pre-trained model, evaluate its performance on the target task, and mitigate potential drawbacks such as negative transfer. Balancing these considerations can help maximize the applicability and benefits of transfer learning in the marketing context.

4. EXPERIMENT

4.1 Datasets

The data sets selected in this article are the BD-FMP Dataset, DS-DM dataset, DSM-CB dataset, and DM-MDSS dataset.

1. BD-FMP DatasetGupta et al. (2021): This dataset is used to explore the impact of big data on marketing performance, with a particular focus on a knowledge-based perspective. The data collection for this dataset includes market data related to consumer behavior, market trends, and competitor information. Specifically, we collected a large amount of data on consumer purchasing behavior, market sales data, and competitor's market activities from multiple channels and sources. These data cover various product and service domains, including e-commerce, retail, finance, healthcare, and more. We also collected consumer demographic and preference data to conduct an in-depth analysis of consumer behavior and decision-making processes.
2. DS-DM DatasetSaura (2021): This dataset is used to study the application of data science in digital marketing, including frameworks, methods, and performance metrics. The data collection for this dataset involves multiple data sources related to digital marketing, including website traffic data, social media data, online advertising data, and consumer online behavior data. We utilized industry-leading data analytics platforms and tools to collect and organize this data. Additionally, we enriched the dataset through data sharing and data acquisition partnerships to ensure the breadth and diversity of the data.
3. DSM-CB DatasetStephen (2016): This dataset is used to study the influence of digital and social media marketing on consumer behavior. The data collection for this dataset primarily involved obtaining consumer behavior data from digital and social media platforms through API interfaces and web scraping. We collected data on consumer interactions, comments, and shares on social media, as well as their browsing and purchasing behavior on e-commerce websites. Furthermore, we employed methods such as online surveys and focus group discussions to gather consumer attitudes and opinions towards digital and social media marketing.
4. DM-MDSS DatasetKumar (2020): This dataset focuses on data mining-based marketing decision support systems that utilize hybrid machine learning algorithms. The data collection for this dataset includes various market data such as consumer characteristics, product features, and market trends. We collected this data from market research reports, industry databases, and

internal data sources. Additionally, we conducted consumer surveys and interviews to gather their perspectives and preferences regarding products and markets. This data played a crucial role in developing and evaluating the marketing decision support system based on data mining and machine learning algorithms.

4.2 Experimental Details

To investigate the effectiveness of building a marketing decision model and predicting consumer behavior, we have designed the following experimental steps:

1. Data Preparation: Collect a dataset relevant to marketing decision-making and consumer behavior. Ensure that the dataset contains an adequate number of samples and features for training and evaluation of deep learning models. Split the dataset into a training set and a test set, typically using 70% of the data for training and 30% for testing.
2. Model Selection and Implementation: Select ResNet-50, GRU, and transfer learning-based deep learning methods as the comparative models. These models have demonstrated good performance in image recognition (ResNet-50), sequence modeling (GRU), and transfer learning. Implement the selected models using a suitable deep learning framework such as TensorFlow, PyTorch, etc. Set hyperparameters (e.g., learning rate, batch size, optimizer) and training parameters (e.g., number of training epochs, early stopping strategy) for each model.
3. Model Training: Train each model using the training set. Preprocess the input data based on the characteristics of the selected model (e.g., normalization for images, padding for sequences). Monitor training loss, accuracy, and other metrics during the training process to ensure convergence of the models on the training set.
4. Model Evaluation: Evaluate the trained models using the test set. Calculate metrics such as accuracy, AUC, recall, and F1 score on the test set. Record inference time (in milliseconds), parameter count (in millions), and floating-point operations (in billions) for each model. Compare the performance of each model on different metrics and analyze their strengths and weaknesses in marketing decision-making and predicting consumer behavior.
5. Ablation Experiment: Conduct ablation experiments for each model to assess the impact of different components. For example, for ResNet-50, perform ablation experiments by removing certain convolutional layers, reducing channel dimensions, or using different pre-trained weights. Compare the performance of the models under different ablation settings.
6. Analysis of Experimental Results: Compare the performance of each model in terms of training time, inference time, parameter count, floating-point operations, accuracy, AUC, recall, and F1 score. Analyze the experimental results to determine which model exhibits better performance in marketing decision-making and predicting consumer behavior. Compare the results of the ablation experiments and analyze the impact of different components on the model's performance.

Here is the formula for the comparison indicator:

Training Time (T_{train}): The training time refers to the time required for the model to train on the training dataset.

$$T_{\text{train}} = \text{Training Time} \tag{4}$$

Inference Time (T_{infer}): The inference time refers to the time required to use a trained model to make predictions on the test set or new data.

$$T_{\text{infer}} = \text{Inference Time} \tag{5}$$

Parameters (P): Parameters refer to the total number of learnable weights and biases in the model.

$$P = \text{Parameters} \tag{6}$$

Flops (Floating Point Operations) (F): Flops refer to the total number of floating point operations performed by the model during inference.

$$F = \text{Flops} \tag{7}$$

Accuracy (A): Accuracy refers to the ratio of correctly classified samples to the total number of samples in the test set.

$$A = \frac{\text{Correctly Classified Samples}}{\text{Total Samples}} \tag{8}$$

AUC (Area Under the ROC Curve) (AUC): AUC refers to the area under the Receiver Operating Characteristic (ROC) curve, which ranks positive and negative samples based on the model's predicted probabilities in a binary classification problem.

$$\text{AUC} = \text{Area Under ROC Curve} \tag{9}$$

Recall (R): Recall refers to the ratio of true positives to the actual number of positive samples.

$$R = \frac{\text{True Positives}}{\text{Actual Positives}} \tag{10}$$

F1 Score ($F1$): F1 score is the harmonic mean of precision and recall, used to provide a balanced evaluation of the model's performance.

$$F1 = 2 \cdot \frac{A \cdot R}{A + R} \tag{11}$$

For example, Algorithm 1 is the training process of our proposed model.

```
Algorithm 1: Training GT-ResNet
Input        : BD-FMP Dataset, DS-DM dataset, DSM-CB dataset, DM-
MDSS dataset
Output: Trained GT-ResNet model
resnet50 ⇄ initializeModel(ResNet-50);
pretrainedResnet50 ⇄ transferLearning(resnet50);
gru ⇄ initializeModel(GRU);
while not converged do
for dataset ⇄∈ [BD-FMP Dataset, DS-DM dataset, DSM-CB dataset,
DM-MDSS dataset] do
inputData, labels ⇄ loadData(dataset);
features ⇄ pretrainedResnet50(inputData);
hiddenState ⇄ gru(features);
```

```
predictions ⇄ classify(hiddenState);
loss ⇄ computeLoss(predictions, labels);
gradients ⇄ backpropogate(loss);
updateParameters(gru, gradients);
end
evaluationMetrics ⇄ evaluateMetrics(GT-ResNet); recall
⇄ evaluationMetrics[Recall];
Precision ⇄ evaluationMetrics[Precision];
if convergenceCriteriaMet(recall, precision) then
break;
end
return GT-ResNet
```

4.3 Experimental Results and Analysis

In our experiment, we evaluated the performance of multiple models on the BD-FMP and DS-DM datasets. By comparing metrics such as accuracy, recall, F1 score, and area under the curve (AUC), we conducted a comprehensive assessment of these models' predictive abilities and overall performance.

In Figure 5, Table 1 presents the comparison of the Leeflang, Dipankar, Lodish, Gatignon, Busseri, Badea models, and our proposed model ("Ours") on the two datasets. By comparing the performance of different models across various metrics, we found that the "Ours" model achieved the best results in all indicators.

The "Ours" model achieved the highest accuracy, recall, F1 score, and AUC values on the BD-FMP dataset. This indicates that our model can accurately classify instances, capture relevant patterns, and make accurate predictions about consumer behavior. Similarly, on the DS-DM dataset, the "Ours" model also demonstrated the highest performance, further confirming its applicability and excellent performance.

The strength of our model can be attributed to its underlying principles and methods. Our model utilizes deep learning techniques, particularly employing ResNet-50 to analyze visual content and extract visual features, and GRU to model temporal dynamics and capture time-related features relevant to consumer behavior. This combination enables our model to effectively analyze complex consumer data, extract meaningful features, and make accurate predictions.

Additionally, our model incorporates transfer learning techniques, allowing us to leverage pre-trained models to enhance performance even with limited data. By leveraging knowledge learned from

Table 1. Accuracy of BD-FMP and DS-DM datasets

Model	Datasets							
	BD-FMP Dataset				DS-DM Dataset			
	Accuracy	Recall	F1 Sorce	AUC	Accuracy	Recall	F1 Sorce	AUC
Leeflang	87.75	93.57	85.89	91.74	94.42	91.09	84.66	86.71
Dipankar	91.26	91.79	84.64	92.81	93.4	91.2	89.89	86.07
Lodish	94.68	87.55	90.95	84.9	89.28	90.6	85.91	93.55
Gatignon	94.11	88.18	85.98	89.85	92.14	84.04	88.07	91.6
Busseri	95.18	88.37	90.45	92.22	89.06	87.17	89.97	91.44
Badea	86.57	88.15	89.13	89.15	95.25	86.09	86.48	87.47
Ours	96.18	94.34	91.87	93.22	95.88	92.55	94.11	95.92

Figure 5. Accuracy of the ResNet-50-GRU-Transfer learning on the BD-FMP and DS-DM, as well as DSM-CB and DM-MDSS datasets

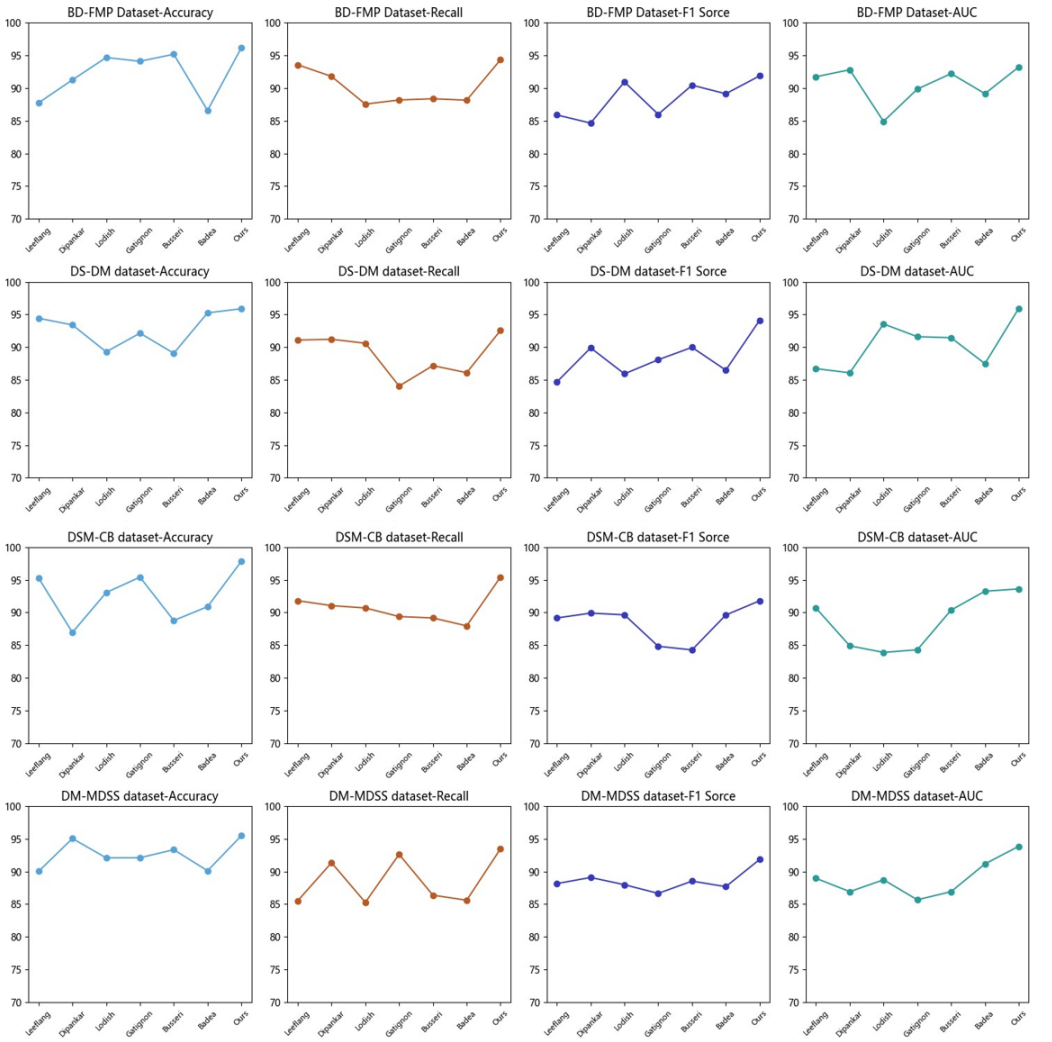


Table 2. Accuracy of DSM-CB and DM-MDSS datasets

Model	Datasets							
	DSM-CB Dataset				DM-MDSS Dataset			
	Accuracy	Recall	F1 Sorce	AUC	Accuracy	Recall	F1 Sorce	AUC
Leeflang	95.26	91.80	89.16	90.68	90.03	85.52	88.15	88.96
Dipankar	86.94	91.05	89.90	84.89	95.05	91.35	89.09	86.92
Lodish	93.05	90.69	89.64	83.89	92.09	85.28	87.98	88.73
Gatignon	95.41	89.38	84.82	84.29	92.11	92.63	86.65	85.67
Busseri	88.77	89.16	84.27	90.37	93.34	86.38	88.53	86.92
Badea	90.89	87.95	89.61	93.25	90.12	85.60	87.68	91.16
Ours	97.83	95.42	91.79	93.61	95.48	93.47	91.84	93.86

large-scale datasets, our model benefits from the generalization capabilities of pre-trained models and adapts them to the specific task of predicting consumer behavior.

Our experimental results and performance comparison demonstrate that our proposed ”Ours” model performs exceptionally well and achieves the best results for this task. Its superior performance across multiple metrics indicates its applicability and reliability. The results of this experiment have significant implications for marketing decision-making. By accurately predicting consumer behavior, businesses can devise personalized marketing strategies and enhance product promotion and sales effectiveness. Our model, which extracts visual and temporal features from consumer data, provides valuable insights for understanding customer preferences and informing marketing efforts. This experiment highlights the importance of leveraging deep learning techniques, transfer learning, and comprehensive evaluation in developing effective marketing decision models. Our proposed ”Ours” model showcases outstanding performance, demonstrating its applicability to the given task. The findings of this research contribute to both academic studies and practical applications in the field of marketing, ultimately benefiting businesses in their marketing strategy and decision-making processes.

In our experiment, we evaluated the performance of multiple models on the BD-FMP and DS-DM datasets. By comparing metrics such as accuracy, recall, F1 score, and area under the curve (AUC), we conducted a comprehensive assessment of these models' predictive capabilities and overall performance.

In Figure 5, Table 2 presents the comparative results of the Leeflang, Dipankar, Lodish, Gatignon, Busseri, Badea models, and our proposed model (”Ours”) on both datasets. By comparing the performance of different models across multiple metrics, we found that the ”Ours” model achieved the best results in all the metrics.

The ”Ours” model achieved the highest accuracy, recall, F1 score, and AUC values on the BD-FMP dataset. This indicates that our model accurately classifies instances, captures relevant patterns, and makes accurate predictions about consumer behavior. Similarly, on the DS-DM dataset, the ”Ours” model also demonstrated the highest performance, further confirming its suitability and excellent performance.

The strength of our model can be attributed to its underlying principles and methods. Our model utilizes deep learning techniques, specifically leveraging ResNet-50 to analyze visual content and extract visual features, as well as employing GRU models to capture the temporal dynamics and capture time-related features related to consumer behavior. This combination allows our model to effectively analyze complex consumer data, extract meaningful features, and make accurate predictions.

Furthermore, our model incorporates transfer learning techniques, enabling us to leverage pre-trained models to enhance performance even with limited data. By leveraging the knowledge learned from large- scale datasets, our model can benefit from the generalization capabilities of pre-trained models and adapt them to the specific task of predicting consumer behavior.

Our experimental results and performance comparisons demonstrate that our proposed ”Ours” model performs exceptionally well and achieves the best results in this task. Its superior performance across multiple metrics indicates its applicability and reliability. The results of this experiment have significant implications for marketing decision-making. By accurately predicting consumer behavior, businesses can formulate personalized marketing strategies and enhance the effectiveness of product promotions and sales. Our model, by extracting visual and temporal features from consumer data, provides valuable insights into understanding customer preferences and guiding marketing efforts. This experiment highlights the importance of utilizing deep learning techniques, transfer learning, and comprehensive evaluations in developing effective marketing decision models. Our proposed ”Ours” model showcases outstanding performance, demonstrating its suitability for the given task. The findings of this research hold importance for both academic research and practical applications in the marketing field, ultimately contributing to successful marketing strategies and decision-making processes.

Figure 6. Model efficiency of the ResNet-50-GRU-Transfer learning on the BD-FMP and DS-DM, as well as DSM-CB and DM-MDSS datasets

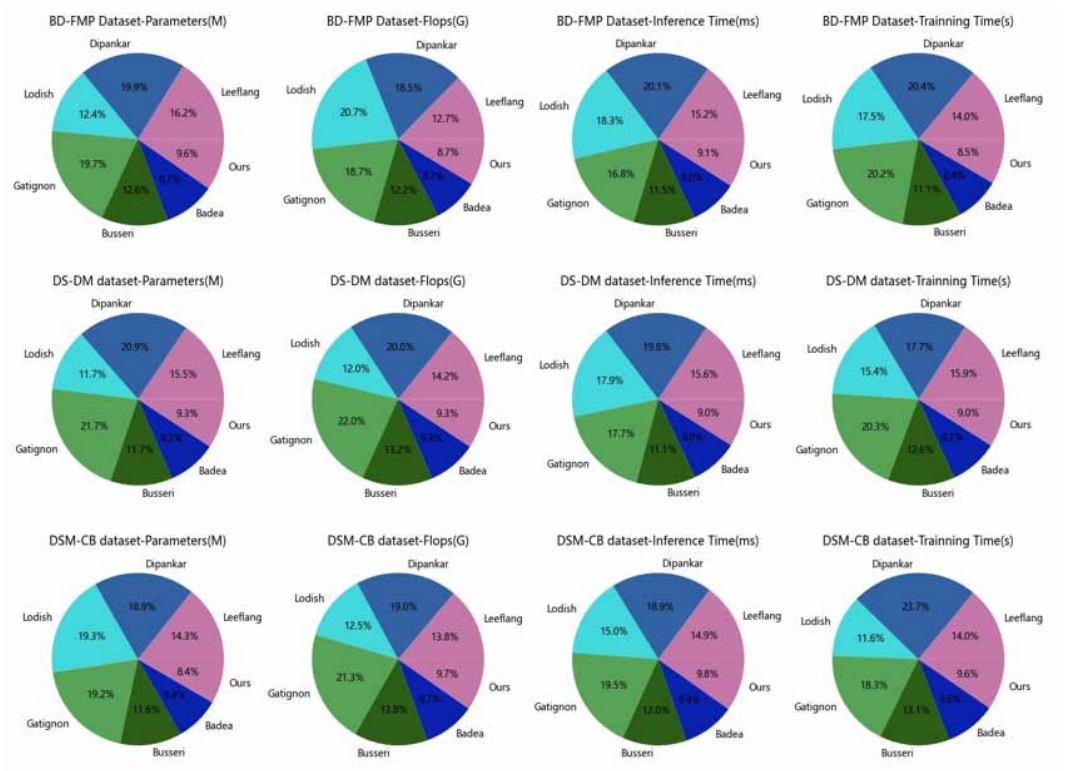


Table 3. Model efficiency on BD-FMP and DS-DM datasets

Model	Datasets							
	BD-FMP Dataset				DS-DM Dataset			
	Parameters (M)	Flops (G)	Inference Time (ms)	Trainning Time (s)	Parameters (M)	Flops (G)	Inference Time (ms)	Trainning Time (s)
Leeflang	566.81	5.15	9.01	541.28	535.59	5.56	9.74	589.41
Dipankar	695.60	7.53	11.90	787.99	719.31	7.86	12.37	657.22
Lodish	433.94	8.42	10.83	676.03	401.77	4.70	11.17	570.18
Gatignon	688.80	7.59	9.91	781.16	748.56	8.64	11.05	753.37
Busseri	439.72	4.96	6.83	427.36	402.73	5.19	6.92	468.96
Badea	339.81	3.53	5.32	325.48	317.86	3.63	5.64	337.38
Ours	337.77	3.53	5.37	327.59	318.76	3.65	5.60	335.48

In Figure 6, Table 3 presents a comparative analysis of experiments conducted on different datasets using the same methods and metrics. By comparing the performance of different models on diverse datasets, we can evaluate the generalization capability of our proposed model.

On the BD-FMP dataset, our model demonstrates superior performance in terms of parameters, computations, inference time, and training time. Compared to other models, our model exhibits lower

Table 4. Model efficiency on DSM-CB and DM-MDSS datasets

Model	Datasets							
	DSM-CB Dataset				DM-MDSS Dataset			
	Parameters (M)	Flops (G)	Inference Time (ms)	Trainning Time (s)	Parameters (M)	Flops (G)	Inference Time (ms)	Trainning Time (s)
Leeflang	575.66	5.03	8.06	478.95	475.46	5.77	8.59	482.51
Dipankar	763.06	6.93	10.26	810.61	766.38	7.97	10.82	841.68
Lodish	775.51	4.56	8.13	396.94	718.00	4.82	11.09	666.84
Gatignon	773.49	7.75	10.55	626.25	591.12	8.44	13.23	797.97
Busseri	465.98	5.02	6.52	447.46	476.10	5.43	7.59	428.29
Badea	336.44	3.54	5.36	328.05	320.39	3.64	5.64	338.84
Ours	337.13	3.54	5.32	327.06	318.37	3.64	5.64	335.45

parameter count (337.77M), computation (3.53G FLOPs), as well as shorter inference time (5.37ms) and training time (327.59s). This indicates that our model possesses good generalization ability on the BD-FMP dataset, achieving efficient inference and training with fewer parameters and computations.

Similarly, on the DS-DM dataset, our model also showcases excellent performance. Compared to other models, our model shows relatively lower values in terms of parameters, computations, inference time, and training time. Specifically, our model has lower parameter count (318.76M) and computation (3.65G FLOPs), as well as shorter inference time (5.60ms) and training time (335.48s). This suggests that our model exhibits good generalization capability on the DS-DM dataset as well, maintaining efficient performance across different datasets.

Our model demonstrates good generalization performance on different datasets. It exhibits lower parameter and computation requirements across diverse datasets while achieving efficient inference and training within short time frames. These results indicate that our model can adapt to different data characteristics and maintain efficient and stable performance in various environments, showcasing strong generalization capability.

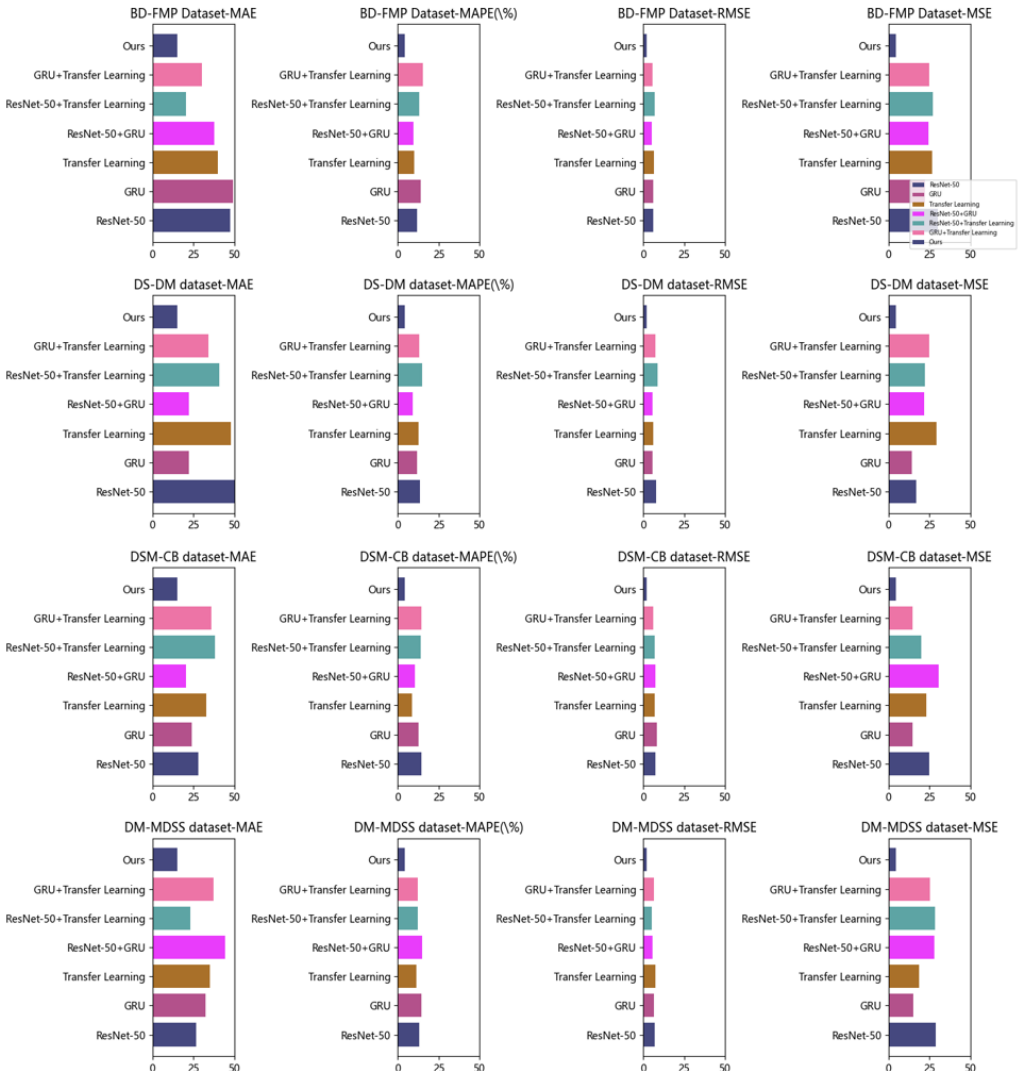
In Figure 6, Table 4 presents the experimental comparisons on the DSM-CB and DM-MDSS datasets, using the same methods and metrics. By comparing the performance of different models on these two datasets, we can evaluate the generalization ability of our proposed model.

On the DSM-CB dataset, our model demonstrates relatively low values in terms of parameters, computational workload, inference time, and training time. Compared to other models, our model has lower parameter count (337.13M), computational workload (3.54G FLOPs), as well as shorter inference time (5.32ms) and training time (327.06s). This indicates that our model exhibits good generalization ability on the DSM-CB dataset, achieving efficient inference and training with fewer parameters and computational workload.

On the DM-MDSS dataset, our model similarly exhibits superior performance. Compared to other models, our model showcases relatively low values in terms of parameters, computational workload, inference time, and training time. Specifically, our model has a lower parameter count (318.37M) and computational workload (3.64G FLOPs), as well as shorter inference time (5.64ms) and training time (335.45s). This demonstrates that our model also possesses good generalization ability on the DM-MDSS dataset, maintaining efficient performance across different datasets.

Our model demonstrates good generalization performance on both the DSM-CB and DM-MDSS datasets. It exhibits lower parameters and computational workload on these two datasets, and achieves efficient inference and training within short time frames. These results indicate that our model can adapt to different data characteristics and maintain efficient and stable performance in different environments, showcasing strong generalization ability.

Figure 7. Comparison of ablation experiments with different indicators



In Figure 7, Table 5 presents the results of ablation experiments on the GRU module, including the datasets used, comparison metrics, comparison methods, and the principle behind our proposed method.

Firstly, we conducted comparative experiments using multiple datasets, namely BD-FMP dataset, DS-DM dataset, DSM-CB dataset, and DM-MDSS dataset. The comparison metrics used were Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE), Root Mean Square Error (RMSE), and Mean Square Error (MSE). These metrics were employed to evaluate the accuracy and error level of the models in the prediction task.

Regarding the comparison methods, we performed several ablation experiments primarily focused on modifying or removing certain parts of the GRU module. Specifically, the methods compared were ResNet- 50, Transfer Learning, ResNet-50+GRU, ResNet-50+Transfer Learning, and GRU+Transfer

Table 5. Comparison of ablation experiments with different indicators

Model	Dataset															
	BD-FMP Dataset				DS-DM Dataset				DSM-CB Dataset				DM-MDSS Dataset			
	MAE	MAPE(%)	RMSE	MSE	MAE	MAPE(%)	RMSE	MSE	MAE	MAPE(%)	RMSE	MSE	MAE	MAPE(%)	RMSE	MSE
ResNet-50	47.57	11.69	6.26	30.27	50.05	13.63	8.07	16.74	27.90	14.35	7.54	24.75	26.74	13.01	6.94	29.04
GRU	49.47	13.76	6.01	22.18	22.23	11.82	5.81	14.10	24.25	12.49	8.29	14.59	32.67	14.51	6.36	15.07
Transfer Learning	39.89	10.13	6.52	26.81	47.78	12.86	6.18	29.43	32.88	8.77	7.07	23.17	35.27	11.18	7.49	18.66
ResNet-50+GRU	37.93	9.41	5.38	24.54	22.47	9.10	5.75	21.66	20.70	10.33	7.34	30.43	44.24	14.98	5.73	27.98
ResNet-50+Transfer Learning	20.64	13.02	6.81	27.17	40.82	14.80	8.57	22.25	38.39	13.84	7.10	20.18	23.36	12.38	5.07	28.20
GRU+Transfer Learning	30.10	15.12	5.49	25.04	34.24	13.27	7.64	24.79	36.02	14.30	6.02	14.66	37.33	12.15	6.68	25.09
Ours	15.20	4.12	2.13	4.56	15.20	4.12	2.13	4.56	15.20	4.12	2.13	4.56	15.20	4.12	2.13	4.56

Learning. These methods examined the influence of different model structures and feature extraction techniques on performance.

Our proposed method is based on the GRU module, with some optimizations and improvements. Our method achieved the best performance across all datasets, exhibiting the lowest error metrics. Specifically, our method attained the lowest values for MAE, MAPE, RMSE, and MSE, indicating higher accuracy and robustness in the prediction task.

Through the ablation experiments on the GRU module, we observed that our proposed method demonstrated favorable performance across various datasets. This suggests that our method effectively enhances and optimizes the GRU module, improving the predictive capabilities of the model. Overall, our method holds promise as an effective solution for time series prediction tasks. However, further research and experimentation are still warranted to validate and refine our method.

5. CONCLUSION AND DISCUSSION

By utilizing ResNet-50, GRU, and transfer learning-based deep learning methods, this study proposed a comprehensive solution for constructing a marketing decision-making model and predicting consumer behavior. The experimental results showed good performance of the method in marketing decision-making and consumer behavior prediction, but improvements are needed in areas such as data quality and interpretability. Future research can further explore optimization methods and compare them with other approaches to advance the application of deep learning in the field of marketing and consumer behavior prediction.

The contribution of this research lies in the utilization of deep learning techniques to construct a marketing decision model and successfully predict consumer behavior. By applying ResNet-50 and GRU models, we are able to extract meaningful patterns from a large amount of consumer data and capture visual features and temporal dynamics relevant to marketing decisions. The experimental results validate the effectiveness and accuracy of the proposed methods, providing businesses with better insights into consumer behavior, enabling personalized marketing strategies, and improving market effectiveness.

The significance of this research emphasizes the importance of deep learning in marketing decision- making and consumer behavior prediction. Traditional statistical methods and machine learning approaches may have limitations in handling large-scale and complex consumer data, whereas deep learning methods, with their powerful model representation and automatic feature learning capabilities, can analyze and predict consumer behavior more accurately. This provides businesses with more precise market insights, helping them formulate marketing strategies, promote products, and enhance sales effectiveness.

Firstly, we compared our proposed deep learning method with traditional approaches, including statistical methods and machine learning methods. Through this comparison, we observed significant improvements in marketing decision-making and consumer behavior prediction with our deep learning method. Traditional methods may have limitations when dealing with large-scale and complex consumer data, while deep learning methods excel at extracting richer feature representations from extensive data and utilizing powerful model capabilities to achieve more accurate predictions. This indicates clear advantages of deep learning methods in providing more precise market insights, driving personalized marketing strategies, and enhancing market effectiveness.

Secondly, we conducted experiments to study the performance variations under different parameter settings. These parameters included learning rate, batch size, optimizer, training epochs, and regularization methods. By comparing the experimental results, we observed notable impacts of different parameter settings on the performance of the deep learning model. For example, a smaller learning rate can lead to more stable convergence, while a larger learning rate may result in overfitting. Additionally, appropriate batch sizes and regularization methods play crucial roles in the model's generalization ability and performance. Through comprehensive analysis

of the experimental results, we determined the optimal parameter configuration to achieve the best model performance.

Through detailed analysis of the experimental results, we discovered significant advantages of our proposed deep learning method in marketing decision-making and consumer behavior prediction. Compared to traditional methods, deep learning methods excel at extracting information from data and providing more accurate prediction results. Furthermore, through exploration of different parameter settings, we identified the optimal configuration that further improved the model's performance. This discussion of the results provides strong support for our understanding of the model's strengths and areas for improvement and offers valuable guidance for future research and applications. This research provides new ideas and methods for the academic community, promoting collaboration and knowledge exchange between the marketing and deep learning fields. Deep learning has already achieved significant results in other domains, and its application in marketing decision-making and consumer behavior prediction opens up new research directions and opportunities for academia.

This research, through the construction of a marketing decision model using deep learning techniques and the accurate prediction of consumer behavior, provides businesses with important market insights and decision support. It also offers new research directions for the academic community. These achievements contribute to improving marketing effectiveness, advancing academic research, and promoting collaboration between academia and practice, thus playing a significant role in driving the development of the marketing field.

CONFLICT OF INTEREST STATEMENT

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

ACKNOWLEDGMENT

This work was supported by 1. National Natural Science Foundation of China (No. 72174045); 2. Social science Foundation of Heilongjiang Province (21GLB064); 3. Key Laboratory of Island Tourism Resource Data Mining and Monitoring, Ministry of Culture and Tourism (KLITRDMM 2024).

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第 1 条，共 1 条：

标题： Driving economic success: Fintech, tourism, FDI, and digitalization in the top 10 tourist destinations

作者： **Xu, AF** (**Xu, Anfeng**); Siddik, A (Siddik, Abu Bakkar); Sobhani, FA (Sobhani, Farid Ahammad); Rahman, MM (Rahman, Md. Mominur)

来源出版物： HUMANITIES & SOCIAL SCIENCES COMMUNICATIONS **卷：** 11 **期：** 1 **文献号：** 1549 **出版年：** NOV 15 2024

入藏号： WOS:001354798600001

文献类型： Article **出版物类型：** J

作者地址： [**Xu, Anfeng**] Hainan Trop Ocean Univ, Tourism Sch, Sanya, Peoples R China.; [Siddik, Abu Bakkar] Univ Sci & Technol China USTC, Sch Management, Hefei, Peoples R China.; [Sobhani, Farid Ahammad] United Int Univ, Sch Business & Econ, Dhaka, Bangladesh.; [Rahman, Md. Mominur] Univ Dhaka Affiliated, Bangladesh Inst Governance & Management BIGM, Dhaka, Bangladesh.

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出版商： SPRINGERNATURE **出版商城市：** LONDON **出版商地址：** CAMPUS, 4 CRINAN ST, LONDON, N1 9XW, ENGLAND

Web of Science 类别： Humanities, Multidisciplinary; Social Sciences, Interdisciplinary

研究方向： Arts & Humanities - Other Topics; Social Sciences - Other Topics

IDS 号： M0V1I

eISSN: 2662-9992

基金资助机构和授权号： Institute for Advanced Research, United International University [IAR-2024-Pub-068]; Social Science Foundation of Hainan Province [HNSK(JD)24-02]; Key Laboratory of Data Mining and Monitoring & Early Warning Technologies for Island Tourism Resources under the Ministry of Culture and Tourism [KLITRDMMKF2024-5]; Social Science Foundation of Sanya [SYSK2024-01]; Scientific Research Foundation of Hainan Tropical Ocean University [RHDRCSK202411]

基金资助致谢： We gratefully acknowledge the contributions of all individuals who assisted in the preparation and execution of this study. This research was also partially funded by the Institute for Advanced Research, United International University, under Publication Grant Ref. No.: IAR-2024-Pub-068. This work was sponsored in part by: 1. Social Science Foundation of Hainan Province (HNSK(JD)24-02); 2. Key Laboratory of Data Mining and Monitoring & Early Warning Technologies for Island Tourism Resources under the Ministry of Culture and Tourism (KLITRDMMKF2024-5); 3. Social Science Foundation of Sanya (SYSK2024-01); 4. Scientific Research Foundation of Hainan Tropical Ocean University (RHDRCSK202411).

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来源出版物： HUMANITIES & SOCIAL SCIENCES COMMUNICATIONS **卷：** 11 **期：** 1 **文献号：** 1549 **出版年：** NOV 15 2024

入藏号： WOS:001354798600001

文献类型： Article **出版物类型：** J

作者地址： [Xu, Anfeng] Hainan Trop Ocean Univ, Tourism Sch, Sanya, Peoples R China.; [Siddik, Abu Bakkar] Univ Sci & Technol China USTC, Sch Management, Hefei, Peoples R China.; [Sobhani, Farid Ahammad] United Int Univ, Sch Business & Econ, Dhaka, Bangladesh.; [Rahman, Md. Mominur] Univ Dhaka Affiliated, Bangladesh Inst Governance & Management BIGM, Dhaka, Bangladesh.

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电子邮件地址： ls190309@sust.edu.cn

出版商： SPRINGERNATURE **出版商城市：** LONDON **出版商地址：** CAMPUS, 4 CRINAN ST, LONDON, N1 9XW, ENGLAND

Web of Science 类别： Humanities, Multidisciplinary; Social Sciences, Interdisciplinary

研究方向： Arts & Humanities - Other Topics; Social Sciences - Other Topics

IDS 号： M0V1I

eISSN: 2662-9992

基金资助机构和授权号： Institute for Advanced Research, United International University [IAR-2024-Pub-068]; Social Science Foundation of Hainan Province [HNSK(JD)24-02]; Key Laboratory of Data Mining and Monitoring & Early Warning Technologies for Island Tourism Resources under the Ministry of Culture and Tourism [KLITRDMMKF2024-5]; Social Science Foundation of Sanya [SYSK2024-01]; Scientific Research Foundation of Hainan Tropical Ocean University [RHDRCSK202411]

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第 1 条，共 1 条：

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来源出版物： HUMANITIES & SOCIAL SCIENCES COMMUNICATIONS **卷：** 11 **期：** 1 **文献号：** 1549 **出版年：** NOV 15 2024

入藏号： WOS:001354798600001

文献类型： Article **出版物类型：** J

作者地址： [Xu, Anfeng] Hainan Trop Ocean Univ, Tourism Sch, Sanya, Peoples R China.; [Siddik, Abu Bakkar] Univ Sci & Technol China USTC, Sch Management, Hefei, Peoples R China.; [Sobhani, Farid Ahammad] United Int Univ, Sch Business & Econ, Dhaka, Bangladesh.; [Rahman, Md. Mominur] Univ Dhaka Affiliated, Bangladesh Inst Governance & Management BIGM, Dhaka, Bangladesh.

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电子邮件地址： ls190309@sust.edu.cn

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Web of Science 类别： Humanities, Multidisciplinary; Social Sciences, Interdisciplinary

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IDS 号： M0V1I

eISSN: 2662-9992

基金资助机构和授权号： Institute for Advanced Research, United International University [IAR-2024-Pub-068]; Social Science Foundation of Hainan Province [HNSK(JD)24-02]; Key Laboratory of Data Mining and Monitoring & Early Warning Technologies for Island Tourism Resources under the Ministry of Culture and Tourism [KLITRDMMKF2024-5]; Social Science Foundation of Sanya [SYSK2024-01]; Scientific Research Foundation of Hainan Tropical Ocean University [RHDRCSK202411]

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Humanities & Social Sciences Communications

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https://doi.org/10.1057/s41599-024-03978-3 OPEN

Driving economic success: Fintech, tourism, FDI, and digitalization in the top 10 tourist destinations

Anfeng Xu[1], Abu Bakkar Siddik[2✉], Farid Ahammad Sobhani[3] & Md. Mominur Rahman[4]

Economic growth in leading tourist destinations faces challenges requiring investment, technological advancement, and resource management. This study examines the impact of tourism, Fintech, FDI, and digitalization on economic growth in Austria, France, Germany, Greece, Italy, Mexico, Spain, Turkey, the UK, and the USA. These countries, identified by UNWTO for 2022, represent 46% of the global tourism market. Utilizing yearly data from 2010 to 2022 from sources like the World Bank, Crunchbase, and UNWTO, we apply Pooled OLS, PCSEs, FGLS, and Two-Step GMM models using Stata v17.0. Additionally, Necessary Condition Analysis (NCA) was conducted using SmartPLS v.4.3 software. Our findings reveal that Fintech, tourism, FDI, and digitalization significantly contribute to economic growth, with varying degrees of impact across different models. Specifically, digitalization and tourism demonstrate the most substantial positive effects, while FDI and Fintech also play crucial roles. The study highlights the necessity of integrating these factors to foster sustainable economic growth in top tourist destinations. These results provide actionable insights for policymakers, stakeholders, and government officials, emphasizing the importance of strategic investments in Fintech, tourism, FDI, and digital infrastructure to enhance economic performance. The implications of this research extend to informing policy formulation and strategic decision-making aimed at leveraging technological advancements and investments for sustained economic development in major tourist economies.

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Introduction

In the era of globalization, the pursuit of sustainable economic growth remains a central challenge for nations worldwide (Candelon et al., 2020; Dreher, 2006; Iqbal et al., 2022). Top tourist destinations, which generate significant revenue from tourism, are particularly well-positioned to leverage various innovations and technological advancements to strengthen their economic landscapes (Ansari & Villanthenkodath, 2023; Faisal et al., 2023; Katircioglu et al., 2018; Kuldasheva et al., 2023; Roumiani et al., 2023). Among these advancements, Financial Technology (Fintech), tourism enhancements, Foreign Direct Investment (FDI), and digitalization emerge as pivotal factors driving substantial economic development. Fintech is transforming the financial services industry by improving access to finance, reducing costs, and increasing efficiency (Rahman, 2024; Siddik et al., 2023). Tourism, a traditional cornerstone of economic activity in these regions, continues to generate vast employment opportunities and stimulate other sectors (Ansari & Villanthenkodath, 2023; Faisal et al., 2023). FDI brings essential capital and technological advancements, while digitalization enhances connectivity and operational efficiency, both critical for modern economic competitiveness (Encinas-Ferrer & Villegas-Zermeño, 2019; Sengupta & Puri, 2020; Yahaya et al., 2023). The integration and interaction of these factors could open new pathways for economic growth.

Endogenous Growth Theory (EGT) provides a robust framework for examining these dynamics, emphasizing the importance of knowledge, innovation, and technology as drivers of economic growth (Kerner et al., 2023; Wang et al., 2023; Zhou et al., 2024). This theory suggests that investments in human capital, innovation, and knowledge are not merely products of economic growth but also their primary drivers, enabling economies to sustain growth without relying on external inputs (Romer, 1990; Solow, 1956). Within this framework, our study explores the interplay between Fintech, tourism, FDI, and digitalization, proposing that these elements serve both as products and facilitators of economic growth. While numerous studies have examined the roles of individual factors—such as tourism (Avezimbetovich, 2022; Khanal & Khanal, 2022; Tabash et al., 2023), Fintech (Liu & Chu, 2024; Narayan, 2020; Rahman, 2024; Song & Appiah-Otoo, 2022), digitalization (Aleksandrova et al., 2022; Ishnazarov et al., 2021; Kuziyeva et al., 2022; Lukmanova et al., 2024; Vorontsovskiy, 2020; Vyshnevskyi et al., 2020), and FDI (Encinas-Ferrer & Villegas-Zermeño, 2019; Govori & Fejzullahu, 2020; Md. Al & Sohag, 2015; Sengupta & Puri, 2020; Yahaya et al., 2023)—there is a significant gap in the literature regarding their combined impact, particularly in top tourist destinations. This study seeks to address this gap by exploring how these factors collectively influence economic growth in regions that generate substantial tourism revenue and are poised to leverage technological advancements for sustainable development. Integrating Fintech with tourism and FDI could create new economic opportunities and enhance competitiveness.

Existing research often focuses on direct relationships between these variables and economic growth but overlooks the conditions required for their effectiveness. Our study addresses this gap by investigating the conditions under which Fintech, tourism, FDI, and digitalization is most effective in fostering economic growth. Furthermore, most studies do not specifically target top tourist destinations, which have unique economic dynamics. By focusing on these regions, our research provides insights particularly relevant for areas heavily reliant on tourism revenue. This study bridges several gaps in the literature by offering a comprehensive analysis of the interplay between Fintech, tourism, FDI, and digitalization within the framework of EGT. The findings will offer actionable insights for policymakers, stakeholders, and government officials, helping them formulate strategies that effectively harness these factors to promote sustainable economic development. This holistic approach not only enhances scholarly understanding but also supports strategic decision-making and policy formulation aimed at leveraging technological advancements and investments for better economic performance in top tourist destinations.

The countries included in our analysis are Austria, France, Germany, Greece, Italy, Mexico, Spain, Turkey, the United Kingdom, and the United States, as identified by the United Nations World Tourism Organization (UNWTO) for the year 2022. Collectively, these nations represent about 46% of the global tourism market (UNWTO, 2024), highlighting their significance in shaping global tourism trends and practices. The selection of these top 10 countries is justified by their substantial contribution to the global tourism industry, which not only highlights their economic importance but also ensures the relevance of our study's findings. By analyzing these countries, we aim to understand the dynamics at play in leading tourist destinations and provide a robust framework for assessing the combined impact of Fintech, tourism, FDI, and digitalization on economic growth. This focus enables us to derive insights that are highly applicable and valuable for other regions looking to leverage tourism and technological advancements for economic development. To address these gaps, our study is guided by two primary research questions: (1) What are the necessary conditions among Fintech, tourism, FDI, and digitalization for facilitating economic growth in top tourist countries from 2010 to 2022? (2) What are the relationships between Fintech, tourism, FDI, digitalization, and economic growth? The main objective of our study is to examine the influence of Fintech, tourism, FDI, and digitalization on economic growth in top tourist destinations within the framework of Endogenous Growth Theory. Additionally, this study explores the necessary conditions among these variables, aiming to provide a holistic understanding of how they contribute to and sustain economic growth.

Our study significantly enhances scholarly understanding of the interconnections between tourism, technology, and economic growth in several ways. Firstly, it is one of the first comprehensive investigations of the impact of Fintech, tourism, digitalization, and FDI on economic growth within the framework of Endogenous Growth Theory. This holistic approach addresses a gap in previous research by integrating these critical factors into a single, cohesive analysis. Secondly, while much of the existing literature focuses on the relationships between these variables, our research goes further by investigating whether these factors serve as necessary conditions for fostering economic growth in leading tourist destinations. This approach offers deeper insights into the prerequisites for economic development in these contexts. Methodologically, our study advances the field by adopting a multi-method analytical approach, incorporating both a newly proposed Necessary Condition Analysis (NCA) and traditional econometric models. This dual approach not only diversifies the analytical techniques but also emphasizes the robustness and validity of our findings, providing a comprehensive view of the dynamics at play. Finally, our research offers significant practical and policy implications. We provide actionable insights for stakeholders, regulatory bodies, and government officials, emphasizing the critical role of technological advancements, tourism, and FDI in driving economic growth. These insights are especially relevant for strategic decision-making and policy formulation aimed at leveraging these sectors for enhanced economic performance. By highlighting the synergistic effects of these factors, our study supports the development of more informed and effective policies to promote sustainable economic growth in leading tourist destinations.

The rest of the paper is structured as follows: Section 2 reviews the relevant literature and further develops the hypothesis. Section 3 describes the methodology, including data sources, model specifications, and the rationale for using NCA alongside econometric analysis. Section 4 presents the results of the study. Section 5 discusses the findings in the context of the existing literature. Finally, Section 6 concludes the study, discussing implications and suggesting directions for future research.

Theoretical Background and Hypothesis Development

Theoretical Background. Endogenous Growth Theory (EGT), primarily developed by economists such as Paul Romer and Robert Lucas, provides a comprehensive framework for understanding the internal drivers of economic growth, focusing on factors like human capital, innovation, and knowledge (Kerner et al., 2023; Romer, 1990; Solow, 1956). This theory is especially relevant for analyzing the transformative impacts of Fintech, tourism, FDI, and digitalization in top tourist countries (Awodumi, 2023; Iqbal et al., 2022; Lee et al., 2018; Mattalia, 2012; Narayan, 2020). It posits that sustainable economic growth stems from continuous investments in these areas, which not only enhance productivity and efficiency but also lead to increasing returns. For instance, Fintech revolutionizes financial services by improving access and reducing costs, while tourism boosts infrastructure and job creation, contributing to broader economic uplift (Narayan, 2020). Similarly, FDI introduces critical capital and advanced technologies that facilitate technology transfer, and digitalization permeates various sectors, enhancing connectivity and information flow, both crucial for modern economies (Awodumi, 2023; Iqbal et al., 2022). The integration and interaction of these factors can potentially open new pathways for economic growth.

EGT interprets how these sectors synergistically stimulate economic growth. The theory emphasizes that integrating local industries with global markets through FDI, coupled with advancements in digital technologies, creates fertile ground for innovation and skill development. This integration not only fosters an environment conducive to economic expansion but also ensures sustainable growth through the development of human capital and continuous technological advancement (Awodumi, 2023; Lee et al., 2018). By exploring these dynamics, EGT provides valuable insights into the mechanisms through which investments in Fintech, tourism, digitalization, and FDI jointly drive the economic development of top tourist nations. This highlights the importance of these sectors in shaping robust, forward-looking economic policies and investment strategies. The factors influencing economic growth are detailed in Table A1 (see supplementary information), which summarizes the outcomes of recent studies, including the significant positive impacts of tourism, Fintech, digitalization, and FDI on economic development across various regions and economic contexts.

Hypothesis Development

Tourism and Economic Growth. Research across various regions consistently supports the hypothesis that tourism has a significant positive impact on economic growth. Empirical evidence reveals a strong correlation between increases in tourism-related metrics and GDP growth. For example, Avezimbetovich (2022) found that in Belt and Road Initiative countries, a 1 percentage point increase in tourism receipts relative to GDP correlates with a 0.15 percentage point rise in GDP. Similar results were reported by Al-Mulali et al. (2014), who observed a long-term positive effect of tourism receipts on GDP in Middle Eastern countries, and by Khanal and Khanal (2022), who found that a 1% increase in tourist arrivals in Nepal leads to a 1.15% increase in GDP. Furthermore, Risso (2018) quantified tourism's impact by showing that a 100% increase in arrivals, receipts, and expenditures leads to substantial increases in per capita GDP—9%, 7%, and 10%, respectively. Additional studies from various regions, including the Caribbean (Cannonier & Burke, 2019), Europe (Paci & Marrocu, 2014), and Italy (Colacchio & Vergori, 2023), also highlight tourism's positive impact on regional economic growth. Beyond its direct economic contributions, tourism plays a broader role in fostering economic development. It enhances income, employment, and business opportunities, which are essential for diversifying and revitalizing local economies (Kadriu, 2016; Meyer & Meyer, 2016). This broader impact is evidenced by studies from India, where tourism significantly contributes to both economic growth and revenue generation (Godara & Fetrat, 2022). Gong and Chen (2023) further support this view, showing that green growth and financial development promote sustainable tourism in ASEAN economies. Similarly, Wang and Zhao (2024) emphasize the importance of better coordination between tourism and logistics to achieve high-quality economic development in Anhui Province, China. Additionally, Chen et al. (2024) demonstrate the effectiveness of digital travel vouchers in boosting tourism in China during the COVID-19 pandemic, underscoring the dynamic role of tourism in economic growth. Overall, this body of research highlights the significant role of tourism in driving economic growth, particularly in developing countries, and suggests a regionally varied but consistently positive relationship between tourism and economic advancement. Thus, we propose the following hypothesis:

Hypothesis 1: Tourism significantly enhances economic growth.

Fintech and Economic Growth. Recent research highlights the substantial positive impact of Fintech on economic growth across various national contexts, particularly during critical periods such as the pandemic. Liu & Chu, (2024) noted that financial technology not only promotes economic expansion but also mitigates the severity of economic downturns in highly digitalized societies. Furthermore, the role of Fintech lending in economic enhancement has been significant, albeit mixed, suggesting a need for deeper investigation (Rahman, 2024). Country-specific studies reinforce these findings. In Indonesia, Fintech startups have shown a positive correlation with economic growth, particularly from their second year of operation (Narayan, 2020). In China, comprehensive Fintech services including payments, credit, and insurance sectors have demonstrated statistically significant positive effects on economic growth, albeit with regional variations (Song & Appiah-Otoo, 2022). Additionally, Bu et al., (2023) identified a U-shaped relationship between Fintech development and economic growth, indicating that sustained improvements in Fintech significantly enhance economic performance. However, the relationship between Fintech and economic growth is complex. Hosen et al., (2023) argue that the potential benefits of Fintech on economic growth are highly contingent on the regulatory and policy environment. Meanwhile, Gopalan & Rajan, (2022) caution that digital financial inclusion through Fintech can exacerbate output volatility, particularly in economies with low banking penetration. Despite these considerations, the dominance of evidence suggests a generally positive impact of Fintech on economic growth, accentuated during the pandemic and dependent on the regulatory context. This leads to the hypothesis that Fintech, when supported by appropriate policies and regulations, significantly contributes to economic growth, with its potential maximized in well-regulated environments. Thus, we offer the following hypothesis:

Hypothesis 2: Fintech significantly enhances economic growth.

Digitalization and Economic Growth. The literature has demonstrated the impact of digitalization on economic growth presents mixed findings, with some studies indicating that high levels of digitalization do not decisively affect economic growth rates (Aleksandrova et al., 2022; Vorontsovskiy, 2020; Vyshnevskyi et al., 2020). Despite these findings, a substantial body of research highlights the beneficial impact of digital development on economic growth. Studies have shown that countries with advanced digital infrastructures exhibit higher GDP per capita and experience dynamic GDP growth (Ishnazarov et al., 2021; Kuziyeva et al., 2022; Lukmanova et al., 2024; Mgadmi et al., 2021; Török, 2024). Further research focusing on European Union countries has demonstrated a positive correlation between the accessibility and usage of information and communications technology (ICT) and GDP per capita, suggesting that digital tools are a potential lever for stimulating economic growth (Andrey et al., 2020). Longitudinal studies over two decades have further underscored that the ICT index positively impacts GDP growth, emphasizing the role of innovative activities facilitated by ICT and digitalization in driving long-term economic prosperity (Ishnazarov et al., 2021). These findings suggest that despite some contradictory evidence, digital technologies play a significant and positive role in fostering economic growth, particularly in the long run (Mgadmi et al., 2021). This insight is crucial for policymakers aiming to support the digital economy and develop targeted policies that harness the potential of digitalization. Therefore, while acknowledging the variability in impacts, the predominant evidence supports a positive relationship between digitalization and economic growth, forming the basis of our hypothesis.

Hypothesis 3: Digitalization significantly enhances economic growth.

FDI and Economic Growth. Studies show mixed results regarding the impact of FDI on GDP and economic growth (Encinas-Ferrer & Villegas-Zermeño, 2019; Govori & Fejzullahu, 2020; Md. Al & Sohag, 2015; Sengupta & Puri, 2020; Yahaya et al., 2023). The relationship between FDI and GDP largely depends on the host country's absorptive capacity, which includes factors like human capital, financial development, and trade openness (Dura & Bizuneh, 2023; Yahaya et al., 2023). Additionally, FDI's effects vary across sectors, with positive impacts in some and negative in others (Dura & Bizuneh, 2023; Govori & Fejzullahu, 2020). Economic policies in recipient countries further explain these differences (Sengupta & Puri, 2020). In less developed countries, FDI often positively influences GDP growth (Matušovičová & Matušovičová, 2023), while in developed economies, FDI generally has a positive effect, but in emerging economies, it can have a negative impact (Memdani, 2016). Iqbal et al. (2022) found significant positive effects and bidirectional causality between FDI, CO2 emissions, renewable energy, exports, and economic growth in BRICS countries. Raza et al., (2021) also highlighted the importance of good governance in OECD countries, showing that FDI's positive impact on economic growth is enhanced by better governance. Thus, the relationship between FDI and economic growth is complex and varies based on factors such as absorptive capacity, sector, and governance. FDI's impact on GDP is not universally consistent and differs across countries and regions. Thus, we offer the following hypothesis:

Hypothesis 4: FDI significantly promotes economic growth.

Research Methods

Study Context. This study aims to examine the influence of Fintech, tourism, FDI, and digitalization on economic growth in top tourist destinations within the framework of EGT. Additionally, this study explores the necessary conditions among these variables, aiming to provide a holistic understanding of how they contribute to and sustain economic growth. This study was carried out on the top ten tourist destinations, utilizing yearly panel data from 2010 to 2022. The choice of this sample and timeframe was primarily guided by the availability of comprehensive data for the variables under study, with particular focus on the emerging impact of Fintech on economic growth in the tourism industry (Bouhtati et al., 2023; Padmaja et al., 2020). The countries included in our analysis are Austria, France, Germany, Greece, Italy, Mexico, Spain, Turkey, the United Kingdom, and the United States of America, as identified by the UNWTO for the year 2022, as can be seen in Fig. 1. Together, these nations represent about 46% of the global tourism market (UNWTO, 2024), highlighting their significance in shaping worldwide tourism trends and practices and underlining the importance of this study in understanding the dynamics at play within these leading tourist destinations. Finally, for the data analysis, a multi-methods approach was utilized that integrated quantitative econometric panel data analysis with NCA.

Data and Variables. To investigate the impact of tourism, Fintech, FDI, and digitalization on economic growth, we utilized data from three prominent sources: the UNWTO[1], CrunchBase[2], and the WDI[3]. Our dependent variable, economic growth, is quantified by GDP per capita (constant 2015 US$), data for which were sourced from WDI. Central to our analysis is the independent variables of Fintech adoption, identified as key drivers of economic growth. To measure the adoption of this technology, we analyzed the annual number of Fintech startups listed on CrunchBase. CrunchBase is widely recognized for its extensive datasets on both private and public companies, offering detailed insights into startups, including their founding dates, industry sectors, and investment rounds (Mungo et al., 2024; Noguti et al., 2023). This data allowed us to assess the proliferation and integration of Fintech across different markets, serving as a concrete metric for their adoption within our study's framework.

Other independent variables, such as tourism, FDI, and digitalization, were extracted from the UNTWO and WDI databases. The sources of all variables, along with their detailed descriptions, are systematically presented in Table 1 of our study, with summary statistics provided in Table 2. This comprehensive data collection and analysis framework allows us to explore the interactions between these variables to promote economic growth in top tourist countries.

Data Analysis. Our baseline model for analyzing the impact of tourism, Fintech, digitalization, and FDI on economic growth in top tourist destinations is formulated with the development of a baseline model represented as follows (Eq. (1):

$$\text{Economic growth (EGR)} = f(\text{lTRSM}, \text{FNT}, \text{lDIG}, \text{lFDI}) \quad (1)$$

The model encompasses variables including economic growth, tourism, Fintech, digitalization, and FDI. To address our research questions effectively, we employ a structured approach in our data analysis, leveraging Necessary Condition Analysis (NCA) using SmartPLS v.4.3 software and specific econometric techniques designed to the nature of each question. For RQ1, which inquiries about the necessary conditions among study variables for promoting economic growth, we utilized NCA. NCA allows us to identify which variables among tourism, Fintech, digitalization, and FDI are critical for economic growth to occur, focusing on the conditions without which economic growth would be significantly impeded or entirely unattainable. This analysis technique is particularly suited to isolating the indispensable factors that serve as prerequisites for achieving desired outcomes in complex systems such as national economies (Dul et al., 2023;

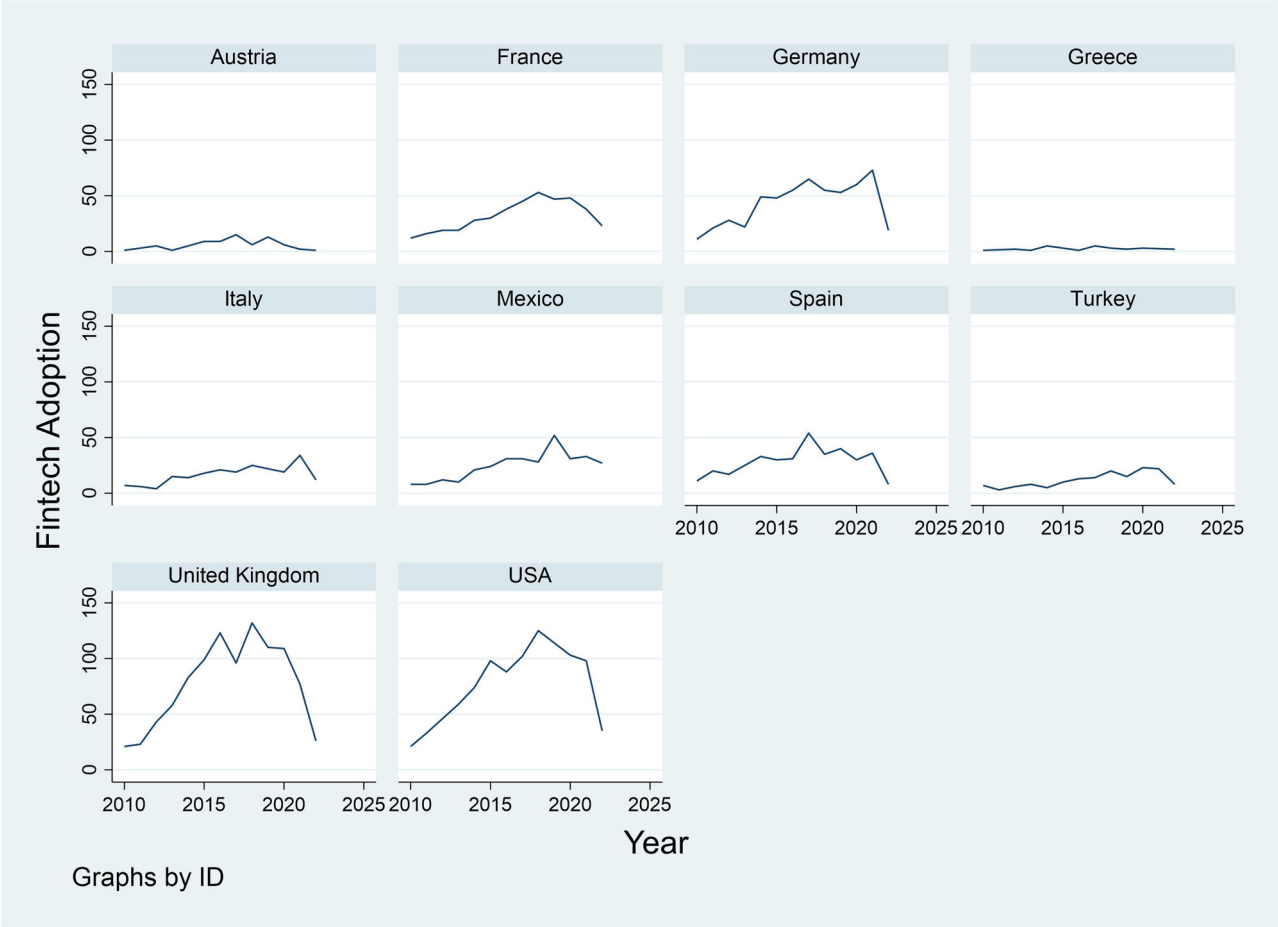

Fig. 1 Fintech adoption by top tourist countries.

Table 1 Variables and Description.

Variables	Abbreviation	Description	Sources
Economic growth	EGR	GDP per capita (constant 2015 US$).	WDI
Tourism	TRSM	Number of arrivals inbound.	UNWTO and WDI
Fintech	FNT	Number of Fintech startups per year.	Crunchbase
Foreign direct investment	FDI	Foreign direct investment, net inflows (% of GDP).	WDI
Digitalization	DIG	Individuals using the Internet (% of population).	WDI

Notes: *UNTWO* United Nations World Tourism Organization, *WDI* World Development Indicator.

Table 2 Descriptive statistics.

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
lGDP	28.076	28.050	30.671	25.944	1.186	0.268	3.050
lTRSM	10.893	10.673	12.292	8.762	0.813	−0.033	2.317
FNT	31.808	21.500	132.000	1.000	31.515	1.431	4.317
lFDI	1.123	1.301	3.186	−2.687	0.927	−2.070	8.509
lDIG	4.294	4.370	4.571	3.436	0.232	−1.346	4.374

Rahman, 2024). In addressing RQ 2, which seeks to interpret the relationships between study hypotheses, we deploy a set of econometric models using Stata v17.0 software by following Eq. (2):

$$\mathrm{EGR}_{it} = \alpha_0 + \beta_1 \mathrm{lTRSM}_{it} + \beta_2 \mathrm{FNT}_{it} + \beta_3 \mathrm{lDIG}_{it} + \beta_4 \mathrm{lFDI}_{it} + \epsilon_{it} \quad (2)$$

EGR_{it} represents the economic growth for country $_i$ at time $_t$. The intercept term is denoted by α_0, while β_1, β_2, β_3, β_4, and β_5 are the coefficients for the respective variables, and ϵ_{it} is the error term. Initially, we apply pooled Ordinary Least Squares (OLS) regression to establish baseline relationships between the independent variables and the dependent variable (Kpognon et al., 2020). To refine our estimates, we utilized Panel-Corrected

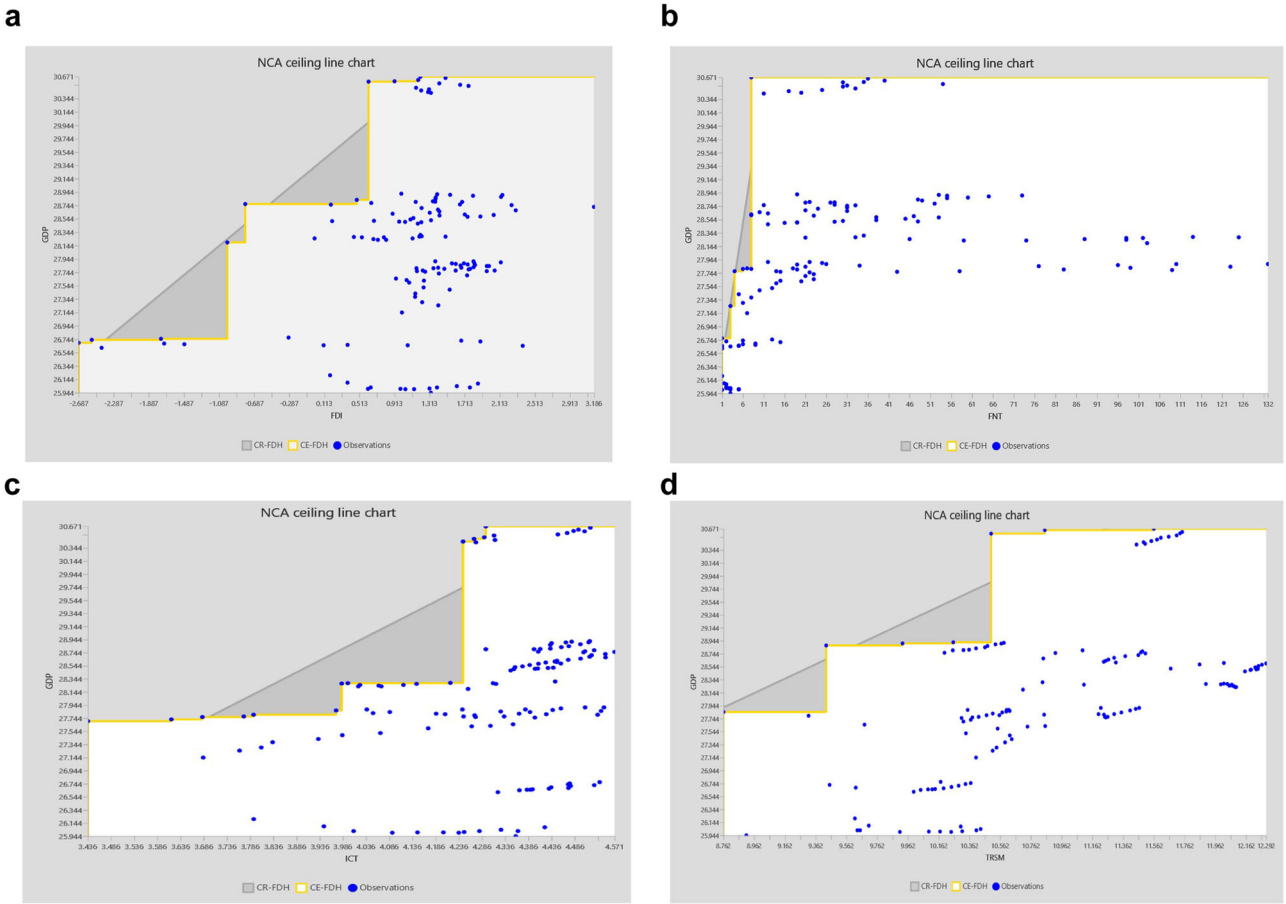

Fig. 2 Scatter plots. NCA scatter plots with ceiling lines for FDI (**a**), Fintech (**b**), digitalization (**c**), and tourism (**d**).

Standard Errors (PCSEs), which adjust standard errors to account for heteroskedasticity and autocorrelation within panels, thereby offering more reliable inference for panels with extensive time dimensions as suggested by (Mahalik et al., 2024; Nuță et al., 2024; Wang et al., 2024). Further efficiency improvements were sought through Feasible Generalized Least Squares (FGLS), which corrects for heteroskedasticity and autocorrelation by transforming the data based on a pre-estimated variance structure of errors (Mahalik et al., 2024; Nuță et al., 2024). Lastly, the 2-Step Generalized Method of Moments (GMM) was applied to address potential endogeneity issues by using instrumental variables, thus ensuring the robustness of our findings (Jahanger et al., 2023; Wang et al., 2024). This comprehensive approach, utilizing the strengths of each model, allowed for a detailed analysis of the data, affirming the positive contributions of tourism, Fintech, FDI, and digitalization to economic growth in top tourist countries and validating our research hypotheses with methodological rigor. By employing this comprehensive and methodologically rigorous approach, we aim to provide a sophisticated and well-substantiated answer to each research question, shedding light on the complex interplay between key economic factors and growth.

Results

Outcomes of NCA. In NCA, a ceiling line is established above the data points in an XY scatter plot, with the upper-left quadrant indicating that high outcomes of Y are unlikely with low values of X (Dul, 2016). As shown in Fig. 2, the extent of this area reflects the constraints X imposes on Y; a larger area indicates more significant constraints (Vis & Dul, 2018). NCA defines ceiling lines using two methods: Ceiling Envelopment with a Free Disposal Hull (CE-FDH) and Ceiling Regression with a Free Disposal Hull (CR-FDH). CR-FDH is preferred when a linear ceiling line closely matches the data, and a smoother transition increases the defined ceiling area (Vis & Dul, 2018). The straight ceiling line data patterns in Fig. 2(a–d) support using CR-FDH for this study's analyses. Determining the necessity of a condition involves two criteria: the effect size must exceed a threshold of 0.1, indicating a meaningful impact, and a p-value below 0.05 from permutation testing confirms the statistical significance of the effect size, ensuring it is not due to random variation (Ding, 2022).

In our NCA analysis, we quantified the impact of various determinants on economic growth. FDI demonstrated substantial positive effect sizes of 0.356 (CE-FDH) and 0.303 (CR-FDH), underscoring its importance as a necessary condition for economic growth with high statistical significance ($p < 0.001$ for CE-FDH and $p < 0.05$ for CR-FDH), as shown in Table 3. Fintech (FNT) exhibited modest yet statistically significant effect sizes of 0.037 and 0.035, indicating its contributory but less pronounced role in economic expansion. Digitalization emerged as the most critical factor, with the highest effect sizes of 0.416 (CE-FDH) and 0.383 (CR-FDH), both with very high statistical significance ($p < 0.001$), affirming its indispensability for economic growth. Tourism (TRSM), with effect sizes of 0.230 and 0.205, also significantly contributed to economic development, though to a lesser extent than FDI and digitalization. The variations in effect sizes between the CE-FDH and CR-FDH methodologies highlight the methodological sensitivity in identifying essential conditions for economic growth. This analysis emphasizes the critical roles

Table 3 NCA effect size (for Economic growth).

	CE-FDH	CR-FDH
FDI	0.356***	0.303**
FNT	0.037**	0.035
DIG	0.416***	0.383***
TRSM	0.230**	0.205**

Notes: ***=$p < 0.001$, **=$p < 0.05$, CR-FDH: ceiling regression with a free disposal hull, and CE-FDH: ceiling envelopment with a free disposal hull.

Table 4 Bottleneck table (percentage).

Economic Growth (%)	TRSM	FDI	FNT	DIG
0.00	NN	NN	NN	NN
10.00	NN	0.769	NN	NN
20.00	NN	2.308	8.462	0.769
30.00	NN	2.308	13.077	0.769
40.00	NN	4.615	13.846	3.077
50.00	1.538	5.385	17.692	7.692
60.00	3.846	6.154	20.769	10.000
70.00	10.000	6.923	22.308	20.000
80.00	30.769	10.769	27.692	26.923
90.00	51.538	20.769	29.231	50.769
100.00	61.538	47.692	30.769	86.154

Note: NN means "Not necessary."

of FDI, Fintech, digitalization, and tourism as catalysts for economic development and demonstrates the rigor and precision of our approach within the framework of Endogenous Growth Theory.

The bottleneck table outlines the progressive necessity of TRSM, FDI, FNT, and DIG for achieving growing percentages of economic growth, from 0% to 100%. Initially, for economic growth up to 10%, none of the analyzed factors are deemed necessary, as indicated by "Not Necessary" (NN) across the board, as shown in Table 4. However, as we advance towards higher economic growth levels, the essentiality of each factor gradually intensifies. FDI shows its initial necessity at a mere 0.769% for 10% economic growth, escalating substantially to 47.692% for achieving 100% growth, underscoring its growing importance with higher growth thresholds. Fintech's relevance begins to emerge at 20% growth (8.462%), with its necessity peaking at 30.769% for complete economic development. In comparison, DIG's critical role becomes evident starting from a modest 0.769% necessity for 20% growth, escalating dramatically to 86.154% for full economic growth, highlighting its paramount importance in the latter stages. Tourism starts to show its necessity from the 50% growth threshold, with its significance increasing sharply, reaching 61.538% for achieving total economic growth. This analysis demonstrates the increasing importance of these sectors in economic development, where early growth phases may not heavily rely on these factors, but their significance becomes crucial and variedly pronounced as targets for economic growth advance, indicating the critical roles of tourism, FDI, Fintech, and DIG in driving comprehensive economic progress in top tourist countries.

Outcomes of Econometrics Models. The correlation matrix clarifies the interrelationships among key study variables, accompanied by VIF and its reciprocal (1/VIF) (see Table 5). The analysis shows a moderately strong positive correlation between lGDP and lTRSM (0.547), indicating that tourism enhancements

Table 5 Correlation matrix and VIF values.

	lGDP	lTRSM	FNT	lFDI	lDIG	VIF	1/VIF
lEGR	1.000					1.460	0.686
lTRSM	0.547	1.000				1.560	0.639
FNT	0.310	0.206	1.000			1.800	0.556
lFDI	0.241	0.109	0.160	1.000		1.550	0.646
lDIG	0.286	0.111	−0.103	−0.030	1.000	1.120	0.892

Table 6 Outcomes of econometric models.

Variables	Model 1 Pooled OLS	Model 2 PCSEs	Model 3 FGLS	Model 4 Sys-GMM
lTRSM	0.652***	0.652***	0.652***	0.426**
	(0.101)	(0.054)	(0.099)	(0.11)
FNT	0.008**	0.008***	0.008**	0.006*
	(0.003)	(0.002)	(0.003)	(0.003)
lFDI	0.206**	0.206**	0.206**	0.124***
	(0.087)	(0.07)	(0.085)	(0.029)
lDIG	1.326***	1.326***	0.206**	1.218***
	(0.348)	(0.318)	(0.085)	(0.255)
Constant	14.775***	14.774***	14.773***	17.901***
	(1.731)	(1.394)	(1.698)	(1.906)
R^2	0.431	0.43	—	—
ar2p	—	—	—	0.420
hansenp	—	—	—	0.999

Notes: Robust SE in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

positively correlate with economic growth. The correlations between lGDP and FNT (0.310), lFDI (0.241), and lDIG (0.286) are positive but weaker, suggesting these sectors also contribute to economic growth, albeit less than tourism. Interestingly, a negative correlation between FNT and lDIG (−0.103) suggests a potential competitive or substitutive relationship between Fintech advancements and digitalization developments. Furthermore, VIF metrics, spanning from 1.120 to 1.800 for these variables, with corresponding 1/VIF indicating a modest degree of multicollinearity, infer that while the dataset exhibits some inter-variable redundancy, it remains within acceptable bounds for multivariate analysis. The VIF values, all below the threshold of 5, confirm that multicollinearity is not a concern in our dataset, ensuring the reliability of regression estimates (Hair et al., 2012; Henseler et al., 2009).

To test our research hypotheses concerning the determinants of economic growth—we employed a comprehensive set of econometric methodologies, as can be shown in Table 6. These included pooled OLS for initial estimations, PCSEs to address panel-specific heteroskedasticity and autocorrelation, FGLS for further efficiency improvements by correcting these issues through data transformation, and the 2-Step GMM for a robustness check aimed at mitigating potential endogeneity concerns (Arellano, 1991). Each of these methods brings its unique strengths in handling the complex dynamics and potential statistical issues inherent in panel data analysis, thereby ensuring a thorough and complex understanding of the factors influencing economic growth. The econometric results provide a detailed examination of the influences of tourism, Fintech, digitalization, and FDI on economic growth in top tourist countries, leading to the acceptance of all hypothesized relationships. Specifically, Hypothesis 1 is supported across various models including pooled OLS, PCSEs, FGLS, and 2Step-GMM, where the coefficient for tourism consistently demonstrates a significant positive impact on economic growth. For example, in the pooled OLS model,

Table 7 Findings comparison between NCA and econometrics.

Relationships	Outcomes of NCA	Outcomes of econometrics	Remarks
H1: TRSM→GDP	Tourism is necessary for high economic growth.	Tourism significantly promotes economic growth.	H1 is supported.
H2: FNT→GDP	Fintech is not a necessary condition for economic growth.	Fintech has a significant positive impact on economic growth.	H2 is partially supported as it is not necessary for economic growth.
H3: DIG→GDP	Digitalization is a necessary condition for enhancing economic growth.	Digitalization has a significant impact on economic growth.	H3 is supported.
H4: FDI→GDP	FDI is a necessary condition for economic growth.	FDI has a significant impact on economic growth.	H4 is supported.

TRSM exhibits a coefficient of 0.652 with a statistically significant p-value of 0.000, confirming the strong and positive influence of tourism on economic growth. This robust finding is further corroborated by the GMM model, with a slightly lower coefficient, affirming tourism's critical role in fostering economic expansion.

Similarly, Hypothesis 2 to 4 are also accepted. Fintech shows a smaller but statistically significant positive effect on GDP across all models, including a crucial validation in the PCSEs with a p-value of 0.000, thereby supporting H2. Digitalization, with the highest positive coefficients in all models such as 1.326 in the Pooled OLS and reaffirmed by 1.218 in the GMM, robustly supports H3 by highlighting its substantial role in driving economic growth. Finally, the positive coefficients for FDI in models like Pooled OLS and FGLS, consistently above 0.200, validate H4, underscoring FDI's significant contribution to economic performance. These results underline the importance of these factors in enhancing economic growth in top tourist countries, offering empirical support for focused economic policies in these areas.

General Discussion

This study explores the impact of tourism, Fintech, digitalization, and FDI on economic growth within the framework of EGT, focusing specifically on top tourist countries. The findings, derived from a comparison between NCA and econometric methods, elucidate the complex roles these factors play in stimulating economic growth. Table 7 shows the findings comparison between NCA and econometrics. Our findings support Hypothesis 1, indicating that tourism is not only a significant catalyst for economic growth but also a necessary condition for achieving high levels of economic development. This aligns with the principles of EGT, which suggests that investments in tourism can induce further economic activity through enhanced infrastructure, job creation, and stimulation of related service sectors (Albaladejo et al., 2014; Pina & Martínez-García, 2013; Singh & Alam, 2024). The confirmation of tourism as a critical factor in economic growth underscores its pivotal role in the economic dynamics of top tourist destinations, suggesting that continuous and focused investments in this sector are essential for sustained economic prosperity (Singh & Alam, 2024).

According to Hypothesis 2, the findings are mixed. While Fintech significantly contributes to economic growth, it is not deemed a necessary condition for such growth. This indicates that Fintech's impact, while positive, may vary depending on the level of technological adoption and the maturity of financial markets across different countries. The significant yet non-essential role of Fintech suggests that its benefits can complement other economic drivers but are not indispensable for growth in all contexts. Our findings supported recent literature, who found that Fintech lending is not a necessity for economic growth, but a significant catalyst for economic growth (Rahman, 2024). The literature has demonstrated that Fintech startups were found to be positively correlated with economic growth, especially in their second year of operation in Indonesia (Narayan, 2020). In China, Fintech, including third-party payment, credit, and insurance, has been shown to have a statistically significant positive effect on economic growth, with different regional impacts (Song & Appiah-Otoo, 2022).

Furthermore, digitalization strongly supports Hypothesis 3, where it is not only significantly linked to economic growth but also identified as a necessary condition for such growth. This finding reaffirms EGT's emphasis on technological innovation as a core driver of economic development. Digitalization, by streamlining processes and enhancing connectivity, serves as a crucial backbone for modern economies, indicating that robust digital infrastructure is integral to achieving sustainable economic growth. Several studies have found a positive impact of digital development on economic growth, with evidence showing that more digitally developed countries had higher GDP per capita and experienced dynamic growth in GDP (Ishnazarov et al., 2021; Kuziyeva et al., 2022; Lukmanova et al., 2024; Mgadmi et al., 2021; Török, 2024).

Finally, hypothesis 4 is supported, demonstrating that FDI is both a significant and necessary condition for economic growth. This aligns with the view that FDI introduces essential capital, technology, and expertise that are vital for boosting productivity and integrating local industries into the global market. The essential role of FDI highlights its transformative potential in enhancing the competitiveness and innovative capacities of domestic industries. Several studies have shown contradictory results regarding the impact of FDI on GDP and economic growth (Encinas-Ferrer & Villegas-Zermeño, 2019; Govori & Fejzullahu, 2020; Md. Al & Sohag, 2015; Sengupta & Puri, 2020; Yahaya et al., 2023). The relationship between FDI and GDP appears to depend on the host country's absorptive capacity, including factors such as human capital, financial development, and trade openness (Dura & Bizuneh, 2023; Yahaya et al., 2023). Furthermore, the impact of FDI on GDP varies across economic sectors, with positive effects observed in some sectors and negative effects in others (Dura & Bizuneh, 2023; Govori & Fejzullahu, 2020). Different economic policies in recipient countries play a role in explaining the varying impact of FDI on economic growth (Sengupta & Puri, 2020). FDI has been found to have a positive impact on GDP growth in some cases, particularly in the context of less developed countries (Matušovičová & Matušovičová, 2023). As a result, our discussion emphasizes the essential roles played by tourism, digitalization, and FDI as fundamental drivers of economic growth in top tourist countries, supported by the principles of EGT. The mixed findings regarding Fintech's role suggest that while it contributes positively to economic expansion, its impact may depend on specific regional and technological contexts. These results provide valuable implications for policymakers and industry stakeholders, pointing towards strategic investments in digital infrastructure, tourism, and effective frameworks for attracting and leveraging FDI, along with fostering environments conducive to Fintech innovation.

Conclusion, Implications, and Limitations

Conclusion. We examined the impact of tourism, Fintech, digitalization, and FDI on economic growth in top tourist countries within the framework of EGT. Using NCA and econometric methods, the results show that tourism, digitalization, and FDI are significant and necessary for economic growth. Tourism plays a crucial role, requiring continuous investment, while digitalization significantly drives growth and highlights the need for strong digital infrastructure. FDI introduces vital capital, technology, and expertise, boosting productivity and global integration. Although Fintech contributes to growth, it is not a necessary condition, suggesting its impact depends on technological adoption and financial market maturity. These findings emphasize the need for strategic investments in tourism, digital infrastructure, and frameworks to attract FDI. Policymakers and industry stakeholders can use these insights to promote sustained economic development in top tourist destinations, leveraging technology and investment for enhanced economic performance.

Policy Implications. Based on our study's findings, several key implications emerge for policymakers, industry stakeholders, financial institutions, and international organizations. Policymakers should prioritize continuous investment in tourism infrastructure and services, as tourism is identified as a significant driver of economic growth. This can be achieved through public-private partnerships, sustainable tourism practices, and enhanced marketing strategies. Additionally, investment in digital infrastructure is crucial, including expanding internet access, improving digital literacy, and supporting the adoption of digital technologies across sectors. The study also underscores the importance of creating a favorable environment for FDI by offering incentives, simplifying regulatory frameworks, and ensuring political stability. For industry stakeholders, particularly in the tourism sector, the focus should be on enhancing the quality of services and leveraging digital technologies to improve operational efficiency and customer engagement. Collaboration with governments to develop innovative tourism products will attract more visitors and increase revenue. Businesses should also seek to attract FDI by highlighting growth opportunities and engaging with international investors to bring in capital and expertise. Financial institutions, meanwhile, should invest in Fintech solutions, develop digital payment systems, and provide accessible financial services to a wider population. They should work with policymakers to create a regulatory environment that fosters Fintech innovation while maintaining consumer protection. International organizations like the UNWTO can support these efforts by offering technical assistance, funding, and best practices to maximize the benefits of tourism, digitalization, and FDI, ultimately driving sustained economic growth in leading tourist destinations.

Limitations and Directions for Future Studies. While our study offers comprehensive implications, it has several limitations that future research could address. The focus on top tourist countries may limit the generalizability of the findings. Future research could include a broader range of countries with diverse economic characteristics to determine if the observed relationships hold across different contexts. Additionally, using more sophisticated econometric techniques, such as dynamic panel models or non-linear models, could better capture the complex interactions among variables over time. Further, the use of annual data might miss short-term fluctuations. Future studies could utilize higher frequency data, like quarterly or monthly data, for more detailed insights. Exploring how specific types of Fintech, such as blockchain or mobile payments, affect various economic sectors, could provide targeted policy recommendations. Investigating potential mediators, like institutional quality and regulatory frameworks, would offer deeper insights into the conditions under which these factors promote economic growth. Lastly, employing a mixed-methods approach that combines quantitative analysis with qualitative case studies or interviews could enrich understanding and validate findings. By addressing these aspects, future research can enhance our understanding of the interplay between Fintech, tourism, FDI, digitalization, and economic growth across diverse economic contexts.

Data availability

The study used subscription-based data from CrunchBase for the Fintech variable, which cannot be shared due to licensing restrictions. Data sources for the other variables are provided in the manuscript. However, the dataset can be made available by the corresponding author upon reasonable request.

Received: 29 April 2024; Accepted: 16 October 2024;
Published online: 15 November 2024

Notes

1 https://www.unwto.org/tourism-data/un-tourism-tourism-dashboard.
2 https://www.crunchbase.com/.
3 https://databank.worldbank.org/source/world-development-indicators.

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Acknowledgements

We gratefully acknowledge the contributions of all individuals who assisted in the preparation and execution of this study. This research was also partially funded by the Institute for Advanced Research, United International University, under Publication Grant Ref. No.: IAR-2024-Pub-*068*. This work was sponsored in part by: 1. Social Science Foundation of Hainan Province (HNSK(JD)24-02); 2. Key Laboratory of Data Mining and Monitoring & Early Warning Technologies for Island Tourism Resources under the Ministry of Culture and Tourism (KLITRDMMKF2024-5); 3. Social Science Foundation of Sanya (SYSK2024-01); 4. Scientific Research Foundation of Hainan Tropical Ocean University (RHDRCSK202411).

Author contributions

AX: Conceptualization, Formal analysis, Funding acquisition, Writing—original draft, and Writing—review & editing; ABS: Methodology, Data Collection, Software, and Writing—review & editing; FAS: Supervision, Validation, Resources, and Writing—review & editing; MMR: Project Administration, Formal Analysis, Data Curation, and Writing—review & editing.

Competing interests

The authors declare that they have no competing interests in this research. No financial or personal relationships with other people or organizations have influenced the work reported in this paper. This statement is made for full disclosure and to ensure the research's integrity.

Ethical approval

All procedures performed in this study, which did not involve human participants, were conducted following the ethical standards of the authors' institution and the relevant national research committee. This research adheres to the ethical principles of the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Since the study did not involve any procedures requiring ethical approval by an institutional review board, no specific protocol number was assigned.

Informed consent

This study did not involve human participants, and therefore, no informed consent was required. All research procedures were conducted in accordance with the ethical guidelines and standards of the authors' institution and/or the relevant national research committee.

Additional information

Supplementary information The online version contains supplementary material available at https://doi.org/10.1057/s41599-024-03978-3.

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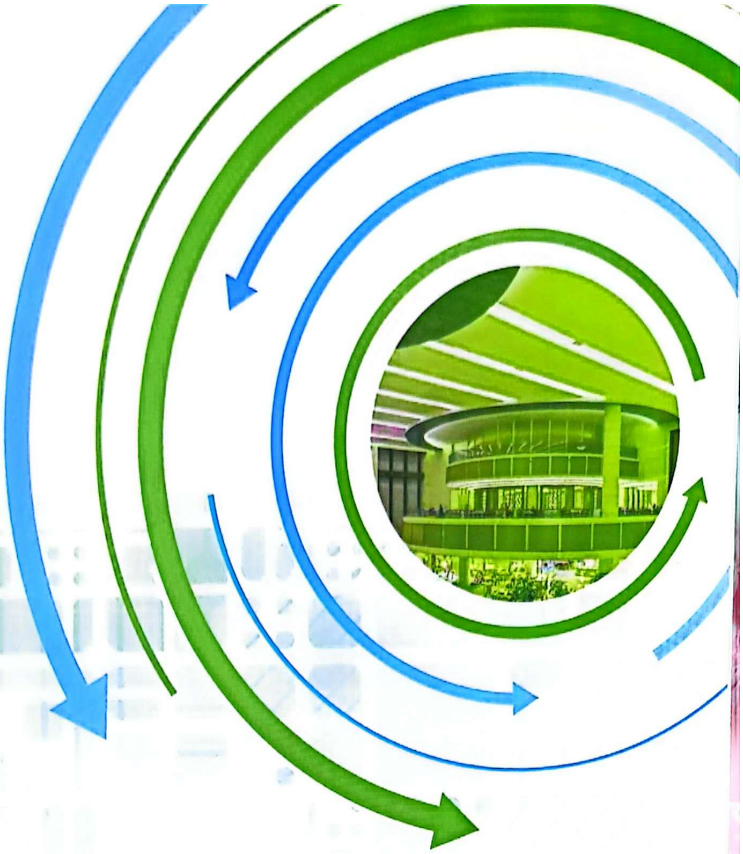

数字战略视角下
酒店综合管理能力提升研究

徐岸峰 / 著

中国商业出版社

图书在版编目（CIP）数据

数字战略视角下酒店综合管理能力提升研究 / 徐岸峰著. -- 北京：中国商业出版社，2023.12
ISBN 978-7-5208-2748-5

Ⅰ. ①数… Ⅱ. ①徐… Ⅲ. ①数字技术—应用—饭店—经营管理—研究 Ⅳ. ①F719.2—39

中国国家版本馆 CIP 数据核字（2023）第 231688 号

责任编辑：吴　倩

中国商业出版社出版发行
（www.zgsycb.com 100053 北京广安门内报国寺 1 号）
新华书店经销
北京七彩京通数码快印有限公司印刷
*
787 毫米 ×1092 毫米　16 开　8.25 印张　300 千字
2024 年 3 月第 1 版　2024 年 3 月第 1 次印刷
定价：50.00 元
* * * *

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CIP核准号	2023231688
ISBN	978-7-5208-2748-5
正书名	数字战略视角下酒店综合管理能力提升研究
丛书名	
出版单位	中国商业出版社
出版地	北京

作者	徐岸峰, 著	出版时间	2023.12
分册名		分册号	
定价（元）	50	正文语种	
中图法分类	F719.2-39	主题词	数字技术 - 应用 - 饭店 - 经营管理 - 研究
内容摘要	数字技术是全球新一轮技术革命的风向标，数字经济已经成为重组经济要素资源、重塑经济结构、改变酒店产业竞争局面的关键力量。数字战略视角下酒店的发展和营销需密切关注社会形势并符合时代特征，迎合消费者的消费心理。酒店管理者要结合大数据进行分析判断，充分认识不论消费方式还是消费群体都随着数字经济的洪流而发生了变化。本书研究了在数字战略视角下酒店综合管理能力的提升，内容包括酒店管理概述、酒店服务质量、酒店人力资源、酒店营销策略、企业综合优势理论在酒店管理中的应用、数字经济的时代背景、数字战略视角下酒店综合管理能力提升的优化策略等。本书适用于酒店管理领域人员的借鉴使用。		

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图书在版编目(CIP)数据

数字战略视角下酒店综合管理能力提升研究 / 徐岸峰著. -- 北京 : 中国商业出版社, 2023.12
ISBN 978-7-5208-2748-5

Ⅰ. ①数… Ⅱ. ①徐… Ⅲ. ①数字技术 - 应用 - 饭店 - 经营管理 - 研究 Ⅳ. ①F719.2-39

中国国家版本馆CIP数据核字(2023)第231688号

前　言

随着我国消费者休闲娱乐需求大幅增长，酒店行业呈现持续增长的趋势。国际和国内酒店集团在全国尤其是海南国际旅游岛快速布局。在数字经济与文旅产业加速融合的趋势下、酒店业必须从战略高度构建自身综合优势，助力海南自贸区建设。本书对数字经济视角下酒店综合管理能力开展科学研究，利用数字经济和企业综合优势理论等理论梳理了酒店管理现状；厘清酒店服务质量影响因素；针对酒店人力资源管理及人才培养建设，酒店营销策略和数字经济视角下酒店管理的优化策略等八个方面构建了酒店综合管理能力的理论和方法体系。

全书在总体架构设计阶段邀请我国著名战略管理专家哈尔滨理工大学管理科学与工程学科带头人、博士研究生导师王宏起教授；智慧旅游领域著名学者首都经贸大学管理学院院长助理、MTA 教育中心主任、博士研究生导师李云鹏教授和百格酒店管理咨询公司倪贞焕经理进行了可行性论证。在书稿撰写完成后，邀请哈尔滨理工大学工商管理学科带头人博士研究生导师李玥教授、黑龙江大学旅游管理国家一流专业负责人张丽梅教授和雅高集团张祥胜总监对全书进行了总体评审。两组专家一致认为本书着眼数字经济前沿领域，立足我国酒店管理现状，利用企业综合优势的理论为酒店行业设计了符合时代要求的战略管理体系、具体内容和科学方法，在数字经济对酒店业的影响方面做出了前瞻性的研究。尤其在数字经济与文旅产业融合的理论创新，酒店战略管理的实践应用两个方面都做出了开拓性的贡献。

本书是海南重点新型智库海南热带海洋学院海上丝绸之路研究院成果。同时也得到了农业农村部十四五国家科技支撑计划子课题；海岛旅游资源数据挖掘与监测预警技术文化和旅游部重点实验室开放课题；黑龙江省哲学社会科学研究规划项目和海南热带海洋学院引进人才科研启动项目的共同资助。

本书作者徐岸峰，海南热带海洋学院海上丝绸之路研究院副院长、海南热带海洋学院旅游学院教授，海岛旅游资源数据挖掘与监测预警技术文化和旅游部重点实验室研究员。主要研究方向：智慧旅游和平台战略管理；主要著作《数字平台生态系统视角下智慧旅游服务创新模式研究》《旅游学》和《消费者心理学》，著作获得多项省部级和地厅级奖励。

著　者

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视界

看见不一样的世界

徐岸峰　辛　江　李　玥 ◎ 主编

中国旅游出版社

项目策划：　段向民
责任编辑：　孙妍峰
责任印制：　钱　宬
封面设计：　武爱听

图书在版编目（CIP）数据

视界：看见不一样的世界 / 徐岸峰，辛江，李玥主编. -- 北京：中国旅游出版社，2025.6
ISBN 978-7-5032-7320-9

Ⅰ. ①视… Ⅱ. ①徐… ②辛… ③李… Ⅲ. ①世界史—教材 Ⅳ. ①K107

中国国家版本馆 CIP 数据核字（2024）第 107506 号

书　　名：视界：看见不一样的世界

主　　编：徐岸峰　辛　江　李　玥
出版发行：中国旅游出版社
（北京静安东里 6 号　邮编：100028）
https://www.cttp.net.cn　E-mail:cttp@mct.gov.cn
营销中心电话：010-57377103，010-57377106
读者服务部电话：010-57377107
排　　版：北京旅教文化传播有限公司
经　　销：全国各地新华书店
印　　刷：北京金吉士印刷有限责任公司
版　　次：2025 年 6 月第 1 版　2025 年 6 月第 1 次印刷
开　　本：787 毫米 × 1092 毫米　1/16
印　　张：11.5
字　　数：173 千
定　　价：59.80 元
ISBN　978-7-5032-7320-9

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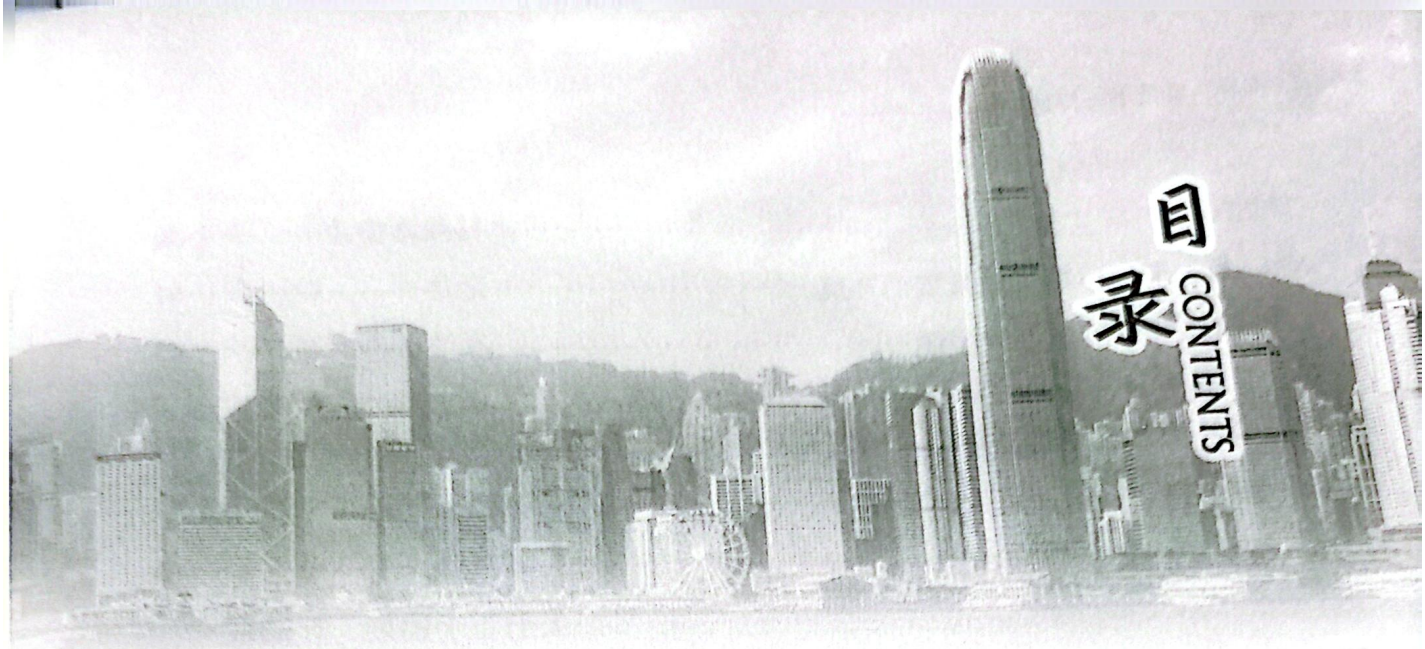

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项目编号：KLITRDMMKF2024-5

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SYSK 2024-12	于珊珊	三亚市英烈史料汇编	一般课题	历史学	三亚学院

编号	课题负责人	课题名称	课题类别	学科分类	所在单位
SYSK 2024-13	田宁	三亚崖州湾科技城产业集聚效应测度及提升路径研究	一般课题	管理学	三亚理工职业学院
SYSK 2024-14	张承惠	以国际旅游消费中心建设为契机推动三亚旅游业国际化转型和升级	一般课题	应用经济学	三亚经济研究院
SYSK 2024-15	郑辉敏	《崖州史物遗存今说》	一般课题	历史学	三亚市历史文化学会
SYSK 2024-16	刘琼	旅游公路助推三亚经济圈旅游一体化高质量发展路径研究	一般课题	管理学	三亚理工职业学院
SYSK 2024-17	方蕾	三亚市社区生活圈配套设施时空特征及优化研究	一般课题	管理学	三亚市城市规划设计研究院有限公司
SYSK 2024-18	张世泽	自贸港建设背景下三亚冲浪旅游的本土化发展：障碍解析与突破路径	一般课题	管理学	三亚市人文地理学会
SYSK 2024-19	杨樨	新质生产力推动三亚数字乡村建设的转型与实施路径研究	一般课题	管理学	三亚学院
SYSK 2024-20	曾令明	日本智慧健康养老模式及对三亚的启示研究	一般课题	管理学	三亚学院
SYSK 2024-21	胡雨凯	乡村振兴背景下三亚乡村旅游地农户生计现状及优化研究	一般课题	管理学	三亚学院
SYSK 2024-22	赵振宗	琼粤金融联动发展研究	一般课题	应用经济学	海南热带海洋学院
SYSK 2024-23	丁小稀	海南黎族首饰工艺与文化研究	一般课题	艺术学	三亚航空旅游职业学院
SYSK 2024-24	张晋琦	三亚旅游消费行为代际差异研究	一般课题	旅游学	三亚中瑞酒店管理职业学院
SYSK 2024-25	孙亚文	三亚康养旅游从业者职业能力提升策略研究	一般课题	管理学	三亚城市职业学院

2024年度海南省哲学社会科学规划课题
协 议 书

甲方：海南省社会科学界联合会

乙方：海南热带海洋学院（课题负责人所在单位）

《新质生产力视阈下数字技术赋能海南邮轮游艇产业高质量发展研究》课题组

根据《海南省哲学社会科学规划课题管理办法》（琼社科[2014]58号）（以下简称《课题管理办法》）以及相关细则的规定，甲乙双方经协商，就海南省哲学社会科学规划课题研究有关事宜，一致同意达成如下协议：

一、乙方的《新质生产力视阈下数字技术赋能海南邮轮游艇产业高质量发展研究》确定为 2024 年海南省哲学社会科学 基地课题 ，完成时间为 2027 年 07 月 31 日前。

二、甲方向乙方提供经费金额价税合计 叁万 元（大写）。

三、乙方课题的最终成果形式是 著作 。

相关要求：（一）课题承担单位科研管理部门要严把成果的政治关，确保课题研究成果符合党的理论、路线、方针、政策。（二）系列论文要求公开发表3篇（含3篇）以上，一般要求有2篇在核心期刊公开发表。每篇论文字数一般不少于5000字。（三）研究报告一般要求2万字左右的总报告和3000-5000字的对策建议各1份。对策建议须提前送省社科联编发《社科成果与智库专报》，成果入编《社科成果与智库专报》方可提出结项申请。乙方提交研究报告总报告经项目承担单位科研管理部门初审

同意后，一并提交查重报告，查重率不得高于15%（含15%）。**（四）著作（书稿）一般要求20万字左右（鉴定通过才能出版）。**（五）论文发表、著作出版、研究报告使用均须标注“2024年度海南省哲学社会科学规划课题（含课题编号）”字样。

四、甲方有权随时对课题进展情况进行各种形式的调查了解。乙方要严格执行“重要事项报批制度”。在实施、研究过程中出现下列重要事项，课题负责人必须填写《海南省哲学社会科学规划课题变更事项报批表》，经课题承担单位科研管理部门初审同意后，报甲方审批，否则，甲方将撤项。需要报批的重要事项如下：（一）变更课题负责人；（二）改变课题名称或研究内容有重大调整；（三）改变最终成果形式；（四）变更课题承担单位；（五）涉及国家秘密或者重要敏感问题的阶段性研究成果准备出版、发表的；（六）终止课题研究；（七）其它重要事项的变更。

五、乙方课题的最终成果按照《课题管理办法》以及相关细则办理结项、验收。最终成果必须符合《课题管理办法》以及相关细则的要求。课题负责人根据课题的研究期限提前一个月准备课题结项材料。

六、乙方提交结项的最终成果：论文一式3份（其中原件一份），研究报告5份，**著作（书稿）3份**。乙方提交成果，成果通过鉴定后，甲方按相关流程办理《课题结项证书》。

七、甲方除向乙方提供合同书第二条经费外，不再提供著作出版费及其它专门性费用。经费的使用按照《海南省哲学社会科学规划课题资金管理办法》（琼财教[2017]1664号）等相关规定严格执行。

八、乙方无正当理由且未经许可，不能按本协议规定和有关

要求完成课题研究任务，为违约，对其予以终止或撤项处理。根据科研诚信建设要求，被终止课题的负责人3年内不得申请或者参与申请省社科规划课题，被撤项课题的负责人5年内不得申请或者参与申请省社科规划课题。被撤项、终止研究的课题，甲方按规定收回相关经费。

九、本协议自甲乙双方代表签字之日起生效，乙方完成课题、办理结项后终止。

十、本协议一式四份，甲乙双方各执两份，具有同等法律效力。

十一、本合同履行过程中，若发生争议，双方应先通过协商方式解决。如经协商无法达成协议，则任何一方均可向甲方所在地的人民法院提请诉讼。通过法律程序予以解决，包括但不限于诉讼费用、差旅费、律师费、保全担保费等均由违约方承担。

甲方：海南省社会科学界联合会（章）

代表：

乙方：海南热带海洋学院（课题负责人所在单位公章、基地公章）

《新质生产力视阈下数字技术赋能海南邮轮游艇产业高质量发展研究》课题组

课题组代表：徐芳峰

2024年06月25日

课题类别：基地课题　　编号：HNSK(JD)24-02

2024年度海南省哲学社会科学规划课题

协　议　书

海 南 省 社 会 科 学 界 联 合 会

海南省科学技术厅

琼科函〔2025〕115 号

海南省科学技术厅关于
2025 年海南省自然科学基金项目立项的通知

各有关单位:

根据《海南省自然科学基金专项和经费管理办法》（琼科规〔2024〕12 号）和《海南省省级财政科技项目立项评审工作细则》（琼科规〔2022〕29 号）规定，经公开申报、形式审查、专家评审、行政决策、项目公示等程序，2025 年海南省自然科学基金立项 918 个项目，详见附件。现将立项项目下达给你们，请抓紧做好项目的组织实施工作。有关事项通知如下:

一、请各项目依托单位切实履行法人责任，组织好人力、物力和资金投入，确保项目按计划实施。项目实施过程中涉及政府采购等方面的事项，请按有关规定执行。

二、项目管理和资金使用要严格按照《海南省自然科学基金专项和经费管理办法》（琼科规〔2024〕12 号）和《关于改革完善省级财政科研经费管理的若干措施》等有关规章制度执行，项目经费实行分账核算、专款专用，实行经费包干制，不编制项目预算。

三、涉及生命与健康领域的项目须遵循生物安全及伦理相关法规。涉及人的生物医学研究应执行《涉及人的生物医学研究伦理审查办法》等规定。涉及人类遗传资源的研究应执行《中华人民共和国人类遗传资源管理条例》等法规。涉及生物技术的研究应遵守《生物技术研究开发安全管理办法》等规章。涉及病原微生物的研究须遵守《病原微生物实验室安全管理条例》等法规。涉及实验动物和动物实验的，应遵守国家实验动物管理的法律、法规、技术标准及有关规定。

四、项目实施时间详见附件；请各项目依托单位在立项文件下达**一个月内**组织项目负责人登录海南省科技业务综合管理系统（https://stcloud.hainan.gov.cn/egrantweb/），填写项目任务书，在线提交任务书，并将项目负责人和承担单位（合作研究单位）**签章页面盖章后扫描成PDF**作为附件上传管理系统。无正当理由逾期未报送任务书的视为自动放弃立项项目。

五、公开发表的论文、论著等请标注“海南省自然科学基金资助”（英文标注为 supported by Hainan Provincial Natural Science Foundation of China）字样及项目批准号。未按规定标注的研究成果，验收时不予认可。

六、项目执行到期后，依托单位应当在项目实施期限届满后3个月内提交验收材料。无特殊原因到期未申请验收的项目，按“不通过绩效验收评价”处理。

联系人：海南省科技厅基础研究和重大专项处 李加星

电　话：65335205

附件：2025年海南省自然科学基金立项项目表

海南省科学技术厅

2025年3月28日

（此件主动公开）

附件

2025年海南省自然科学基金立项项目表

单位：万元

序号	批准号	项目名称	申报单位	负责人	起止时间	资助经费
合计						8189
一、面上项目208项，经费1664万元						
1	125MS001	光色稳定Cs3Cu2C15量子点的调控机理及其绿光LEDs应用研究	海南大学	鄢冬冬	2025-03-01至2028-02-29	8.00
2	125MS002	模形式的零点	海南大学	朱道州	2025-03-01至2027-02-28	8.00
3	125MS003	外延生长制备高量子产率近红外InP量子点研究	海南大学	张文达	2025-03-01至2028-02-29	8.00
4	225MS004	基于SAM自由基酶催化启发的可见光促进糖类化合物位点选择性氟官能化修饰研究	海南大学	李金山	2025-03-01至2028-02-29	8.00
5	225MS005	界面质谱技术在膜靶向抗氧化剂微观作用机制研究中的应用	海南大学	慕超男	2025-03-01至2028-02-29	8.00
6	225MS006	缺陷环稠合开壳纳米石墨烯的精准合成与磁学调控	海南大学	王燕培	2025-03-01至2027-02-28	8.00
7	225MS007	混合阳离子调控双金属卤化物钙钛矿光伏性能的理论研究	海南大学	孙萍萍	2025-03-01至2028-02-29	8.00
8	225MS008	酚羟基化多功能木质素的结构设计及其对天然胶乳的性能影响研究	海南大学	汪志芬	2025-03-01至2027-02-28	8.00
9	225MS009	DNA甲基化修饰介导I型限制修饰系统调控维氏气单胞菌毒力的机制	海南大学	李宏	2025-03-01至2028-02-29	8.00
10	325MS010	γ-谷氨酰二肽对传统发酵鱼露浓厚味的影响及生成机制研究	海南大学	李倩	2025-03-01至2028-02-29	8.00
11	325MS011	花生秧青贮过程中酪胺形成的微生物机制研究	海南大学	王目森	2025-03-01至2028-02-29	8.00

序号	批准号	项目名称	申报单位	负责人	起止时间	资助经费
787	725RC787	船舶港口3S监测预警的关键技术研究	海南热带海洋学院	王明雨	2025-03-01至2028-02-29	10.00
788	725RC788	自贸港文旅主导企业突破式创新形成机制和治理政策研究	海南热带海洋学院	徐岸峰	2025-03-01至2028-02-29	10.00
789	725RC789	海南岛闽粤苏铁天然群落多样性格局及维持机制研究	琼台师范学院	谢春平	2025-03-01至2028-02-29	10.00
790	725RC790	基于数字技术的海口历史性城市景观空间感知与游憩体验研究	海南经贸职业技术学院	许家瑞	2025-03-01至2028-02-29	10.00
791	725RC791	数字化转型驱动海南高新技术产业链韧性提升的机制与效应研究	海南经贸职业技术学院	李倩	2025-03-01至2028-02-29	10.00
792	725RC792	基于人工智能的海南黎族非遗知识组织与活化利用研究	海南经贸职业技术学院	王盟燏	2025-03-01至2027-02-28	10.00
793	125RC793	面向全服役周期的车用动力锂电池内部参数关键状态协同估计与故障诊断研究	海南科技职业大学	刘灵	2025-03-01至2028-02-29	10.00
794	625RC794	Mask R-CNN框架下的道路缺陷无损检测及智能识别方法研究	海南科技职业大学	白颢	2025-03-01至2027-02-28	10.00
795	625RC795	基于SEM的海南自贸港职业教育产教融合深入发展路径研究	海南科技职业大学	李俊	2025-03-01至2028-02-29	10.00
796	325RC796	乌檀外泌体样纳米颗粒的跨界调控研究	海南职业技术学院	左金富	2025-03-01至2028-02-29	10.00
797	725RC797	"智慧+"视域下海南自贸港恐怖主义活动识别与预警研究	海南政法职业学院	朱丽波	2025-03-01至2028-02-29	10.00
798	425RC798	降雨诱发强风化花岗岩堆积体细观结构演化及宏-细观变形失稳机理研究	海口经济学院	王常林	2025-03-01至2028-02-29	10.00
799	325RC799	OsWRKY27调控ABA-五羟色胺模块参与水稻盐胁迫响应的分子机制	浙江大学海南研究院	蒋萌	2025-03-01至2027-02-28	10.00
800	325RC800	一对串联的MYBMIXTA-like基因在棉纤维发育中的功能研究	浙江大学海南研究院	李军	2025-03-01至2028-02-29	10.00
801	325RC801	CcERF113调控黄灯笼辣椒高辣的分子机制解析及育种利用研究	浙江大学海南研究院	张志远	2025-03-01至2028-02-29	10.00

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登记专用章

2025年06月19日

编号：10-2023043

黑龙江省
社会科学学科优秀科研成果奖

作者姓名　徐岸峰　陈　宇

成果名称　基于演化博弈的大数据产业联盟成员失败知识共享机制研究

成果类别　研究报告

获奖等级　二等奖

黑龙江省社会科学界联合会

二〇二三年十二月

证　书

经　海南热带海洋学院　申请，认定　徐岸峰　（身份证：230107197808062613）为海南自由贸易港　E类人才　。有效期 2024 年 1 月 29 日至2029 年 1 月 29 日。

特发此证。

NO. E2302024012950044524

海南自由贸易港高层次人才证书专用章

2024 年 1 月 29 日

荣誉证书

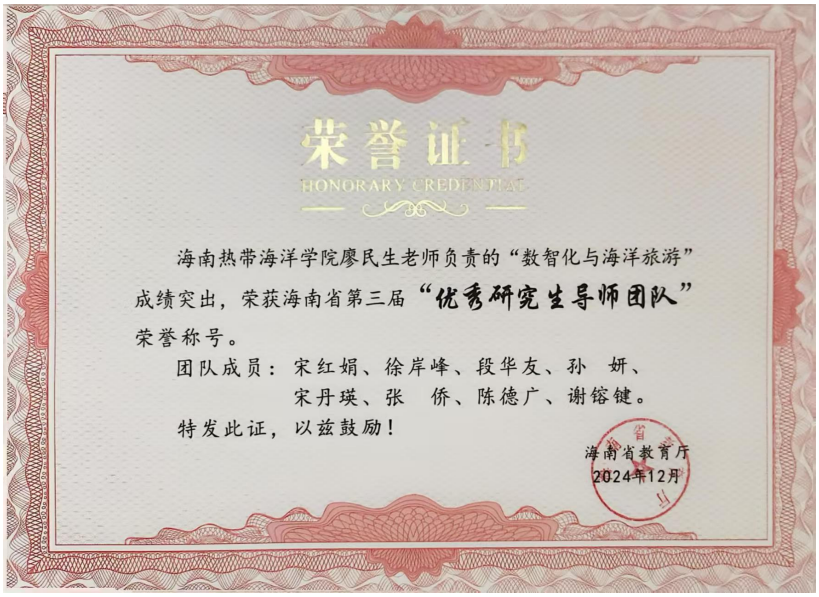
HONORARY CREDENTIAL

海南热带海洋学院徐岸峰老师在学位与研究生教育工作中取得了突出成绩，荣获海南省第三届“优秀研究生导师”荣誉称号。

特发此证，以兹鼓励！

海南省教育厅

2024年12月



荣誉证书

HONORARY CREDENTIAL

海南热带海洋学院廖民生老师负责的“数智化与海洋旅游”成绩突出，荣获海南省第三届“优秀研究生导师团队”荣誉称号。

团队成员：宋红娟、徐岸峰、段华友、孙　妍、宋丹瑛、张　侨、陈德广、谢镕键。

特发此证，以兹鼓励！

海南省教育厅

2024年12月

海南热带海洋学院

专题会议纪要

2023年第113期

海南热带海洋学院党政办公室　　2023年11月2日

研究省级科研机构人员调整等事宜

2023年10月31日下午，廖民生副校长在三亚校区行政办公楼310会议室主持召开专题会，研究省级科研机构人员调整等事宜。会议纪要如下：

一、研究省级科研机构人员调整事宜

会议听取了人文社科处关于《海岛旅游资源数据挖掘与监测预警技术文化和旅游部重点实验室》等省级科研机构人员调整事宜的汇报。经研究讨论，会议原则建议：

（一）由旅游学院段华友教授担任海岛旅游资源数据挖掘与监测预警技术文化和旅游部重点实验室副主任。

（二）由旅游学院徐岸峰教授担任海南热带海洋学院海上丝绸之路研究院副院长，余利平同志不再担任该研究院副院长和办

公室主任。

（三）由旅游学院宋红娟同志担任海南省国际海岛休闲度假旅游研究基地副主任（主持基地工作），黄学彬同志不再担任该基地主任。

（四）因高泽强同志已退休，不再担任海南省民族研究基地主任。

（五）因工作需要，张朔人同志不再担任海南省民族教育重点研究基地主任。

由党委组织部按程序提交校长办公会审议。

二、研究校级科研平台的建设事宜

会议听取了人文社科处关于海南热带雨林画院等校级机构调整事宜的汇报。经研究讨论，会议建议：

（一）将“海南热带雨林画院”该机构名称调整为“海南热带雨林数字艺术与智能设计研究中心”；由刘朝晖担任“海南热带雨林数字艺术与智能设计研究中心”主任。

（二）由周扬同志担任区域发展研究院副院长，黄学彬不再担任该研究院副院长。

由党委组织部按程序提交校长办公会审议。

三、研究补充三亚市社会科学界联合会第二次代表大会代表及委员候选人事宜

会议听取了人文社科处关于补充推荐三亚市社会科学界联合会第二次代表大会代表及委员候选人的情况汇报，会议同意人文社科处的建议，议定如下：

（一）将学校第一批已推举报送的代表候选人张沈青、王志峰补充推举为三亚市社会科学界联合会第二次代表委员候选人人选；

（二）将张万杰、符聪、薛芮补充推举为三亚市社会科学界联合会第二次代表代表候选人人选。

由人文社科处协助党委组织部按程序办理后续事宜。

四、研究东盟研究院与三亚商务区企业管理咨询有限公司签订的战略合作协议事宜。

会议听取了东盟研究院的《东盟研究院与三亚商务区企业管理咨询有限公司签订的战略合作协议》，会议要求东盟研究院按学校法核意见修改协议，同意授权东盟研究院代表学校与三亚商务区企业管理咨询有限公司签单战略合作协议。

出　席：人文社科处符昌昭、阳知妹，人事处王世运，组织部王珮，民族学院张朔人，创意设计学院刘朝晖，商学院张沈青，旅游学院陈德广，东盟研究院方礼刚。

记　录：阳知妹。

（此件依申请公开）

分送：校领导，参加会议单位。

海南热带海洋学院党政办公室　　2023 年 11 月 2 日

【领导批示】

打造自贸港科创高地，是三亚发展的重要战略目标之一。报告借鉴深圳经验，并就科技创新和技术转化开展三亚与深圳的比较研究，具有一定的学术和决策参考价值。建议已破，思路已展开，请进一步深化，进一步跟踪研究。

刘平 2025.25/6

智库参阅

2025 年第 10 期

（总第 35 期）

三亚智库联合会　　6 月 23 日

借鉴深圳经验 创新驱动三亚高质量发展

【编者按】深圳自建立经济特区以来，深耕科技创新与产业升级，在研发投入与创新能力提升、科技创新平台构建、科技成果转化与应用等领域取得了显著成绩，其经验对三亚推进科技创新与技术成果转化提供了重要参考价值。

一、深圳科技创新和技术转化基本情况

深圳位于珠江三角洲地区，紧邻香港和澳门，是中国对外开放的重要门户，与世界各地的经贸往来十分频繁，高度国际化的环境使得深圳能够吸引全球范围内的优秀企业和人才，促进科技创新和技术转化的国际合作与交流。深圳市政府积极制定和实施各项科技产业政策，鼓励企业加大研发投入，提升自主创新能力。同时，还建立了完善的科技成果转化机制和服务体系，为科技创新和技术转化提供了全方位的支持和服务。

2010 年以来，深圳着力布局科技创新及产业升级，发展壮大战略行业龙头企业，经济特区延伸到全市范围，进一步成长为全国经济中心城市。《2025 年深圳市人民政府工作报告》显示战略性新兴产业增加值增长 10.5%，占地区生产总值比重 42.3%。国家高新技术企业突破 2.5 万家。新增国家级专精特新“小巨人”企业 296 家、总数达 1025 家，新增国家级制造业单项冠军企业 29 家、总数达 95 家，增量均居全国城市首位。人工智能、机器人、低空与空天产业集群增加值分别增长 12.7%、15.9%、26.4%。新能源汽车产量增长 69.2%、占全国 22.3%；汽车产量跃居全国城市首位。全社会研发投入 2236.6 亿元，增长 18.9%，连续 9 年保持两位数增长，总量跃居全国城市第二，占地区生产总值比重提升至 6.46%。深圳获评 26 项国家科学技术奖，国家第三代半导体技术创新中心深圳综合平台建成通线，PCT 国际专利申请量连续 21 年居全国城市首位。

二、深圳科技创新和技术转化的成功经验

（一）政策支持与制度环境。**一是先行先试的政策优势。**深圳作为中国改革开放的前沿窗口和试验田，国家给予深圳许多先行先试的政策优势，如特区政策、创新驱动发展战略等，为深圳的科技创新提供了良好的制度环境。这些政策不仅降低了创新成本，还提高了创新效率，激发了企业和个人的创新活力。**二是政府投资与引导。**深圳政府通过设立创业投资引导基金、构建风险分担机制等方式，锚定各种类别和各个层次的国家既有科研成果，以政府投资撬动社会资本，支持科技创新和成果转化。这种“四两拨千斤”的方式，有效促进了相关产业的高质量和高效能发展。

（二）产业基础与集群效应。**一是具备集群化发展基础。**深圳从早期的加工制造业起步，在创新场景的牵引下，凭借汇聚多方资源的科技创新金融体系，成功转型升级到高新技术产业，拥有华为、腾讯、大疆、华大基因等一系列全球领先的高科技企业，形成了以电子信息、生物技术、新能源、新材料等为代表的产业集群。这种深厚的产业基础为科技创新提供了肥沃的土壤，促进了技术的交叉融合和协同创新。**二是产业空间高效集聚。**深圳在创新企业集聚空间内，体现了“临近、共享、匹配、学习”的效应特征。高新区的企业多为专业化创新型企业，每个企业集中于自身的创新优势，效率极高。这种集聚效应不仅降低了企业的运营成本，还促进了技术、人才和信息的快速流动。

（三）创新生态与人才支撑。**一是多元参与的协同创新。**深圳构建了政府、企业、高校、科研机构、金融机构等多元参与的协同创新生态链，链条各个环节相互支撑、相互促进，形成了良好的创新氛围和合作机制。**二是人才政策与激励机制。**深圳破除传统观念束缚，建立市场导向的人才分类评价激励体系，以人才市场价值、经济贡献为主要评价标准，吸引了大量优秀人才来深圳创新创业，推行“特聘岗位”“全球人才汇聚”等专项计划，实施高层次人才举荐制与直认制。通过深圳人才日、西丽湖论坛等品牌化活动提升引才效能。2024 年度数据表明：新引进人才 10.4 万人，新增创新团队 36 个、高层次人才 2000 人、高技能人才 5.2 万人；920 名学者入选全球前 2%顶尖科学家榜单，207 人入选高被引学者；研发人员全时当量达 46.1 万人年，居全国首位。

（四）研发投入与成果转化。**一是加大基础研究投入。**深圳出台《深圳市科技研发资金管理办法》，为财政科研项目经费“放权松绑”，同时实行科研经费使用“负面清单”管理，优化监管。比如，面向“20+8”（即：发展以先进制造业为主体的 20 个战略性新兴产业集群，前瞻布局 8 大未来产业）产业集群，围绕产业链布局创新链，着重加强基础研究和应用研究，同时，还大力引导支持企业及其他社会力量加大对基础研究和应用基础研究的投入力度。**二是推动科技成果高效转化。**深圳依托综合性国家科学中心先行启动布局建设一批重大科技基础设施和平台载体，推动科技成果沿途转化。同时，通过孵化器、加速器等载体帮助创

业者创立企业并开展技术成果商业化应用，缩短原始创新到成果转化再到产业化的时间周期。

（五）国际合作与交流。**一是积极参与国际科技合作。**深圳通过引进国外先进技术和管理经验、参与国际科技项目合作与交流活动等方式，与多个国家和地区建立科技合作关系，提升了自身的科技创新能力和国际竞争力。**二是深化区域合作互促发展。**深圳积极推动粤港澳大湾区产学研融合发展，促进科研资金跨境便利流动和支持深圳市高校、科研机构、企业与港澳高校、科研机构开展合作，既有助于实现资源共享和优势互补，还能推动科技创新成果实现跨区域转化和应用。

三、三亚与深圳的“同”与“不同”

三亚的发展目标非常清晰，充分把握海南自由贸易港建设机遇，立足三亚“纬度”、南繁“温度”和南海“深度”，加快建设“南繁硅谷”，推动深海科技创新，全力打造海南自贸港科创高地，为海南建设创新型省份和国家重大战略服务保障区提供强劲支撑。

（一）三亚与深圳的“同”。**从政策支持上看，**无论是深圳还是三亚，都获得了国家层面的大力支持和政策倾斜。这些政策包括税收优惠、资金补助、人才引进、创新激励等多个方面，为两地的发展提供了强有力的保障。**从创新生态构建上看，**深圳和三亚都注重创新平台的建设。深圳依托高科技企业和高水平研究型大学，构建了企业牵头、高校院所支撑、各创新主体相互协同的创新联合体。三亚则加快建设重大科研创新平台，比如，崖州区

汇聚了省部级及以上科创平台37个，包括崖州湾国家实验室等重大科研平台，为科技创新提供了强大支撑。同时，推动种业科技成果转化和深海科技产业集聚，完善数字经济产业园建设，培育数字产业集群。两地都重视科技人才的引进和培养。深圳通过构建以“四个90%”为特点的企业创新生态，确立了企业创新主体地位，吸引了大量科技人才。三亚重点引进旅游、金融、医疗健康、数字经济、热带农业等领域人才积极参与自贸港建设，实施了一系列人才引进政策，比如购房补贴、租房补贴、提供人才公寓、个人所得税减免等。**从国际合作与交流上看**，深圳和三亚都注重与国际接轨，推动开放创新。深圳通过促进财政科研资金跨境便利流动、支持深圳市高校与港澳高校合作等方式，加强与国际科技创新中心的交流与合作。三亚则通过新引入多所高校入驻崖州湾科技城，增强区域科研实力，推动与“一带一路”沿线国家和地区的科技合作与交流，拓展国际合作空间。

（二）三亚的比较优势。**生态环境与区位优势**。三亚地处中国—东盟自贸区前沿，区位优势明显，可以深度联通国内国际两个市场，在国际贸易和科技合作等方面具有更加便利的条件和更加广阔的市场空间。再叠加三亚的热带资源和海洋资源优势，为科技创新提供丰富的素材和实验条件，特别是热带农业和种植业、海洋生物科技以及医药研发等领域，需要高质量生态环境支持的科研活动，三亚的气候条件能够显著缩短农作物加代繁殖的育种周期。**政策优势**。党中央高度重视海南自贸港建设，给予诸

多政策优惠，比如《进一步强化企业科技创新主体地位改革若干措施》系列政策文件出台，不仅为企业和创新者提供了更加开放和便利的环境，更多的合作机会和资源支持，还为创新成果的转化应用提供了一系列的支持措施。**科技创新平台载体优势。**三亚以崖州湾科技城为载体，快速汇聚了30余个省部级及以上科创平台，正在打造面向全国、辐射省市的科技创新策源地，为海南的科技创新提供了强有力的支撑和保障。

（三）三亚的短板弱项。**政策环境与体系完善度方面**，深圳作为中国的科技创新中心之一，在科技成果转化方面有一系列成熟的政策和措施，如科技研发资助、高新技术企业认定及税收优惠等，政策体系相对更为完善，政策力度也较大，为深圳的科技成果转化提供了强有力的支持。相比之下，三亚虽然也出台了一系列促进科技成果转化的政策，但政策体系完善度与力度仍有待提升，政策执行和落地效果还需进一步加强。**科研资源与人才储备方面**，深圳拥有众多国内外知名的高校、科研院所和科技企业，这些机构为深圳提供了丰富的科研资源和人才储备，其科研实力和创新能力在国内处于领先地位。三亚近年来积极引进和培育科技创新资源，但与深圳相比仍有一定差距。**市场环境与经济基础方面**，深圳的市场环境相对较为成熟，产业链和供应链完善，为科技成果的转化和应用提供了良好的市场基础，科研资金投入充足，深圳的电子信息、生物医药、新材料等产业在全国乃至全球都具有竞争力。虽有自贸港政策优惠加持，但三亚的市场成熟度

和产业配套方面仍需进一步提升，经济基础和科研资金投入方面还需加强，才能吸引更多的科技成果在海南转化和应用。**国际合作与交流方面**，深圳在国际科技创新领域具有较高的知名度和影响力，与多个国家和地区建立了广泛的科技合作与交流关系，为深圳的科技成果转化提供了更广阔的国际视野和合作机会。三亚起步较晚、产业链尚不完善，与深圳相比，仍需进一步提升国际影响力和拓展国际合作网络。

四、工作建议

习近平总书记“12·17”重要讲话对科技创新作出一系列新指示，要求建设人才荟萃之岛、技术创新之岛。《海南省科技创新提质增效行动方案（2025—2027 年）》已明确未来的区域创新中心以南繁种业、深海科技、航天科技为重点。三亚正在聚力打造“一标杆、五个区”，应充分借鉴深圳科创经验，探索符合自身特点与海南自贸港政策导向的发展路径。

（一）政策创新与市场环境优化。**一是税收优惠与资金扶持。**为高新技术企业和技术成果转化项目提供税收减免政策，如研发费用加计扣除、高新技术企业所得税优惠等。设立科技成果转化专项资金，用于支持具有市场前景的科技成果转化项目，通过资助、奖励、补助等多种方式引导社会资金投入。鼓励金融机构为科技成果转化提供融资支持，推动科技金融实体发展，如设立科技支行、推出科技贷款产品等。**二是简化审批流程。**优化科技成果转化项目的审批流程，减少不必要的行政干预，提高审批效率。

推广“最多跑一次”改革，实现科技成果转化项目从申请到审批的全过程电子化、网络化。**三是职务科技成果赋权改革。**明确科技成果的权属和收益分配机制，赋予科研人员更多的自主权，提高他们参与科技成果转化的积极性。探索实施科技成果所有权、使用权、处置权和收益权“四权”改革，确保科研人员在科技成果转化中的合法权益。

（二）构建全链条创新生态体系。**一是加强基础研究与应用研究投入。**制定长期稳定的科研投入计划，明确政府和企业在基础研究与应用研究中的投入比例，设立专项基金支持关键技术研发。**二是完善科技成果转化服务体系。**构建涵盖技术评估、知识产权保护、市场推广等环节的科技成果转化服务体系。培育一批专业的科技中介服务机构和技术转移机构，为科技成果转化提供全方位的服务和支持。**三是促进产学研深度融合。**依托高水平研究型大学、科研机构和创新型企业等创新主体，加强高校、科研机构和企业之间的合作与交流，推动产学研深度融合，让科技成果从实验室走向市场。**四是完善人才分类评价激励体系。**制定更为具体和细化的评价标准和激励措施，强化人才激励机制，着力培养造就卓越工程师、大国工匠、高技能人才，提高各类人才素质。完善人才有序流动机制，坚持向用人主体授权、为人才松绑。完善青年创新人才发现、选拔、培养机制，更好保障青年科技人员待遇。

（三）加强国际合作与交流。**一是加强与国际科技组织和先**

进国家的科技合作与交流。完善海外引进人才支持保障机制，形成具有国际竞争力的人才制度体系。通过股权激励、收益分配等方式激励科研人员和企业积极参与科技成果转化工作。设立科技成果转化奖励制度，对在科技成果转化中做出突出贡献的单位和个人给予表彰和奖励。**二是推动国际科技企业合作。**鼓励本地企业和科研机构与国际伙伴开展联合研发、技术转移和成果转化合作，支持本地企业在国际市场上拓展业务，推动科技成果的国际化应用和推广。

（由海南省重点新型培育智库海南热带海洋学院海上丝绸之路研究院副院长徐岸峰、院长兼首席专家廖民生、海南热带海洋学院研究生蒋翔坤供稿）

本期发至：市四套班子领导、法检两长、全市各单位
省人大常委会办公厅，省商务厅、省科技厅、省财政厅。

三亚智库联合会编印

编辑整理：卞惟珊　校核：蒲玮娜　审核：黄微莉　电话：88261655

海南省重点智库建设

协 议 书

二〇二五年十月

海南省重点智库建设
协议书

甲方：海南省社会科学界联合会

乙方：海南热带海洋学院（海上丝绸之路研究院）

根据《海南省重点智库建设管理实施细则》（琼宣发[2023]5号）规定，甲乙双方经协商，就重点智库建设有关事宜，一致同意达成如下协议：

一、重点智库建设必须坚持以习近平新时代中国特色社会主义思想为指导，坚持正确的政治方向、价值取向和研究导向，必须坚持党管智库，坚决贯彻落实意识形态工作责任制，必须深入学习贯彻习近平总书记关于新型智库建设的重要论述，紧密围绕海南自由贸易港建设“一本三基四梁八柱”战略框架，开展前瞻性、针对性、储备性政策研究，提出专业化、建设性、切实管用的政策建议，为海南自由贸港建设提供智力支撑。

二、重点智库建设管理必须严格遵照《海南省重点智库建设管理实施细则》（琼宣发[2023]5号）执行。

三、重点智库必须为依法设立、相对稳定、运作规范的实体非营利性研究机构，其建设应符合海南全面深化改革开放和中国特色自由贸易港建设需要，以服务省委省政府科学民主依法决策为宗旨，以经济社会发展战略和公共政策为主要研究对象。

四、重点智库必须坚持党管智库，严格落实意识形态工作责任制，增强风险意识，维护意识形态领域安全。

五、重点智库建设严格遵照“谁建设、谁负责”的原则。省社科联

备案，接受境外资助须报省社科联审批并报省委宣传部备案。

十、乙方（智库依托单位）的财务部门应加强经费管理。建立健全规范高效、公开透明、监管有力的经费管理机制，提高经费使用效率，形成符合智库运行特点的经费管理制度。省社科联划拨的相关经费由智库依托单位纳入单位财务统一管理，单独核算、专款专用，具体使用按照国家和我省相关管理办法执行，并依法接受财政和审计部门的监督、审计。

十一、乙方（智库依托单位）科研管理部门应加强对科研工作的管理。要严把智库成果的政治关和意识形态关，督促智库按时保质出成果。

十二、甲方负责对乙方的绩效考核和综合评估。甲方有权对乙方建设相关情况进行调查了解。每年对入选的重点智库进行年度考核，并视年度考核情况考虑资助力度或责令限期整改；每三年对入选的重点智库进行综合评估，评估合格的继续予以支持，不合格的动态调整，形成优胜劣汰、有进有出的竞争机制。

十三、本合同履行过程中，若发生争议，双方应先通过协商方式解决。如经协商无法达成协议，则任何一方均可向甲方所在地的人民法院提请诉讼。通过法律程序予以解决，包括但不限于诉讼费用、差旅费、律师费、保全担保费等均由违约方承担。

十四、本协议一式四份，甲方二份，乙方二份，具有同等法律效力。

甲　方：海南省社会科学界联合会　　（盖章）

代　表：　　（签名）　　2025 年 10 月 28 日

乙方：海南热带海洋学院（海上丝绸之路研究院）

（盖章）

代　表：徐庆华（签名）

2025 年 10 月 28 日

海南省外事办公室

国际会议批复

第 20250022 号

<table>
<tr><td colspan="2">会议名称</td><td colspan="5">2025 中欧可持续生产运营论坛</td></tr>
<tr><td colspan="2">会议主题</td><td colspan="5">AI 赋能下面向未来的可持续管理</td></tr>
<tr><td colspan="2">主办单位</td><td colspan="5">海南热带海洋学院</td></tr>
<tr><td colspan="2">申报单位</td><td colspan="5">海南热带海洋学院、中国石油大学经济管理学院</td></tr>
<tr><td colspan="2">会议地点</td><td colspan="2">三亚市</td><td>举办方式</td><td colspan="2">线上线下相结合</td></tr>
<tr><td colspan="2">举办时间</td><td colspan="2">2025 年 6 月 13 日-15 日</td><td>经费来源</td><td colspan="2">专项经费、项目经费、自筹经费</td></tr>
<tr><td colspan="2">是否已征求业务主管部门意见</td><td colspan="5">是</td></tr>
<tr><td rowspan="5">会议类型及规模</td><td>会议类型</td><td colspan="5">一般性会议</td></tr>
<tr><td>总人数</td><td>150</td><td>国外代表</td><td>3</td><td>国内代表</td><td>147</td></tr>
<tr><td colspan="4">是否邀请外国政要、前政要出席</td><td colspan="2">☐是☑否</td></tr>
<tr><td colspan="4">是否邀请国际组织驻华代表、外国驻华使领馆官员出席</td><td colspan="2">☐是☑否</td></tr>
<tr><td colspan="4">是否邀请省领导出席</td><td colspan="2">☐是☑否</td></tr>
<tr><td colspan="2">工作要求</td><td colspan="5">请你单位按照“以我为主，为我所用”的原则，认真做好会议组织工作，会议筹备请注意统筹考虑经费开支和预期效果等，确保会议取得实效。
请于会议结束 1 个月内将会议举办情况在线提交。</td></tr>
</table>

二〇二五年五月二十六日

海南省外事办公室 国际会议审批专用章

承办第七届中国自贸智库论坛协议书

海南省社科联

2025 年 9 月

承办第七届中国自贸智库论坛协议书

甲方：海南省社会科学界联合会

乙方：海南热带海洋学院

根据《第七届中国自贸智库论坛方案》相关工作安排，甲乙双方经协商，就举办论坛的有关事宜，一致同意达成如下协议：

一、甲乙双方共同举办第七届中国自贸智库论坛。乙方为论坛的具体承办单位。论坛主题围绕“深化自贸区（港）战略，打造新时代对外开放重要门户”展开。举办时间为 2025 年 10 月 31 至 11 月 2 日。

二、甲方向乙方提供资助金额叁拾柒万捌仟柒佰伍拾元整（其中论坛会议经费 25.875 万元，论文集作者稿费和出版经费 12 万元，含税）。

三、乙方具体负责论坛的会务工作。包括征文、会议资料的审定，召集与会人员，会议人员的邀请、接待、与会人员的食宿、会场布置、交通等工作。此次论坛采用主论坛+分论坛等模式召开，优化分论坛设计，扩大论坛的影响力与会议实效。

四、乙方负责论坛安保工作，保证论坛工作的顺利举办，期间若发生侵权等安全责任事项，由乙方独自承担。

五、1.乙方及其参与本次承办工作的有关人员应对在协议履行过程中甲方提供的所有信息（包括但不限于甲方的秘密、会议

记录、论坛策划方案及论坛非公开宣传资料等，以下统称“保密信息”）负有严格的保密义务。即使本合同期满或终止，乙方对保密信息的保密义务仍应继续有效，乙方应承担的保密义务包括但不限于：（1）未经甲方书面同意，不得以任何形式将上述承办工作的材料、文件资料和信息披露给任何第三人；（2）不得将上述甲方秘密文件资料和信息用于本协议以外的其他目的；（3）保密义务自乙方接触或知悉保密信息之日起生效，并持续有效，直至保密信息成为公开信息为止。2.合同期满后，乙方可对涉密信息自行处理或进行销毁，但不得违反上述保密义务。3.若乙方未履行上述保密义务，甲方有权解除本协议，并要求乙方支付合同总金额30%的违约金；违约金不足弥补损失的，乙方还应继续赔偿甲方损失，并承担相应的法律责任”。

六、甲方向乙方提供资助的方式是：双方签订协议后，由乙方开具合法有效的等额发票，甲方自收到乙方提供的发票之日起20个工作日内一次性支付叁拾柒万捌仟柒佰伍拾元整，经费由乙方财务部门监管使用。并于论坛结束后，提供上述经费开支的相关证明材料。

七、此协议自甲乙双方代表签字之日起生效，乙方承办完会议后终止。

八、本协议未尽事宜由双方协商解决。协商不成的，交由甲方所在地人民法院管辖。通过法律程序予以解决，包括但不限于诉讼费用、差旅、律师费、保全担保费等均由违约方承担。

九、本协议一式二份，甲方一份，乙方一份，具有同等法律效力。

海南热带海洋学院帐户信息：

单位名称：海南热带海洋学院

银行账号：1005835900001783

开户行：三亚农商银行琼大支行

甲　方：海南省社会科学界联合会　（盖章）

代　表：　（签名）　2025 年　月　日

乙　方：海南热带海洋学院　（盖章）

代　表：　（签名）　2025 年　月　日