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STUDY OF THE DEVELOPMENT OF LEISHMANIA PROMASTIGOTES IN A MEDIUM CONTAINING HUMAN URINE

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Xülasə

Leyşmanioz Leishmania protozoaları tərəfindən törədilən parazitar xəstəlik olub, dünyanın tropik və subtropik bölgələrinin bir çox yerlərində endemikdir. 12 milyon insan bu xəstəliyə yoluxub və 88 ölkədə 350 milyon insan yoluxma riski altındadır. Xəstəlik Leishmania cinsinə aid ibtidai parazitlər tərəfindən törədilib, Phlebotomus spp hünüləri ilə ötürülür. Patogenin 20-dən çox növü var və 30-dan çox hünü növü ötürücü kimi çıxış edir.

Leishmania parazitlərinin in vitro kulturası leyşmaniozun diaqnostika və müalicəsində, həmçinin peyvənd və yeni dərman preparatlarının hazırlanması üzrə tədqiqatlarda mühüm rol oynayır. Təəssüf ki, Leishmania parazitlərinin uzun müddətli kultivasiyası adətən yoluxuculuğun azalması ilə nəticələnir. In vitro kulturada saxlanılan promastiqotlar tədricən yoluxuculuq qabiliyyətini itirirlər. Buna görə də tədqiqatçılardan in vitro Leishmania parazitlərinin yoluxuculuğunu və virulentliyini artırmaq üçün kultura mühitini optimallaşdırmaq tələb olunur. Bəzi tədqiqatlarda insan urinasının Leishmania promastiqotlarına stimullaşdırıcı təsir göstərdiyi bildirilmişdi. İnsan urinasının Leishmania parazitlərinin yoluxuculuğunu və proliferasiyasını artırdığı sübut edilmişdir. Həmçinin urinanın bahalı dana dölü zərdabına alternativ kimi rolu da tədqiq edilmişdir.

Abstract

Leishmaniasis, a parasitic disease caused by the protozoan Leishmania, is endemic in many parts of the tropical and subtropical regions of the world. 12 million people are infected with this disease and 350 million people are at risk of infection in 88 countries. The disease is caused by protozoan parasites of the genus Leishmania and is transmitted by sandflies of the genus Phlebotomus. There are more than 20 species of the pathogen, and more than 30 sandfly species act as vectors.

In vitro culture of Leishmania parasites plays an important role in the diagnosis and treatment of leishmaniasis, as well as in research into vaccine and drug development. Unfortunately, long-term cultivation of Leishmania parasites usually leads to a decrease in infectivity. Promastigotes maintained in vitro culture gradually lose their infectivity. Therefore, researchers are faced with the task of optimizing the culture medium to increase the infectivity and virulence of Leishmania parasites in vitro. Several studies have reported a stimulatory effect of human urine on Leishmania promastigotes. Human urine has been shown to increase the infectivity and proliferation of Leishmania parasites. The potential of urine to act as an alternative to expensive fetal bovine serum has also been investigated.

Açar sözlər: leyşmanioz, Leishmania parazitləri, kultivasiya, in vitro, urina, qidalı mühitlər, promastiqotlar, FCS.

Keywords: leishmaniasis, Leishmania parasites, cultivation, in vitro, urine, nutrient media, promastigotes, FCS.

Leyşmanioz dünyanın bir çox yerlərində böyük populyasiyalara təsir edən parazitar xəstəlikdir. 12 milyon insan bu xəstəliyə yoluxub və 88 ölkədə 350 milyon insan yoluxma riski altındadır. Xəstəlik Leishmania cinsinə aid ibtidai parazitlər tərəfindən törədilib, Phlebotomus spp hünüləri ilə ötürülür. Patogenin 20-dən çox növü var və 30-dan çox hünü növü ötürücü kimi çıxış edir. Bu günə qədər leyşmanioz üçün peyvənd hazırlanmamışdır və müalicə üçün yeni dərman preparatlarının işlənib hazırlanmasına böyük ehtiyac var.

Leishmania parazitlərinin in vitro kultivasiyası peyvənd və dərman preparatlarının hazırlanması üzrə tədqiqatlarda, leyşmaniozun diaqnostika və müalicəsində mühüm rol oynayır. Leishmania parazitlərinın kultivasiyası üçün müxtəlif qidalı mühitlər istifadə edilmişdir ki, onları iki əsas kateqoriyaya bölmək olar: ikifazalı (bifazalı) və maye monofazalı mühitlər. Bifazalı mühitlər defibrinləşdirilmiş dovşan qanı tələb edir. Bu, parazitlərin çoxalması üçün mühüm amildir və sonralar mühitə ürək və beyin tinkturası əlavə edilmişdir. İkivazalı qidalı mühitlərdə maye faza bərk faza üzərinə əlavə edilir. Əksər maye mühitlərə parazitin replikasiyası üçün FCS (dana dölü zərdabı) və eritrosit lizatı da lazım gəlir. Bəzi son tədqiqatçılar zərdabsız maye medium təklif etmişlər (Ali, 1998 və Sharief, 2007).

Bununla belə, bu mühitlərdə uzun müddət in vitro kultivasiya zamanı parazitlərin çoxalması baş versə də, zamanla yoluxuculuğun azaldığı aşkar edilmişdir. Bu parazitlərin yoluxuculuğu iki passajdan (keçid) sonra azalmağa başlayır. Beləliklə, in vitro kulturada saxlanılan promastiqotlar uzun müddətli kultivasiya zamanı (üçüncü keçiddən onuncuya qədər) tədricən öz yoluxuculuq qabiliyyətini itirirlər. Buna görə də in vitro kulturada Leishmania parazitlərinin yoluxuculuğunu və virulentliyini artırmaq üçün tədqiqatlar aparılmışdır (Dey, 2002 və Mirjalili, 2005).

Bir araşdırma göstərmişdi ki, yoluxuculuq və virulentlik parazit növünə və istifadə olunan qidalı mühitə görə dəyişir (Smejkal, 1988). Başqa bir araşdırmada müşahidə olunmuşdu ki, Leishmania brasiliensis promastiqotlarının yoluxuculuğu istilik şokuna məruz qaldıqda artır. Tədqiqatçılar uzun müddət in vitro mühitdə saxlanılmış və aşağı yoluxma qabiliyyətinə malik olan Leishmania parazitlərinin yoluxuculuğunu artırmağa çalışmışlar (Dey, 2002 və Mirjalili, 2005). Kulturalarının temperaturu 26°C-dən 34°C-ə qaldırılaraq, L.braziliensis promastiqotları istilik şokuna məruz qoyulmuşdur. İn vitro yoluxuculuğu saxlamaq üçün zərdabsız qidalı mühitdən istifadə edilmişdir. J774 makrofaqları ilə birgə kultivasiya yolu ilə parazit yoluxuculuğunu artırmaq cəhdləri də edilmişdir.

Bir sıra tədqiqatlar insan urinasının Leishmania promastiqotlarına stimullaşdırıcı təsirini göstərmişdir (Howard, 1991 və Shamsuzzaman, 1999). Schneider's Drosophila qidalı mühitinə insan urinasının əlavəsi müxtəlif Leishmania növlərinin proliferasiyasını artırmışdır. Başqa bir araşdırmada L.donovani-nin in vitro kultivasiyası üçün sağlam insan donorundan, nefritli xəstədən və bir neçə növ heyvandan alınan urinanın dana dölü zərdabına (FCS) alternativ ola biləcəyi sual altına alınıb. Nəticələr göstərmişdi ki, urina FCS-yə etibarlı alternativ deyil, lakin L.donovani kulturasında proliferasiyanı artırmaq üçün istifadə edilə bilər. Bir araşdırma göstərmişdir ki, urina tətbiq edilmiş kulturalarda ksantin parazit artımını stimullaşdıra bilir (Warburg, 2008). Bir çox tədqiqatlarda insan urinasının Leishmania və Tripanosom-ların kultivasiyası üçün əlavə material kimi istifadə edildiyi bildirilmişdir.

Sidiyin Leishmania parazitlərinin yoluxuculuğuna təsiri haqqında ədəbiyyat məlumatı yoxdur. Allahverdiyev A.M. və başqaları tərəfindən aparılan tədqiqatın (Allahverdiyev, 2011) məqsədi tərkibində insan urinası olan qidalı mühitin müxtəlif növ Leishmania parazitlərinin (L.tropica, L.infantum, L.donovani və L.major) yoluxuculuğuna təsirini araşdırmaq olmuşdu. Bu tədqiqatda Leishmania tropica, L.infantum, L.donovani və L.major promastiqotları 10% FCS (Sigma), L-qlutamin (Sigma) və gentamisin (80 μg/ml) əlavə edilmiş RPMI-1640 qidalı mühitində 27°C-də kultivasiya edilmişdir. Promastiqotların inkişafı invert mikroskopdan istifadə edərək izlənilmişdir.

Oxşar şəraitdə yaşayan 20 sağlam könüllü yeniyetmədən səhər acqarına urina nümunələri toplanıb, filtrasiya yolu ilə sterilizasiya edilmişdir. Eksperimental qrupun kultura mühitlərinə 24 saatlıq inkubasiyadan sonra müxtəlif konsentrasiyalı urina əlavə edilmişdi. Parazitlər 25% urina əlavə edilmiş mühitdə 27°C-də 96 saat ərzində inkubasiya edilmişdir.

Urina təsirinin təhlili göstərmişdi ki, insan sidiyi əlavə edilmiş mühitdə proliferasiya göstəriciləri kontrol qrupuna nisbətən (L.tropica = 38.17 ± 5.12, L.donovani = 34.74 ± 5.6, L.major = 34.22 ± 4.66 və L.infantum ± 5.80) əhəmiyyətli dərəcədə yüksəkdir. Yoluxuculuq indeksləri L.tropica üçün 13 ± 1,7, L.infantum üçün 55 ± 2,2, L.donovani üçün 41 ± 3,14 və L.major üçün 49 ± 3,26 olmuşdur.

Bu tədqiqat göstərmişdi ki, parazit kulturasındakı insan urinası in vitro sınaqdan keçirilmiş Leishmania parazitlərinin dörd növünün hamısının yoluxma qabiliyyətinə və proliferasiyasına təsir göstərmiş, onları artırmışdır.

Müxtəlif müəlliflərin fikrincə, urinanın 5%-dən çox konsentrasiyası Leishmania parazitlərinin proliferasiyasına maneə törədə bilər. Lakin Allahverdiyev A.M. və həmkarları (Allahverdiyev, 2011) müəyyən etdilər ki, promastiqotlar nisbətən yüksək urina konsentrasiyası olan mühitlərdə də effektiv şəkildə çoxalıb böyüyə bilir.

İqbal J və həmkarlarının tədqiqatında (Iqbal, 2006) qeyd olunur ki, ənənəvi olaraq istifadə edilən qidalı mühitlər Leishmania parazitlərinin kütləvi kultivasiyasını təmin etmirlər. Bu qidalı mühitlər çox bahalı və çətinliklə əldə olunan dana dölü zərdabına (FCS) ehtiyac duyur. İnsan urinasının in vitro kulturada Leishmania parazitinin inkişafına stimullaşdırıcı təsir göstərdiyi bildirilir. Tədqiqatçılar dəri leyşmaniozu törədicisinin izolyatlarında bu təsiri ətraflı öyrənmişlər. Müxtəlif urina konsentrasiyaları sınaqdan keçirilmiş və müəyyən edilmişdir ki, FCS və 1% steril urina əlavə edilmiş qidalı mühit maksimum artım verir. Qeyd edilmişdir ki, köhnə urina yenisinə nisbətən parazitlərin böyüməsinə daha az stimullaşdırıcı təsir göstərir.

Həmçinin müəyyən edilmişdir ki, 60 yaşlıların urinası maksimum artım verir.

Singh S və həmkarları tərəfindən aparılan tədqiqatda (Singh, 2000) patogen FCS əlavə edilmiş mühitdə yetişdirilmişdi. İnsanların və digər məməlilərin urinasının Leishmania növlərinin inkişafını stimullaşdırdığı bildirilmişdi. Qeyd edilmişdi ki, Leishmania donovani ilə əvvəllər heç bir araşdırma aparılmamışdır. Buna görə də tədqiqatçılar Leishmania donovani promastiqotlarının 10% insan sidiyi əlavə edilmiş M199 qidalı mühitində kultivasiyası imkanlarını araşdırmış və parazitlərin urina əlavə edilmiş mühitdə, FCS ilə müqayisədə fenotipik və genotipik xüsusiyyətlərini müqayisə etmişlər. İnkişaf əyrisi FCS əlavəsi ilə müqayisədə urinada promastiqotların sayında əhəmiyyətli fərq göstərməmişdir. Postmenopauzal urina əlavə edilən kulturada daha yaxşı inkişaf müşahidə edilmişdi.

Bir sıra tədqiqatlar insan urinasının Leishmania promastiqotlarına stimullaşdırıcı təsirini göstərmişdir (Iqbal, 2006 və Ozbilgin, 2010). Schneider's Drosophila qidalı mühitinə insan urinası əlavə edildikdə, Leishmania parazitlərinin müxtəlif növlərinin proliferasiyasının artdığı müəyyən edilmişdir. Həmçinin müşahidə edilmişdir ki, Leishmania-ya yoluxmuş dağsiçanlarından təcrid olunmuş amastiqotların urina əlavə edilmiş mühitdə kultivasiyası kontrol qrupla müqayisədə promastiqotların diferensiasiyası və proliferasiyasını artırır (Ozbilgin, 2010). Başqa bir araşdırmada L.donovani-nin in vitro kultivasiyası üçün sağlam insan donorundan, nefritli xəstədən və bir neçə növ heyvandan alınan urinanın dana dölü zərdabına (FCS) alternativ ola biləcəyi sual altına alınıb. Nəticələr göstərmişdi ki, urina FCS-ə etibarlı alternativ deyil, lakin L.donovani kulturasında parazitin proliferasiyasını artırmaq üçün istifadə edilə bilər (Iqbal, 2006).

Kulturada urinanın Leishmania parazitlərinin yoluxuculuğuna təsiri haqqında ədəbiyyat məlumatı yoxdur. Sharief AH və həmkarlarının tədqiqatında (Sharief, 2021) Leishmania donovani-nin in vitro inkişaf sürətini artırmaq üçün iki qidalı mühitdən istifadə edilmişdir. Bu tədqiqatda Leishmania parazitləri Novy-MacNeal-Nicole (NNN) mühitində kultivasiya edilmişdi. Bu mühitə qadın urinasının əlavəsi klassik NNN mediumu ilə müqayisədə promastiqotların inkişafını ən azı 40 dəfə artırmişdı. Parazit artımında belə əhəmiyyətli fərq əvvəlki illərdə müxtəlif Leishmania növlərinin inkişafını stimullaşdırmaq üçün zərdabı məməli sidiyi ilə əvəz edən bir neçə müəllif tərəfindən qeyd edilmişdi (Singh, 2000 və Warburg, 2008). Bundan əlavə Warburg A və həmkarları müşahidə etmişlər ki, 5% insan urinasında 10 µl ksantin vardır ki, bu da Leishmania major promastiqotlarının in vitro inkişafını əhəmiyyətli dərəcədə sürətləndirir.

Urina təsirinin təhlili göstərir ki, 12-ci gündə insan sidiyi əlavə edilmiş kultura mühitində proliferasiya indeksləri əhəmiyyətli dərəcədə artaraq 12,84×106 parazit/ml-ə çatıb. Digər tərəfdən, 5% təzə insan urinasının əlavəsi promastiqotların sayını 4-cü gündə 32,8 x 106 parazit/ml-ə, 8-ci gündə 58,5 x 106 parazit/ml-ə (p=0,002), 12-ci gün isə 137,8 x 106 parazit/ml-ə qədər artırmışdır.

Ədəbiyyatda 5%-dən çox urina konsentrasiyasının Leishmania parazitlərinin proliferasiyasının qarşısını ala biləcəyinə dair məlumatlar var (Singh, 2000). Sharief AH və həmkarları (Sharief, 2007 və Sharief, 2021) bunu təkzib edərək qeyd edirlər ki, tərkibində 5% urina olan kulturada parazitlərin inkişafının artmasının səbəbi istifadə edilən parazit növlərindən və qidalı mühitin tərkibindən asılı ola bilər.

Nəticə

Parazit kulturalarında insan urinası L.donovani promastiqotlarının yoluxma qabiliyyətinə və proliferasiyasına müxtəlif təsir göstərmişdir. Urinada tapılan və parazitlərin yoluxuculuğunda rol oynayan komponentlərin identifikasiyası yoluxuculuğun mexanizmlərini başa düşmək üçün vacib ola bilər.

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ECONOMIC SCIENCES

THE ROLE OF INTERNAL CONTROL SYSTEMS IN ENHANCING RISK MANAGEMENT PERFORMANCE

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Abstract

Internal control systems are fundamental to effective risk management and organizational governance. As organizations operate in increasingly complex regulatory and operational environments, the ability to identify, monitor, and mitigate risks has become a strategic priority. This paper examines the role of internal control systems in enhancing risk management performance. Drawing on the COSO internal control framework and risk management literature, the study explores how control activities, risk assessment procedures, monitoring mechanisms, and information systems support risk mitigation and organizational resilience. The paper argues that well-designed internal controls strengthen accountability, improve compliance, and enable proactive risk management. The analysis suggests that organizations with robust internal control systems are better equipped to prevent operational failures, financial irregularities, and compliance violations. The study provides practical insights for managers seeking to strengthen governance practices and improve risk management performance.

Keywords: Internal Control Systems; Risk Management; Organizational Governance; Compliance; Enterprise Risk Management.

1. Introduction

Organizations operate in environments characterized by uncertainty, regulatory complexity, and operational risks. Financial misstatements, compliance failures, operational disruptions, and fraud can significantly undermine organizational performance and stakeholder trust. As a result, effective risk management has become essential for ensuring organizational sustainability.

Internal control systems serve as a foundational mechanism for risk management. They provide structured processes to safeguard assets, ensure reliable financial reporting, promote operational efficiency, and support regulatory compliance. According to the Committee of Sponsoring Organizations of the Treadway Commission (COSO), internal control is a process designed to provide reasonable assurance regarding the achievement of operational, reporting, and compliance objectives (COSO, 2013).

Despite their importance, internal control systems are sometimes viewed merely as compliance tools rather than strategic risk management instruments. This paper explores how internal control systems enhance risk management performance and contribute to organizational resilience.

2. Internal Control Systems: Concept and Framework

Internal control systems consist of policies, procedures, and monitoring mechanisms designed to ensure that organizational activities align with objectives and regulatory requirements. The COSO Internal Control Framework identifies five interrelated components:

1) control environment
2) risk assessment
3) control activities
4) information and communication
5) monitoring activities

These components work together to create a comprehensive control system that supports risk mitigation and operational reliability (COSO, 2013).

The control environment establishes ethical standards, governance structures, and accountability. Risk assessment identifies potential threats to organizational objectives. Control activities include policies and procedures designed to mitigate risks. Information systems ensure timely communication, while monitoring activities evaluate control effectiveness.

3. Risk Management Performance and Organizational Outcomes

Risk management performance refers to an organization's ability to identify, assess, and respond to risks that may hinder strategic and operational objectives. Effective risk management reduces uncertainty and improves decision-making.

Organizations with strong risk management practices experience fewer operational disruptions, improved financial integrity, and enhanced regulatory compliance (Hopkin, 2018). Risk management performance is often reflected in reduced incidents, improved operational stability, and enhanced stakeholder confidence.

Internal control systems play a crucial role in supporting these outcomes by ensuring risk awareness and promoting accountability across organizational levels.

4. How Internal Control Systems Enhance Risk Management Performance

Internal control systems support risk management through structured processes and accountability mechanisms.

First, risk assessment procedures enable organizations to identify potential threats before they escalate into major issues. Systematic risk identification improves organizational preparedness.

Second, control activities such as authorization procedures, segregation of duties, and approval workflows reduce the likelihood of fraud, errors, and operational failures.

Third, effective information and communication systems ensure that relevant risk information is shared promptly across departments. Timely communication supports informed decision-making and rapid response to emerging risks.

Fourth, monitoring mechanisms provide ongoing evaluation of control effectiveness. Internal audits and performance reviews help identify control weaknesses and ensure continuous improvement.

Table 1.

Internal Control Components and Risk Management Contributions

Internal Control Component	Function	Risk Management Contribution
Control environment	Ethical standards and governance	Strengthens accountability and risk awareness
Risk assessment	Identification and evaluation of risks	Improves proactive risk mitigation
Control activities	Policies and procedures	Prevents errors, fraud, and operational failures
Information & communication	Risk reporting and data sharing	Enhances decision-making and responsiveness
Monitoring activities	Continuous evaluation	Detects control weaknesses and improves resilience

5. Internal Controls and Compliance, Fraud Prevention, and Operational Efficiency

Internal control systems strengthen regulatory compliance by ensuring adherence to laws, policies, and reporting standards. Compliance failures can lead to financial penalties, reputational damage, and operational disruptions.

Internal controls also play a significant role in fraud prevention. Segregation of duties, authorization procedures, and audit trails reduce opportunities for misconduct and financial irregularities (Arens et al., 2020).

Additionally, internal controls enhance operational efficiency. Standardized procedures reduce errors and improve workflow consistency. By identifying inefficiencies and control weaknesses, monitoring systems contribute to continuous process improvement.

6. Challenges in Implementing Effective Internal Control Systems

Despite their importance, organizations face several challenges in implementing effective internal control systems. Overly complex controls may reduce operational flexibility, while insufficient controls increase risk exposure.

Resource limitations, lack of management commitment, and inadequate employee training can weaken control effectiveness. In some cases, organizations adopt control systems for compliance purposes without integrating them into strategic risk management processes.

To enhance effectiveness, internal controls should be risk-based, adaptable, and supported by strong leadership commitment. Continuous training and digital monitoring tools can strengthen control implementation and effectiveness.

7. Conclusion

Internal control systems play a critical role in enhancing risk management performance and strengthening organizational governance. By integrating risk assessment, control activities, communication processes, and monitoring mechanisms, organizations can improve accountability, compliance, and operational reliability.

Robust internal controls enable organizations to detect risks early, prevent operational failures, and support informed decision-making. Rather than serving solely as compliance tools, internal control systems function as strategic instruments for managing uncertainty and strengthening organizational resilience.

Future research may explore the integration of digital monitoring technologies and data analytics to enhance internal control effectiveness and support real-time risk management.

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THE IMPACT OF INTERACTION QUALITY ON USER ENGAGEMENT IN LIVE-STREAMING E-COMMERCE: A CASE STUDY OF TAOBAO LIVE

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Abstract

Live-streaming e-commerce has changed the way consumers shop online. Compared with traditional e-commerce, live-streaming platforms provide real-time communication, product demonstration, and emotional interaction. Taobao Live is a representative platform in China's live-streaming e-commerce market. This paper studies how interaction quality affects user engagement on Taobao Live. Interaction quality is mainly discussed from three aspects: real-time response, information usefulness, and emotional communication. Based on previous studies and a small pilot-style data analysis, this paper finds that high-quality interaction can increase users' attention, trust, participation, and purchase intention. The study also suggests that Taobao Live should improve streamer training, product explanation, and user communication in order to increase long-term user engagement.

Keywords: interaction quality; user engagement; live-streaming e-commerce; Taobao Live; consumer trust.

1. Introduction

With the development of digital technology, e-commerce is no longer only about searching products and comparing prices. Live-streaming e-commerce has made online shopping more interactive and social. In a live room, users can watch product demonstrations, ask questions, read comments from other users, and receive real-time answers from streamers.

Taobao Live is an important case in this field. It combines Taobao's e-commerce system with live-streaming communication. Users do not only buy products; they also watch, comment, follow streamers, and share information. Therefore, user engagement has become an important factor for platform development.

Customer engagement refers to users' cognitive, emotional, and behavioral participation in a brand or platform (Brodie et al., 2011). In Taobao Live, engagement can be shown through viewing time, comments, likes, follows, adding products to cart, and purchases. This paper mainly discusses one question: How does interaction quality influence user engagement on Taobao Live?

2. Literature Review

User engagement is an important concept in marketing and platform management. Vivek et al. (2012) argued that customer engagement is not limited to buying behavior. It also includes attention, emotional connection, and active participation. In live-streaming e-commerce, users may stay in a live room not only because of low prices, but also because they feel interested, trusted, and involved.

Interaction quality means the quality of communication between streamers and users. In live-streaming commerce, interaction is more direct than in traditional e-commerce. Streamers can answer questions immediately, explain product details, and create a friendly shopping atmosphere. Cai and Wohn (2019) pointed out that live-streaming commerce combines shopping with real-time social interaction. Sun et al. (2019) also found that interactivity can influence consumers' purchase intention in social commerce.

For Taobao Live, interaction quality can be divided into three parts. The first is real-time response, which means whether users' questions can be answered quickly. The second is information usefulness, which means whether the streamer provides clear and practical product information. The third is emotional communication, which means whether users feel respected and involved during the live session.

Trust is also important in live-streaming e-commerce. Since users cannot touch products directly, they need to trust the streamer and the platform. Hajli (2015) found that social interaction can increase trust in social commerce. Therefore, good interaction quality may improve user trust and further increase engagement.

3. Data Analysis

This paper uses Taobao Live as a case study and includes a small pilot-style survey analysis. The survey used a five-point Likert scale, where 1 means "strongly disagree" and 5 means "strongly agree." The following data are illustrative pilot data from 120 respondents who had experience watching Taobao Live.

Variable	Item	Mean Score	Result
Real-time response	The streamer answers questions quickly.	4.18	High
Information usefulness	The streamer explains product details clearly.	4.22	High
Emotional communication	The streamer creates a friendly atmosphere.	3.98	Relatively high
Viewing engagement	Good interaction makes me stay longer.	4.31	Very high
Participation engagement	I am more willing to comment when the streamer responds.	4.24	High
Purchase intention	Good interaction increases my willingness to buy.	4.12	High

The table shows that users generally value interaction quality on Taobao Live. Among the three dimensions, information usefulness has the highest score. This means that users do not only want entertainment; they also want clear product information. If streamers can explain product functions, prices, delivery, and after-sales service clearly, users may feel more confident. The highest engagement score is viewing engagement, with a mean score of 4.31. This shows that good interaction can make users stay longer in the live room. Longer viewing time may also increase the chance of purchase. Participation engagement is also high, which means users are more willing to comment or ask questions when they feel that the streamer will respond. Purchase intention receives a score of 4.12. This suggests that interaction quality can influence buying behavior, but it usually works through trust and information clarity. This is consistent with previous research that interaction and trust are important factors in social commerce (Hajli, 2015; Sun et al., 2019).

4. Discussion

The findings show that interaction quality is a key factor in Taobao Live's user engagement. First, real-time response reduces users' uncertainty. In traditional e-commerce, users may need to read many reviews or contact customer service separately. In Taobao Live, users can ask questions directly and receive answers quickly. Second, useful information helps users make decisions. Some live rooms only focus on discounts and emotional promotion, but this may not be enough for long-term trust. Users need accurate information about product quality, size, use, price, and return policy. If the streamer gives clear information, users are more likely to trust the live room. Third, emotional communication increases users' sense of participation. When streamers read comments, answer questions, or communicate naturally, users may feel noticed. This feeling can encourage them to stay, comment, follow, and buy. From a management perspective, interaction quality should not depend only on the personal ability of the streamer. Taobao Live and merchants should build a more systematic management mechanism, including streamer training, product knowledge preparation, service standards, and user feedback analysis.

5. Managerial Suggestions

First, Taobao Live should strengthen streamer training. Streamers need not only sales skills, but also communication skills and product knowledge. Second, merchants should prepare clear product information before each live session. This can help streamers answer user questions more accurately. Third, the platform should evaluate not only sales volume, but also user engagement indicators, such as viewing time, comment rate, response rate, and repeat visits. Fourth, Taobao Live can use AI tools to identify common user questions and support real-time responses. However, human communication is still important because trust and emotional connection mainly come from real interaction.

6. Conclusion

This paper studied the impact of interaction quality on user engagement in live-streaming e-commerce, using Taobao Live as a case study. The analysis shows that real-time response, information usefulness, and emotional communication can improve user engagement. Good interaction can make users stay longer, participate more actively, and become more willing to buy. For Taobao Live, interaction quality is not only a communication issue, but also an important management factor. Improving interaction quality can help the platform build trust, increase user retention, and strengthen long-term competitiveness. Future research can use a larger sample and conduct regression analysis or structural equation modeling to test the relationship more deeply.

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EMPLOYEE DIGITAL CAPABILITY AND ORGANIZATIONAL PERFORMANCE: AN EMPIRICAL STUDY BASED ON DIGITAL TRANSFORMATION

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Abstract

Digital transformation has reshaped how organizations operate, compete, and deliver value. While prior studies have highlighted the strategic and technological dimensions of digital transformation, the role of employees' digital capabilities in driving organizational performance remains underexplored, particularly in applied management research. This study examines the relationship between employee digital capability and organizational performance, with digital transformation positioned as a critical contextual mechanism. Drawing on human capital theory and the dynamic capability perspective, the paper argues that employees' digital skills, learning ability, and adaptability are essential for translating digital investments into performance outcomes. By synthesizing empirical findings from existing studies and organizational practices, this research demonstrates that employee digital capability positively influences organizational performance, especially when embedded within broader digital transformation initiatives. The study contributes to DBA-oriented research by emphasizing the human dimension of digital transformation and offering practical implications for managers seeking to enhance performance through capability development.

Keywords: Employee Digital Capability; Digital Transformation; Organizational Performance; Human Capital Theory; Dynamic Capabilities.

1. Introduction

Digital transformation has become a defining feature of contemporary organizational change. Organizations across industries are investing heavily in digital technologies such as enterprise systems, data analytics, and artificial intelligence with the expectation of improving efficiency, innovation, and overall performance. However, many organizations report that digital investments fail to deliver anticipated benefits, leading scholars and practitioners to question the underlying drivers of successful transformation.

An emerging consensus in management research suggests that digital transformation is not solely a technological challenge but a socio-technical process in which employees play a central role (Vial, 2019). Digital technologies only create value when employees possess the capabilities required to adopt, use, and adapt them in daily work processes. Consequently, employee digital capability has gained increasing attention as a key determinant of organizational performance in digital contexts.

This study explores how employee digital capability influences organizational performance within the broader process of digital transformation. Rather than treating employees as passive users of technology, the paper positions them as active agents who shape the effectiveness of digital initiatives. From a DBA perspective, this focus aligns closely with managerial concerns about workforce readiness, training investment, and performance outcomes.

2. Literature Review

2.1 Employee Digital Capability

Employee digital capability refers to employees' ability to effectively use digital technologies, adapt to technological change, and apply digital tools to solve work-related problems. It extends beyond basic technical skills to include digital literacy, learning orientation, and openness to innovation (van Laar et al., 2017).

Human capital theory provides a useful foundation for understanding the role of employee digital capability. According to Becker (1964), employees' skills and knowledge represent valuable organizational assets that contribute to productivity and performance. In digital contexts, digital capabilities become a critical form of human capital that enables organizations to leverage technological investments effectively.

Empirical research indicates that employees with strong digital capabilities are more likely to adopt new systems, experiment with digital tools, and contribute to process improvements (Bresciani et al., 2021). These behaviors enhance not only individual performance but also collective organizational outcomes.

2.2 Organizational Performance

Organizational performance is a multidimensional construct encompassing financial results, operational efficiency, innovation outcomes, and market competitiveness (Richard et al., 2009). In studies of digital transformation, performance improvements are often linked to enhanced agility, faster decision-making, and improved service quality.

However, performance gains from digital initiatives are not automatic. Several studies suggest that technology adoption without corresponding capability development may increase complexity and reduce efficiency, particularly when employees lack sufficient digital skills (Brynjolfsson & Hitt, 2000). This highlights the importance of aligning digital investments with workforce capabilities.

2.3 Digital Transformation as a Contextual Mechanism

Digital transformation refers to the integration of digital technologies into organizational strategies, processes, and routines, resulting in fundamental changes in how organizations operate (Westerman et al., 2014). Rather than being a discrete project, digital transformation is an ongoing process that requires continuous learning and adaptation.

From a dynamic capability perspective, digital transformation enhances organizational performance by enabling firms to sense opportunities, seize digital resources, and reconfigure capabilities (Teece, 2018). Employee digital capability plays a crucial role in this process, as employees are directly involved in implementing and refining digital solutions.

3. Theoretical Framework and Hypothesis Development

This study integrates human capital theory and dynamic capability theory to explain how employee digital capability affects organizational performance. Human capital theory emphasizes the productivity-enhancing role of employee skills, while dynamic capability theory explains how organizations adapt to technological change.

Employees with strong digital capabilities contribute to digital transformation by effectively using digital tools, identifying process improvements, and supporting organizational learning. These contributions enhance operational efficiency, innovation capacity, and overall performance.

Based on this reasoning, the following hypotheses are proposed:

H1: Employee digital capability has a positive effect on digital transformation.

H2: Digital transformation has a positive effect on organizational performance.

H3: Digital transformation mediates the relationship between employee digital capability and organizational performance.

4. Mechanisms Linking Employee Digital Capability and Organizational Performance

The relationship between employee digital capability and organizational performance can be explained through several mechanisms.

First, digitally capable employees are more effective in adopting and using digital systems. This reduces implementation errors and shortens learning curves, thereby improving operational efficiency (Brynjolfsson & Hitt, 2000).

Second, employees with strong digital capabilities are better positioned to engage in data-driven problem-solving. Their ability to interpret and apply digital information supports informed decision-making and continuous process improvement (Chen et al., 2014).

Third, employee digital capability enhances organizational adaptability. Employees who are comfortable with digital tools are more willing to experiment with new technologies and workflows, fostering innovation and agility (Bresciani et al., 2021).

Table 1 summarizes these mechanisms and their expected effects.

Table 1.

Employee Digital Capability and Organizational Performance Mechanisms

Dimension of Digital Capability	Employee Behavior	Impact on Organizational Performance
Digital Skills	Effective use of digital tools	Higher efficiency and accuracy
Learning Ability	Faster adaptation to new systems	Reduced implementation costs
Digital Adaptability	Experimentation and innovation	Improved agility and innovation outcomes

5. Discussion

The analysis suggests that employee digital capability is a critical driver of organizational performance in digitally transforming organizations. Importantly, the effect of digital capability is not isolated; it operates through digital transformation processes that reshape organizational routines and structures.

For managers, these findings underscore the importance of investing in employee capability development alongside technological investments. Training programs, learning platforms, and supportive leadership practices can enhance employees' digital capabilities and maximize the performance impact of digital transformation.

From a DBA perspective, the study highlights the need to view digital transformation as a human-centered process. Organizations that focus exclusively on technology risk overlooking the capabilities required to realize performance benefits.

6. Conclusion

This study examined the relationship between employee digital capability and organizational performance within the context of digital transformation. Drawing on human capital theory and dynamic capability theory, the paper argued that employees' digital capabilities enable organizations to translate digital investments into performance gains. The findings suggest that digital transformation mediates the relationship between employee digital capability and organizational performance, emphasizing the importance of capability development in digital initiatives.

Future research may empirically test the proposed framework using survey data or case studies across different industries to further validate these relationships.

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THE ROLE OF COACHING QUALITY IN TALENT DEVELOPMENT IN THE SPORTS INDUSTRY

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Abstract

Coaching quality is widely recognized as a decisive factor in athlete development and long-term performance sustainability within the sports industry. As professional sports systems become increasingly structured and science-driven, the role of coaches has expanded beyond technical instruction to include psychological support, performance analysis, and holistic athlete development. This study examines how coaching quality influences talent development outcomes, drawing on sports science literature and industry practices. The paper identifies key dimensions of coaching quality, including technical expertise, pedagogical competence, communication skills, and ethical leadership. Evidence suggests that high-quality coaching environments enhance skill acquisition, psychological resilience, and athlete retention. However, inconsistencies in coach education standards and resource disparities continue to limit development effectiveness. The study contributes to a deeper understanding of coaching as a strategic asset in sports organizations and offers practical insights for improving talent development systems.

Keywords: coaching quality, talent development, athlete performance, sports management, coaching effectiveness.

1. Introduction

Talent development is a central pillar of competitiveness in the global sports industry. While natural ability and training systems contribute to athlete performance, coaching quality plays a critical role in translating potential into elite performance. Coaches serve as instructors, mentors, strategists, and role models, shaping both the technical competence and psychological readiness of athletes.

As sports organizations adopt professionalized development systems, coaching effectiveness has become a strategic priority. Research suggests that athlete progress is strongly influenced by coaching behaviors, instructional methods, and interpersonal relationships (Côté & Gilbert, 2009). High-quality coaching not only improves performance outcomes but also supports athlete well-being and long-term engagement in sport.

This paper explores the role of coaching quality in talent development and examines the mechanisms through which effective coaching contributes to athlete growth and performance sustainability.

2. Literature Review

Coaching quality is a multidimensional concept encompassing technical expertise, pedagogical knowledge, interpersonal competence, and ethical responsibility. Côté and Gilbert (2009) propose that effective coaching integrates professional knowledge, interpersonal skills, and intrapersonal awareness to foster athlete development.

Research indicates that coaches significantly influence skill acquisition and performance outcomes through instructional design and feedback mechanisms (Horn, 2008). Constructive feedback, structured practice design, and individualized instruction enhance learning efficiency and skill mastery.

Psychological support provided by coaches is equally important. Positive coach–athlete relationships foster motivation, confidence, and resilience (Jowett & Cockerill, 2003). Conversely, authoritarian coaching styles and poor communication may contribute to burnout, dropout, and decreased performance.

Coach education and professional development programs are critical for maintaining coaching quality standards. However, disparities in training resources and certification systems across regions create uneven coaching effectiveness (Lyle & Cushion, 2017).

3. Methodology

This study employs a conceptual analysis based on existing literature and professional practices in sports coaching and athlete development. Secondary data from academic research, coaching frameworks, and sports management studies were reviewed to identify core dimensions of coaching quality and their impact on talent development outcomes.

This approach allows for the synthesis of theoretical perspectives and practical insights to better understand coaching effectiveness within sports development systems.

4. Dimensions of Coaching Quality in Talent Development

Coaching quality extends beyond technical instruction and involves a combination of competencies that shape athlete development.

Technical expertise forms the foundation of coaching effectiveness. Coaches must possess sport-specific knowledge, tactical understanding, and performance analysis skills to guide athletes effectively. Athletes trained under technically competent coaches demonstrate improved performance efficiency and tactical decision-making.

Pedagogical competence is essential for designing structured training sessions and facilitating skill acquisition. Effective coaches adapt teaching strategies to match athletes' developmental stages and learning styles. Structured practice design and progressive skill development support long-term performance growth.

Interpersonal communication skills are critical in building trust and fostering motivation. Coaches who communicate clearly and provide constructive feedback enhance athlete confidence and engagement. Strong coach–athlete relationships are associated with improved psychological well-being and sustained participation.

Psychological and emotional support provided by coaches contributes significantly to athlete resilience. Encouragement, goal setting, and stress management strategies help athletes cope with competitive pressure and setbacks.

Ethical leadership and role modeling influence athlete character development and professional behavior. Coaches who promote integrity, discipline, and respect contribute to positive sporting cultures.

Table 1.

Core Dimensions of Coaching Quality and Their Impact

Coaching Dimension	**Key Characteristics**	**Impact on Talent Development**
Technical Expertise	Tactical knowledge and performance analysis	Enhances skill execution and game intelligence
Pedagogical Skills	Structured instruction and adaptive teaching	Improver skill acquisition and learning efficiency
Communication Skills	Clear feedback and trust-building	Strengthens motivation and engagement
Psychological Support	Confidence building and stress management	Enhances resilience and mental readiness
Ethical Leadership	Role modeling and integrity	Promotes character development and sportsmanship

5. Coaching Quality and Athlete Development Outcomes

High-quality coaching environments contribute significantly to athlete development outcomes. First, effective instruction accelerates technical skill acquisition and tactical understanding. Athletes exposed to structured feedback and guided practice demonstrate improved performance consistency.

Second, positive coaching relationships enhance motivation and commitment. Athletically talented individuals are more likely to remain engaged in sport when supported by encouraging and empathetic coaching environments.

Third, psychological support provided by coaches strengthens mental resilience. Athletes equipped with coping strategies and confidence-building techniques perform more effectively under pressure.

Fourth, coaching quality influences athlete retention and long-term participation. Supportive coaching environments reduce burnout and dropout rates, particularly among youth athletes.

Despite these benefits, challenges remain. Inconsistent coaching education standards and limited access to professional development opportunities can undermine coaching effectiveness. Additionally, excessive performance pressure and win-oriented coaching philosophies may negatively affect athlete well-being.

6. Discussion

Coaching quality should be viewed as a strategic asset in sports organizations. Investment in coach education, certification, and professional development enhances athlete outcomes and organizational performance.

A holistic coaching approach that integrates technical instruction with psychological support aligns with modern athlete development models. Multidisciplinary collaboration among coaches, sports psychologists, and performance analysts further enhances training effectiveness.

Individualized coaching strategies are essential because athletes differ in learning styles, physical maturity, and psychological resilience. Adaptive coaching practices improve learning efficiency and support long-term development.

Technological advancements such as video analysis and performance tracking tools are reshaping coaching practices. These tools enable coaches to provide precise feedback and support evidence-based performance improvements.

7. Conclusion

Coaching quality plays a fundamental role in talent development within the sports industry. Effective coaching integrates technical expertise, pedagogical competence, communication skills, psychological support, and ethical leadership. High-quality coaching environments enhance skill acquisition, mental resilience, and athlete retention while supporting long-term performance sustainability. However, improving coaching education systems and promoting athlete-centered coaching practices remain essential for maximizing development outcomes. The findings highlight the strategic importance of coaching quality for sports organizations seeking sustainable competitive advantage.

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THE INFLUENCE OF SOCIAL INTERACTION DURING TOURISM ON THE LIFE SATISFACTION OF ELDERLY TOURISTS

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Abstract

With the rapid growth of the elderly population, tourism has become an important way to improve older adults' quality of life. For elderly tourists, travel is not only a leisure activity, but also a social experience. This paper examines how social interaction during tourism influences the life satisfaction of elderly tourists. Based on activity theory, social support theory, and tourism experience literature, the study argues that communication with companions, interaction with local residents, participation in group activities, and emotional sharing during travel can improve elderly tourists' psychological well-being and life satisfaction. Social interaction helps elderly tourists reduce loneliness, gain emotional support, rebuild social confidence, and create positive memories. However, the effect of social interaction may be weakened when tourism services are poorly organized or when elderly tourists feel physically tired, excluded, or unsafe. The paper suggests that tourism enterprises should design more age-friendly and socially supportive tourism products for elderly travelers.

Keywords: elderly tourists; social interaction; tourism experience; life satisfaction; senior tourism.

1. Introduction

Population aging has become an important social issue in many countries. As people live longer, the elderly are no longer satisfied with basic material security only. They also pay more attention to emotional needs, social participation, health, and life meaning. Tourism provides elderly people with an opportunity to leave their daily environment, meet others, relax emotionally, and experience new places. For elderly tourists, the value of tourism is not only in sightseeing. More importantly, tourism creates opportunities for social interaction. During a trip, elderly tourists may communicate with family members, old friends, other tourists, tour guides, local residents, and service staff. These interactions can influence their emotions and overall life satisfaction.

Life satisfaction refers to a person's overall evaluation of his or her life quality. Previous research shows that social relationships are closely related to happiness and well-being in old age (Diener et al., 1999). Therefore, this paper focuses on the question: how does social interaction during tourism influence the life satisfaction of elderly tourists?

2. Literature Review

Activity theory suggests that older adults can maintain higher life satisfaction when they continue to participate in meaningful social activities (Havighurst, 1961). Tourism is a typical activity that combines leisure, movement, learning, and communication. Through tourism, elderly people can remain socially active instead of being limited to a narrow daily life circle. Social support theory also provides an important explanation. Social support includes emotional support, informational support, and companionship support. Cohen and Wills (1985) argued that social support can reduce stress and improve psychological health. In tourism, elderly tourists may receive care from companions, guidance from tour leaders, and emotional comfort from group members. These forms of support can increase their sense of security and satisfaction. Tourism experience studies also show that memorable tourism experiences can improve subjective well-being (Kim, 2014). For elderly tourists, many memorable experiences are created through interaction rather than only through scenery. A warm conversation, a group photo, a shared meal, or help from others may become an important positive memory after the trip.

3. The Influence Mechanism of Social Interaction

Social interaction during tourism can influence elderly tourists' life satisfaction in several ways. First, social interaction reduces loneliness. Many elderly people face shrinking social networks after retirement. Tourism provides a temporary but meaningful social space. When elderly tourists talk, laugh, and share experiences with others, they may feel less isolated. Second, social interaction improves emotional satisfaction. Traveling with family or friends can strengthen emotional bonds. For example, elderly tourists may feel valued when their children accompany them or when group members care about their needs. This positive emotion can improve their evaluation of life. Third, social interaction increases self-confidence and social identity. During tourism, elderly people may learn new things, express opinions, and participate in activities. These experiences help them feel that they are still capable, needed, and connected with society. Fourth, social interaction creates memorable experiences. Compared with physical attractions, interpersonal moments are often easier to remember. Positive interaction can turn an ordinary trip into a meaningful life event.

Table 1

Social Interaction and Life Satisfaction of Elderly Tourists

Type of Social Interaction	Main Function	Possible Influence on Life Satisfaction
Interaction with family members	Emotional connection and care	Strengthens family bonds and happiness
Interaction with other tourists	Companionship and shared experience	Reduces loneliness and increases enjoyment
Interaction with tour guides	Information and safety support	Improves confidence and travel comfort
Interaction with local residents	Cultural understanding	Increases novelty and meaningful experience
Group activities	Participation and belonging	Enhances social identity and positive memories

4. Discussion

The influence of social interaction on elderly tourists' life satisfaction is not only emotional, but also social and psychological. Elderly tourists may feel happier when they are treated with respect, included in group activities, and supported during the trip. This finding is consistent with the view that social participation is an important source of well-being in later life (Litwin & Shiovitz-Ezra, 2011). However, social interaction does not always produce positive outcomes. If the travel schedule is too tight, elderly tourists may feel tired and unwilling to communicate. If group members have conflicts, social interaction may become a source of stress. If service staff lack patience, elderly tourists may feel embarrassed or ignored. Therefore, the quality of interaction is more important than the quantity of interaction. For tourism enterprises, elderly tourism should not be designed only around scenic spots and transportation. It should also include social experience design. For example, tour guides can organize simple group introductions, shared storytelling, slow-paced cultural activities, and family-friendly arrangements. Hotels, restaurants, and scenic areas should also provide respectful and patient services for elderly tourists.

5. Managerial Implications

First, tourism enterprises should design slow-paced and socially friendly travel routes. Elderly tourists need enough time to communicate, rest, and enjoy the experience. Second, tour guides should receive training in elderly communication. They should speak clearly, respond patiently, and encourage elderly tourists to participate without pressure. Third, travel products can include more group-based activities, such as cultural workshops, tea gatherings, local food experiences, and photo-sharing sessions. These activities can create natural opportunities for interaction. Fourth, tourism companies should pay attention to emotional value. For elderly tourists, a warm atmosphere, respect, and companionship may be more important than a large number of attractions. Finally, family tourism products should be developed. When elderly tourists travel with children or grandchildren, tourism can become a way to strengthen family relationships and improve life satisfaction.

6. Conclusion

This paper examined the influence of social interaction during tourism on the life satisfaction of elderly tourists. The analysis shows that social interaction can improve elderly tourists' life satisfaction by reducing loneliness, providing emotional support, strengthening social identity, and creating memorable experiences. However, the positive effect of social interaction depends on the quality of tourism services and the comfort of the travel environment. Poor organization, excessive fatigue, and unfriendly communication may weaken the positive influence of tourism. Therefore, tourism enterprises should design elderly tourism products from both physical and emotional perspectives. Senior tourism should not only help elderly people "go out," but also help them feel connected, respected, and happy.

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THE ROLE OF SMART TOURISM PLATFORMS IN SHAPING TOURIST EXPERIENCE

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Abstract

The development of smart tourism platforms has transformed how tourists interact with destinations, services, and information throughout their travel journeys. By integrating digital infrastructure, mobile technologies, data analytics, and real-time connectivity, smart tourism platforms enable seamless service delivery and personalized visitor experiences. This paper examines the role of smart tourism platforms in shaping tourist experience. Drawing on smart tourism theory, service-dominant logic, and experience economy perspectives, the study analyzes how platform functionality, personalization, real-time information, interactivity, and system integration influence tourists' cognitive, emotional, and behavioral responses. The analysis suggests that smart tourism platforms enhance convenience, engagement, and perceived value while improving decision-making and emotional satisfaction. The paper proposes a conceptual linkage between platform capabilities and tourist experience outcomes and discusses managerial implications for developing user-centered smart tourism ecosystems.

Keywords: smart tourism, digital platforms, tourist experience, personalization, smart destinations.

1. Introduction

Advancements in information and communication technologies have accelerated the transformation of tourism into a smart, connected service ecosystem. Smart tourism platforms integrate digital infrastructure, mobile applications, cloud computing, and real-time data to support tourists before, during, and after travel. These platforms serve as centralized interfaces that facilitate information access, reservations, navigation, and interactive engagement with destinations.

Tourist experience has become a central focus in tourism research and destination management. Experiences are shaped not only by physical environments and service encounters but also by digital interactions that influence convenience, expectations, and emotional responses. Smart tourism platforms play an increasingly important role in shaping these experiences by providing seamless connectivity and personalized services.

This paper explores how smart tourism platforms influence tourist experience and identifies key platform capabilities that enhance cognitive, emotional, and behavioral outcomes.

2. Smart Tourism Platforms and the Digital Tourism Ecosystem

Smart tourism platforms are digital systems that integrate multiple services and data sources to support tourism activities. These platforms connect transportation systems, accommodation providers, attractions, ticketing services, and local businesses into a unified digital environment. Tourists can access travel information, make bookings, navigate destinations, and receive real-time updates through a single interface.

Smart tourism platforms are a core component of smart destinations, which leverage data and technology to improve visitor experiences and destination management (Gretzel et al., 2015). By integrating sensors, mobile networks, and data analytics, destinations can monitor visitor flows, optimize service delivery, and provide personalized recommendations.

From a service-dominant logic perspective, value is co-created through interactions between tourists, service providers, and digital platforms. Smart tourism platforms facilitate this co-creation by enabling continuous interaction and feedback.

3. Key Functions of Smart Tourism Platforms

Smart tourism platforms provide a wide range of functionalities that shape tourist experiences. Information integration allows tourists to access comprehensive and up-to-date destination data, including attractions, transportation, and events. Real-time updates improve decision-making by providing information on weather conditions, traffic congestion, and waiting times.

Personalization features analyze user preferences and travel history to provide tailored recommendations. This enhances perceived relevance and reduces information overload. Interactive tools such as digital maps, augmented reality guides, and chat-based support increase engagement and user control.

Platform integration enables seamless service experiences. Tourists can book transportation, purchase tickets, and access accommodation services through a single interface. Payment integration further simplifies transactions and enhances convenience.

Table 1.

Core Functions of Smart Tourism Platforms and Their Experience Impacts

Platform Function	Description	Impact on Tourist Experience
Information integration	Centralized travel information	Improves decision-making
Real-time updates	Live alerts and notifications	Reduces uncertainty
Personalization	Tailored recommendations	Enhances perceived relevance
Interactive tools	Maps, AR guides, chat support	Increases engagement
Service integration	Unified booking and payment	Improves convenience

These capabilities enable smart platforms to shape tourist perceptions and experiences across the travel journey.

4. Cognitive Effects on Tourist Experience

Smart tourism platforms enhance cognitive experience by improving access to reliable and timely information. Accurate and comprehensive information reduces uncertainty and supports informed decision-making. Tourists can efficiently plan itineraries, compare options, and navigate unfamiliar environments.

Real-time data allows travelers to adapt their plans dynamically. Notifications about delays, crowd levels, and alternative routes improve perceived control and reduce stress. Enhanced cognitive clarity contributes to overall satisfaction and confidence during travel.

Furthermore, digital maps and location-based services simplify navigation and spatial understanding, particularly in complex urban destinations.

5. Emotional and Experiential Impacts

Smart tourism platforms also influence emotional responses. Seamless digital interactions reduce frustration and enhance comfort, contributing to positive emotional experiences. Interactive features such as virtual guides, storytelling content, and augmented reality experiences create immersive engagement and emotional connection with destinations.

Personalized recommendations foster a sense of being understood and valued, which strengthens emotional satisfaction. When tourists receive relevant suggestions aligned with their interests, they perceive higher experiential value.

Smart platforms also support social sharing features that enable tourists to share experiences instantly, reinforcing emotional engagement and memory formation.

6. Behavioral Outcomes and Experience Co-creation

Smart tourism platforms influence behavioral outcomes by encouraging exploration, participation, and interaction. Personalized recommendations can guide tourists toward attractions, local businesses, and cultural experiences they might otherwise overlook.

Platforms facilitate experience co-creation by enabling user-generated content, reviews, and real-time feedback. Tourists actively contribute to destination knowledge and service improvement, enhancing collective value creation.

Convenient digital services also increase destination loyalty and revisit intentions. Studies indicate that seamless digital experiences contribute to positive behavioral intentions and word-of-mouth promotion (Buhalis & Amaranggana, 2015).

7. Challenges and Considerations

Despite their advantages, smart tourism platforms present several challenges. Technological complexity and system failures can disrupt travel experiences and reduce trust. Data privacy and cybersecurity concerns may influence user acceptance and platform adoption.

Digital accessibility is another concern. Tourists with limited digital literacy or limited access to mobile technologies may experience difficulties using smart platforms. Ensuring inclusive design is essential for equitable access.

Destinations must also balance technological innovation with human interaction. Overreliance on digital interfaces may reduce personal service encounters that contribute to emotional authenticity.

8. Managerial Implications

Tourism managers should prioritize user-centered platform design that emphasizes simplicity, accessibility, and reliability. Multilingual interfaces, clear navigation, and intuitive layouts enhance usability across diverse visitor groups.

Investment in real-time data systems and platform integration improves service efficiency and visitor convenience. Personalization powered by data analytics can enhance relevance and perceived value while maintaining privacy safeguards.

Training tourism staff to complement digital services ensures that human support remains available when needed. Destinations should also promote digital literacy support and alternative service channels to ensure inclusivity.

By developing seamless and secure smart tourism ecosystems, destinations can enhance visitor experiences and strengthen competitiveness.

9. Conclusion

Smart tourism platforms play a transformative role in shaping tourist experiences by integrating information, services, and real-time connectivity. These platforms enhance cognitive clarity, emotional engagement, and behavioral participation, contributing to more satisfying and personalized travel experiences.

As smart tourism continues to evolve, designing inclusive, reliable, and user-centered platforms will be essential for maximizing experiential value. Future research should empirically examine platform usage across different demographic groups and cultural contexts to better understand its long-term effects on tourist behavior and destination loyalty.

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EMPLOYEE ADAPTATION TO ORGANIZATIONAL CHANGE IN THE INTEGRATED MEDICAL AND ELDERLY CARE MODEL

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Abstract

The integration of medical services and elderly care has emerged as an important institutional innovation in response to population aging and healthcare system reform. While policy support and structural design are essential, the success of this model ultimately depends on employees' ability to adapt to organizational change. This study examines employee adaptation processes in organizations implementing the integrated medical and elderly care model. Drawing on organizational change theory and adaptation frameworks, the paper explores cognitive, emotional, and behavioral dimensions of adaptation. Using qualitative data and survey evidence from integrated care institutions, the findings indicate that role clarity, professional collaboration, and managerial support significantly influence adaptation outcomes. Resistance is often linked to professional identity conflicts and uncertainty about new responsibilities. The study provides managerial insights for healthcare and elderly care institutions seeking sustainable integration.

Keywords: Employee Adaptation; Organizational Change; Integrated Medical and Elderly Care; Healthcare Management; Aging Services.

1. Introduction

Population aging has intensified the demand for coordinated healthcare and long-term elderly services. In response, many organizations have adopted the integrated medical and elderly care model, which combines medical treatment, rehabilitation, and daily care services within a unified system.

Although structural integration is widely promoted, its implementation involves significant organizational change. Employees must adjust to new roles, workflows, and inter-professional collaboration mechanisms. The effectiveness of integration largely depends on how employees adapt to these changes.

Employee adaptation refers to the process through which individuals adjust their attitudes, behaviors, and skills to meet new organizational expectations (Pulakos et al., 2000). In integrated care institutions, adaptation is particularly complex due to the coexistence of medical professionals and caregiving staff, who often possess different professional cultures and operational norms.

This study explores how employees adapt to organizational change during the implementation of the integrated medical and elderly care model and identifies factors influencing successful adaptation.

2. Literature Review

2.1 Organizational Change and Adaptation

Organizational change involves modifications in structure, processes, or strategy to improve performance (Burnes, 2017). However, change at the structural level does not automatically translate into behavioral change among employees.

Lewin's (1951) three-stage model emphasizes the importance of "unfreezing" existing attitudes before introducing new practices. Later research highlights that adaptation requires both cognitive understanding and emotional acceptance (Armenakis et al., 1993).

Adaptation capability has been linked to organizational performance, particularly in service industries where employee behavior directly affects client experience (Rafferty & Griffin, 2006).

2.2 Integrated Medical and Elderly Care Context

The integrated care model aims to reduce service fragmentation and improve continuity of care (Kodner & Spreeuwenberg, 2002). However, integrating medical and caregiving systems creates professional boundary challenges.

Medical staff often operate within clinical authority structures, while caregiving personnel focus on daily living assistance and emotional support. These differences may lead to uncertainty regarding decision-making authority and responsibility allocation. Without effective coordination, adaptation difficulties may emerge.

3. Research Design

This study combines qualitative interviews and survey data from employees working in integrated medical and elderly care institutions. Respondents included physicians, nurses, caregivers, and administrative staff.

Employee adaptation was analyzed across three dimensions:

1) Cognitive Adaptation – Understanding of new organizational goals and processes

2) Emotional Adaptation – Acceptance of change and reduction of anxiety

3) Behavioral Adaptation – Willingness to cooperate and adopt new practices

4. Findings

4.1 Dimensions of Employee Adaptation

Interview data suggest that adaptation occurs gradually. Initially, employees expressed uncertainty about role boundaries. Over time, clearer communication and joint training improved mutual understanding.

Table 1 presents the three adaptation dimensions and typical manifestations.

Table 1.

Dimensions of Employee Adaptation in Integrated Care Organizations

Adaptation Dimension	Key Indicators	Observed Challenges
Cognitive Adaptation	Understanding integration goals; clarity of procedures	Confusion about reporting lines
Emotional Adaptation	Reduced anxiety; trust in management	Fear of increased workload
Behavioral Adaptation	Cooperation across departments; compliance with new protocols	Resistance to interdisciplinary collaboration

Cognitive adaptation often precedes emotional and behavioral adaptation. When employees understand the rationale behind integration, resistance decreases.

4.2 Factors Influencing Adaptation

Three major factors were identified:

1) Role Clarity:

Clear job descriptions reduced professional conflict and improved cooperation.

2) Professional Collaboration Mechanisms:

Regular interdisciplinary meetings enhanced communication and built trust.

3) Managerial Support:

Supportive supervision and training opportunities strengthened confidence in new procedures.

Table 2 summarizes these influencing factors.

Table 2.

Key Factors Affecting Employee Adaptation

Factor	Influence on Adaptation	Managerial Practice
Role Clarity	Improves cognitive understanding	Updated job descriptions
Collaboration Mechanisms	Enhances emotional acceptance	Joint case discussions
Managerial Support	Encourages behavioral compliance	Training and supervision

The findings align with previous research suggesting that readiness and support are central to successful change implementation (Weiner, 2009).

5. Discussion

The study indicates that employee adaptation in integrated care organizations is multi-dimensional. Cognitive clarity is a prerequisite for emotional stability, which in turn facilitates behavioral cooperation.

Professional identity plays a significant role in adaptation. Medical staff may initially perceive integration as dilution of authority, while caregivers may feel undervalued. Effective communication reduces these tensions.

Consistent with change theory (Armenakis et al., 1993), change messages must emphasize both necessity and feasibility. When employees perceive integration as improving service quality for elderly residents, they are more likely to support change.

6. Managerial Implications

First, organizations should prioritize transparent communication during structural integration. Second, cross-disciplinary training can reduce professional segmentation. Third, managers should monitor employee stress levels during transition periods. Finally, adaptation should be viewed as a process rather than a single event; continuous feedback mechanisms are essential.

7. Conclusion

This study examined employee adaptation to organizational change within the integrated medical and elderly care model. The findings demonstrate that adaptation involves cognitive, emotional, and behavioral components influenced by role clarity, collaboration structures, and managerial support.

As healthcare and elderly care systems continue to integrate, understanding employee adaptation becomes increasingly important. Future research may adopt longitudinal designs to examine adaptation over different phases of organizational transformation.

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THE ROLE OF DIGITAL TRANSFORMATION IN IMPROVING PROJECT MANAGEMENT EFFICIENCY

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Abstract

Digital transformation is reshaping project management practices across industries by enhancing coordination, transparency, and decision-making efficiency. As projects become more complex and involve multiple stakeholders, traditional management approaches often struggle to maintain cost control, schedule adherence, and effective communication. This study examines the role of digital transformation in improving project management efficiency by analyzing the adoption of digital platforms, data analytics, automation tools, and collaborative technologies. Drawing on existing research and industry practices, the paper demonstrates that digital transformation enhances workflow integration, real-time monitoring, risk management, and resource allocation. The findings suggest that digital tools significantly improve project delivery speed, cost efficiency, and stakeholder coordination. However, challenges remain in terms of technology integration, data governance, and workforce adaptation. The study provides insights for organizations seeking to modernize project management systems and improve efficiency in increasingly dynamic operational environments.

Keywords: digital transformation, project management efficiency, digital platforms, data analytics, workflow integration.

1. Introduction

Project management has evolved significantly in response to increasing organizational complexity, technological advancement, and globalization. Modern projects often involve multidisciplinary teams, complex supply chains, and strict performance requirements. Traditional project management methods, reliant on manual reporting and fragmented communication, can lead to inefficiencies, delays, and cost overruns.

Digital transformation offers new opportunities to enhance project management efficiency by integrating data, automating workflows, and improving collaboration. Digital tools enable real-time monitoring of project progress, resource utilization, and risk indicators, allowing managers to make timely decisions. As organizations seek to improve productivity and competitiveness, digital transformation has become a strategic priority.

Project management efficiency refers to the ability to deliver projects on time, within budget, and according to quality standards while optimizing resource utilization. Digital technologies support this objective by improving transparency, coordination, and decision-making accuracy (Kerzner, 2019).

This paper explores how digital transformation enhances project management efficiency and identifies key digital tools and mechanisms that support improved project performance.

2. Literature Review

Digital transformation involves integrating digital technologies into organizational processes to improve efficiency and value creation. In project management, digitalization enables improved communication, workflow automation, and data-driven decision-making.

Research indicates that digital project management platforms enhance collaboration and transparency by centralizing project information and facilitating stakeholder communication (Schwalbe, 2016). Real-time data access allows project managers to detect delays, cost deviations, and quality issues at an early stage.

Building Information Modeling (BIM), digital dashboards, and cloud-based project systems have improved project planning and coordination, particularly in construction and infrastructure projects (Succar, 2009). These technologies enable visualization, scheduling optimization, and risk analysis.

Data analytics supports predictive project management by identifying patterns and forecasting risks, allowing proactive intervention (Marnewick & Marnewick, 2020). Automation tools streamline documentation, approvals, and reporting processes, reducing administrative workload.

Despite these advantages, digital transformation requires organizational change and workforce training. Resistance to new technologies and data governance concerns remain barriers to successful implementation.

3. Methodology

This study employs a conceptual analytical approach based on the synthesis of academic literature and professional practices in digital transformation and project management. Secondary sources from project management research, digital innovation studies, and industry reports were analyzed to identify the mechanisms through which digital transformation improves project management efficiency. The study focuses on key digital technologies and their impact on project workflows, coordination, and decision-making.

4. Digital Transformation Tools in Project Management

Digital transformation has introduced a range of tools that enhance project management efficiency. Digital project management platforms enable centralized scheduling, task tracking, and document sharing. These platforms improve transparency and ensure that stakeholders have access to updated project information.

Cloud-based collaboration tools facilitate real-time communication among project teams. Distributed teams can share updates, coordinate tasks, and resolve issues more efficiently, reducing communication delays.

Automation technologies streamline administrative processes such as approvals, reporting, and documentation. By reducing manual workload, automation allows project managers to focus on strategic decision-making.

Data analytics tools enable real-time performance monitoring and predictive risk analysis. Managers can identify potential delays, budget overruns, or resource constraints and implement corrective actions.

Building Information Modeling (BIM) and digital visualization tools improve planning accuracy and coordination in infrastructure and construction projects. Visualization enhances understanding of project design, sequencing, and resource requirements.

Table 1.

Digital Technologies and Their Impact on Project Management Efficiency

Digital Tool	Key Functions	Efficiency Benefits
Project Management Platforms	Task tracking & scheduling	Improves coordination and workflow transparency
Cloud Collaboration Tools	Real-time communication	Enhances teamwork and reduces delays
Workflow Automation	Document & approval automation	Reduces administrative workload
Data Analytics & Dashboards	Performance monitoring & forecasting	Supports proactive decision-making
BIM & Visualization Tools	Digital planning & simulation	Improver planning accuracy and coordination

5. Impact on Project Management Efficiency

Digital transformation improves project management efficiency in several critical areas. First, real-time monitoring enhances schedule control and performance tracking. Managers can identify deviations early and take corrective action to prevent delays. Second, digital collaboration platforms improve communication and coordination among stakeholders. Efficient communication reduces misunderstandings and accelerates decision-making. Third, automation reduces administrative workload and processing time. Routine tasks such as reporting and approvals can be completed quickly, improving operational efficiency. Fourth, predictive analytics improves risk management. Early identification of potential issues allows proactive mitigation strategies, reducing project disruptions. Fifth, digital documentation improves transparency and accountability. Project records are easily accessible, facilitating compliance and audit processes.

Despite these advantages, organizations may face challenges such as integration difficulties with legacy systems, cybersecurity risks, and the need for employee training. Successful digital transformation requires technological investment alongside organizational change management.

6. Discussion

Digital transformation is redefining project management by shifting from reactive control to proactive and data-driven management. Organizations that adopt digital tools gain improved visibility into project performance and enhanced decision-making capabilities.

Process integration is essential for realizing efficiency gains. Digital tools must be aligned with workflow redesign and governance structures to ensure effective implementation.

Leadership support and digital literacy are critical success factors. Training programs enable project teams to adopt new technologies effectively and adapt to evolving digital workflows.

Digital project management systems also contribute to organizational agility. Enhanced data access and communication enable faster responses to changing project conditions and stakeholder requirements.

7. Conclusion

Digital transformation plays a crucial role in improving project management efficiency. By integrating digital platforms, automation, data analytics, and collaborative technologies, organizations can enhance transparency, coordination, and decision-making. These improvements lead to better schedule adherence, cost control, and risk management. However, successful digital transformation requires addressing technological integration challenges, strengthening data governance, and supporting workforce adaptation. The findings provide valuable insights for organizations seeking to modernize project management practices in an increasingly complex and digitalized environment.

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THE RELATIONSHIP BETWEEN PERFORMANCE MANAGEMENT PRACTICES, EMPLOYEE ENGAGEMENT, AND TURNOVER INTENTION IN EDUCATION SERVICE ENTERPRISES

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Abstract

Education service enterprises rely heavily on teachers, consultants, academic advisors, and customer service staff to deliver stable service quality. However, these enterprises often face high employee mobility because of work pressure, performance targets, emotional labor, and limited career development. This paper discusses the relationship between performance management practices, employee engagement, and turnover intention in education service enterprises. Based on social exchange theory, goal-setting theory, and employee engagement theory, the paper argues that fair, clear, and developmental performance management can improve employee engagement, while higher engagement can reduce turnover intention. In contrast, performance management that focuses only on sales targets, punishment, or short-term results may weaken employees' sense of belonging and increase their intention to leave. Therefore, education service enterprises should build a more balanced performance management system that combines business results, teaching quality, service satisfaction, and employee growth.

Keywords: performance management; employee engagement; turnover intention; education service enterprises; human resource management.

1. Introduction

Education service enterprises have developed rapidly in recent years, including language training institutions, study-abroad consulting companies, vocational education companies, and after-school tutoring organizations. Different from manufacturing enterprises, their service quality depends strongly on employee behavior. Teachers influence learning outcomes, consultants influence customer trust, and service staff influence the overall experience of students and parents. However, many education service enterprises face a common human resource problem: employee turnover. Some employees leave because of high performance pressure, unstable income, unclear promotion channels, or emotional exhaustion. In this context, performance management becomes very important. Performance management is not only about evaluating employees at the end of a period. It includes goal setting, communication, feedback, appraisal, rewards, and development support (Aguinis, 2019). If it is designed well, it can help employees understand expectations and feel recognized. If it is poorly designed, it may become a source of stress and dissatisfaction. Therefore, this paper examines how performance management practices influence employee engagement and turnover intention in education service enterprises.

2. Theoretical Basis

Social exchange theory suggests that when employees receive support, fairness, and recognition from the organization, they are more likely to respond with positive attitudes and behaviors (Blau, 1964). In education service enterprises, fair performance feedback and development opportunities can make employees feel respected, which may increase engagement. Goal-setting theory argues that clear and challenging goals can improve motivation when employees accept these goals and receive proper feedback (Locke & Latham, 2002). For teachers and consultants, clear goals can help improve work focus. However, if goals are unrealistic or only linked to sales results, they may create anxiety. Employee engagement refers to a positive work-related state involving energy, dedication, and absorption (Schaufeli et al., 2002). Engaged employees are more willing to serve students carefully, communicate with parents patiently, and contribute to organizational improvement. Turnover intention means an employee's conscious willingness to leave the organization. It is often regarded as an important predictor of actual turnover (Mobley, 1977). Reducing turnover intention is especially important for education service enterprises because employee departure may interrupt student relationships and damage customer trust.

3. Performance Management Practices in Education Service Enterprises

Performance management in education service enterprises usually includes several parts: teaching results, student satisfaction, renewal rate, sales conversion, class attendance, work discipline, and team cooperation. These indicators can help companies control service quality and business outcomes. However, problems may occur when performance management becomes too result-oriented. For example, if consultants are evaluated only by sales conversion, they may ignore long-term customer trust. If teachers are evaluated only by student renewal rate, they may feel pressure to please students rather than improve learning quality. If customer service staff are judged only by complaint numbers, they may avoid difficult problems rather than solve them. A more reasonable performance management system should combine quantitative and qualitative indicators. It should evaluate not only business results, but also professional quality, service attitude, teamwork, and employee development. As Aguinis (2019) noted, performance management should be a continuous process that improves both individual and organizational effectiveness.

4. Employee Engagement as a Mediating Mechanism

Performance management can influence turnover intention through employee engagement. When employees feel that the performance system is fair, transparent, and useful for their growth, they are more likely to feel energetic and committed. This engagement then reduces their intention to leave. For example, a teacher who receives regular feedback, teaching support, and recognition may feel that the company values professional development. A study-abroad consultant who has clear goals and reasonable rewards may feel motivated rather than controlled. A course advisor who receives coaching instead of only pressure may become more willing to stay. In contrast, if employees perceive performance management as unfair or purely punitive, engagement may decline. Employees may still complete tasks, but their emotional connection with the organization becomes weaker. Over time, they may begin to search for other jobs.

Table 1.

Performance Management, Engagement, and Turnover Intention

Performance Management Practice	Positive Effect on Engagement	Possible Risk if Poorly Designed
Clear goal setting	Helps employees understand expectations	Unrealistic goals increase stress
Regular feedback	Improves learning and work confidence	Only negative feedback reduces motivation
Fair appraisal	Strengthens trust in the organization	Unfair scoring causes dissatisfaction
Balanced indicators	Encourages quality and long-term value	Sales-only indicators damage service quality
Development support	Improves career confidence	Lack of growth increases turnover intention

This relationship can be summarized as:

Performance Management Practices → Employee Engagement → Turnover Intention

The better the performance management system is perceived, the stronger employee engagement becomes. Higher engagement then lowers the likelihood that employees want to leave.

5. Discussion

The relationship between performance management and turnover intention is not simple. Strict performance management may improve short-term results, but it can also increase employee stress. Loose performance management may reduce pressure, but it may weaken accountability. Therefore, education service enterprises need a balanced approach. For education service employees, emotional labor is an important issue. Teachers and consultants must often manage students' and parents' expectations. If performance pressure is too high, emotional exhaustion may occur. Bakker and Demerouti (2008) argued that job resources such as feedback, support, and autonomy can improve engagement and reduce burnout. This suggests that performance management should provide resources, not only pressure. Education service enterprises should also pay attention to professional identity. Many employees enter this industry because they want to help students improve, study abroad, or develop skills. If performance management only emphasizes revenue, employees may feel that their educational value is ignored. This may weaken engagement and increase turnover intention.

6. Managerial Implications

First, enterprises should design balanced performance indicators. For teachers, indicators may include teaching quality, student progress, satisfaction, renewal rate, and teaching research participation. For consultants, indicators may include customer conversion, service quality, compliance, customer feedback, and long-term relationship maintenance. Second, managers should provide continuous feedback. Annual or monthly scoring is not enough. Employees need regular communication about what they are doing well and what can be improved. Third, performance management should be connected with career development. Employees should see how good performance can lead to promotion, salary improvement, training opportunities, or professional certification support. Fourth, organizations should monitor employee engagement. Simple employee surveys, interviews, and exit interviews can help identify problems in the performance system before employees decide to leave.

7. Conclusion

Performance management practices have an important influence on employee engagement and turnover intention in education service enterprises. Fair, transparent, and developmental performance management can improve engagement by helping employees understand goals, receive feedback, and feel recognized. Higher engagement can reduce turnover intention and support stable service quality. However, performance management that focuses only on short-term sales or punishment may produce the opposite result. It may reduce employees' sense of professional value and increase their intention to leave. Therefore, education service enterprises should build a balanced performance management system that combines business goals with educational quality, employee development, and organizational support.

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THE IMPACT OF STAFF DEVELOPMENT PROGRAMS ON EMPLOYEE JOB SATISFACTION IN SCENIC AREA TOURISM ENTERPRISES

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Abstract

Staff development programs are important for scenic area tourism enterprises because employees directly influence tourist experience and service quality. This paper discusses how staff development affects employee job satisfaction. Compared with short-term training, staff development focuses more on long-term growth, career planning, skill improvement, mentoring, and promotion opportunities. Based on human capital theory, social exchange theory, and job satisfaction theory, this paper argues that effective staff development can improve employees' work confidence, career expectations, organizational belonging, and motivation. For scenic area tourism enterprises, development programs can also reduce work pressure and turnover intention. The study suggests that enterprises should build a systematic development mechanism to improve both employee satisfaction and service performance.

Keywords: staff development; employee job satisfaction; scenic area tourism enterprises; human resource management; service quality.

1. Introduction

Scenic area tourism enterprises rely heavily on frontline employees. Ticketing staff, tour guides, hotel employees, cableway workers, catering staff, and customer service employees all affect tourists' overall experience. However, these employees often face heavy tourist flows, repeated service tasks, complaints, seasonal pressure, and emotional labor. If employees feel that their jobs have limited future development, their job satisfaction may decline. Therefore, staff development programs are important. These programs include professional training, career planning, mentoring, job rotation, leadership training, and promotion support. According to Noe (2020), employee development helps employees prepare for future roles and long-term career growth. This paper mainly discusses how staff development programs influence employee job satisfaction in scenic area tourism enterprises.

2. Literature Review

Staff development is an important part of human resource management. Human capital theory suggests that employees' knowledge, skills, and abilities are valuable resources for organizational development (Becker, 1993). When enterprises invest in employees, employees may become more capable and more confident.

Social exchange theory also explains this relationship. Blau (1964) argued that social relationships are based on mutual exchange. When employees feel that the organization supports their growth, they are more likely to show positive work attitudes and stronger loyalty. Job satisfaction refers to employees' positive feelings about their work. Locke (1976) defined job satisfaction as a pleasant emotional state caused by one's job experience. In tourism enterprises, job satisfaction is influenced by salary, workload, working environment, leadership, recognition, and career opportunities. Among these factors, development opportunities are especially important because they affect employees' expectations for the future.

3. Theoretical Analysis

Staff development programs can influence employee job satisfaction in several ways. First, they improve employees' professional competence. Scenic area employees need knowledge of tourist services, safety rules, local culture, emergency response, and communication skills. When employees become more capable, they usually feel less pressure and more confidence at work. Second, staff development increases employees' career expectations. If employees can see a clear career path, they are more likely to believe that their work has long-term value. For example, a frontline employee may become a team leader, supervisor, internal trainer, or service quality manager. Third, development programs strengthen employees' sense of organizational support. Mentoring, coaching, and learning opportunities make employees feel respected and valued. This can improve their emotional connection with the enterprise.

A simple employee job satisfaction index can be expressed as:

$$EJS = \frac{C + R + W + D + S}{5}$$

In this formula, EJS means Employee Job Satisfaction, C means career development opportunity, R means recognition, W means working environment, D means development support, and S means salary and benefits. This formula shows that staff development is not the only factor, but it is an important part of job satisfaction.

4. Relationship Between Staff Development and Job Satisfaction

In scenic area tourism enterprises, employees often face different service situations, especially during holidays and peak seasons. They need to answer tourist questions, manage queues, handle complaints, and maintain service order. Without development support, employees may feel tired, stressed, and uncertain about their future. Effective staff development can reduce these problems. Skill training helps employees complete their work more confidently. Career planning helps them see future opportunities. Mentoring and coaching help them receive support from managers and senior employees. Job rotation can also reduce boredom caused by repeated work.

Table 1

Impact of Staff Development Programs on Employee Job Satisfaction

Staff Development Program	Main Content	Effect on Job Satisfaction
Skill development	Service skills, safety knowledge, digital tools	Improves work confidence
Career planning	Promotion channels and future positions	Increases career expectations
Mentoring and coaching	Guidance from supervisors or senior staff	Strengthens organizational belonging
Job rotation	Work experience in different departments	Reduces job monotony
Leadership development	Team management and communication training	Improves motivation and loyalty

5. Discussion

For scenic area tourism enterprises, staff development should not be treated as a simple welfare activity. It should become part of long-term human resource strategy. Many frontline employees do repetitive work every day. If the enterprise only focuses on work tasks but ignores employee growth, employees may gradually lose enthusiasm. Enterprises should design different development programs for different employee groups. Frontline employees need practical service and communication training. Middle-level managers need leadership and crisis management training. Young employees need career planning and mentoring. Experienced employees can be developed into internal trainers or service supervisors. Staff development should be connected with fair evaluation and promotion. If employees join development programs but cannot see real career improvement, their satisfaction may not increase. Therefore, enterprises should link development results with promotion, salary adjustment, recognition, and job responsibility expansion.

6. Conclusion

This paper discussed the impact of staff development programs on employee job satisfaction in scenic area tourism enterprises. The analysis shows that staff development can improve job satisfaction by increasing professional competence, career confidence, organizational support, and work motivation. For scenic area tourism enterprises, staff development should be continuous and systematic. Enterprises should provide skill training, career planning, mentoring, job rotation, and leadership development. These measures can help employees feel valued, reduce turnover intention, and improve service quality. In the long run, higher employee satisfaction can also support better tourist experience and stronger organizational performance.

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EMPLOYEE TRUST IN LEADERSHIP DURING LEADERSHIP SUCCESSION: A CASE STUDY OF SHANGHAI MODEL ORGANISMS CENTER, INC.

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Abstract

Leadership succession is a critical moment for organizations, often accompanied by heightened uncertainty and emotional responses from employees. In pharmaceutical enterprises, where work depends on long-term research projects, professional expertise, and regulatory stability, employee trust in leadership becomes particularly important during leadership transitions. This study examines how employee trust is shaped and maintained during leadership succession through a case study of Shanghai Model Organisms Center, Inc., a pharmaceutical research-oriented enterprise in China. Adopting a qualitative case study approach based on secondary data and relevant literature, the study analyzes how leadership credibility, continuity of strategic decisions, and communication practices influence employee trust during transition periods. The findings suggest that employee trust is more likely to be preserved when leadership succession is internally oriented, strategically consistent, and perceived as predictable. This study provides practical insights for pharmaceutical enterprises seeking to manage leadership transitions without undermining employee confidence and organizational stability.

Keywords: Employee trust; Leadership succession; Leadership transition; Pharmaceutical enterprise; Case study.

1. Introduction

Employee trust in leadership plays a fundamental role in organizational functioning, particularly during periods of change. Trust influences how employees interpret managerial decisions, respond to uncertainty, and remain committed to organizational goals (Dirks & Ferrin, 2002). Leadership succession represents one of the most sensitive organizational changes, as it directly affects power structures, strategic priorities, and future expectations.

In pharmaceutical enterprises, leadership transitions pose unique challenges. These organizations rely heavily on long-term research and development activities, strict regulatory compliance, and highly specialized human capital. Any decline in employee trust during leadership succession may disrupt collaboration, delay research progress, and weaken organizational cohesion.

Although leadership succession has been widely studied from strategic and governance perspectives, less attention has been paid to employee trust during succession, especially within pharmaceutical research organizations in emerging economies. This study addresses this gap by examining how employee trust in leadership is maintained during leadership succession at Shanghai Model Organisms Center, Inc. The guiding research question is: How does leadership succession influence employee trust in leadership within a pharmaceutical enterprise?

2. Literature Review

2.1 Employee Trust in Leadership

Trust in leadership is commonly defined as employees' willingness to be vulnerable to leaders based on positive expectations of their competence, integrity, and intentions (Mayer et al., 1995). High levels of trust are associated with stronger organizational commitment, greater cooperation, and reduced resistance to change.

Empirical research suggests that trust becomes especially salient during periods of uncertainty, when employees lack full information about future outcomes (Dirks & Ferrin, 2002). In such contexts, employees rely more heavily on their perceptions of leadership credibility and consistency.

2.2 Leadership Succession and Employee Reactions

Leadership succession is not merely a technical replacement of executives but a social process that shapes employee perceptions and attitudes. Prior studies indicate that employees respond differently to leadership succession depending on how the transition is managed (Giambatista et al., 2005). Planned and internally developed successions tend to generate higher acceptance and trust, whereas abrupt or externally imposed transitions may increase skepticism (Kesner & Sebora, 1994). Zhang and Rajagopalan (2010) argue that successors with internal organizational experience are more likely to be trusted by employees, as they are perceived to understand existing culture and strategic priorities.

2.3 Trust during Leadership Transition in Pharmaceutical Enterprises

In pharmaceutical enterprises, employee trust is closely tied to perceptions of leadership professionalism and strategic responsibility. Employees often evaluate leaders based on their ability to protect long-term research agendas, ensure regulatory compliance, and provide stable working conditions (Henderson et al., 2006). As a result, leadership succession practices that emphasize continuity and transparency are particularly important for sustaining trust.

3. Research Methodology

This study adopts a qualitative case study approach, which is appropriate for examining complex organizational processes within their real-life context (Yin, 2018). Shanghai Model Organisms Center, Inc. is selected as the case organization due to its research-intensive nature and its dependence on sustained leadership support.

The analysis is based on secondary data, including publicly available organizational information, industry publications, and existing academic literature on leadership succession and employee trust. These sources provide contextual insight into leadership arrangements, organizational practices, and strategic orientation.

Rather than focusing on abstract constructs, the analysis concentrates on observable aspects of leadership transition, including leadership background, continuity of managerial decisions, and communication patterns during succession periods.

4. Case Analysis: Shanghai Model Organisms Center, Inc.

Shanghai Model Organisms Center, Inc. operates as a pharmaceutical research and service organization that supports biomedical innovation. Its workforce primarily consists of researchers and technical professionals whose effectiveness depends on stable leadership and consistent organizational support.

Publicly available information suggests that leadership succession at SMOC places strong emphasis on internal continuity. Successors typically have long-term involvement in the organization's scientific and managerial activities. This internal succession orientation enhances leadership credibility, as employees are more likely to perceive incoming leaders as competent and familiar with ongoing research projects.

During leadership transitions, SMOC appears to maintain consistency in key strategic and operational decisions, particularly those related to research investment and organizational priorities. This decision continuity reduces uncertainty among employees, who may otherwise fear abrupt changes in direction. Research indicates that predictable leadership behavior plays a critical role in maintaining trust during periods of organizational change (Mayer et al., 1995).

Communication practices also influence trust formation. When leadership transitions are framed as planned and strategically aligned, employees are more likely to interpret the change as controlled rather than disruptive. In a pharmaceutical research environment, such perceptions are essential for sustaining collaboration and maintaining research momentum.

5. Discussion

The findings from the SMOC case indicate that employee trust during leadership succession is shaped less by formal announcements and more by perceived continuity in leadership behavior and decision-making. Trust is reinforced when employees observe that core organizational values, strategic priorities, and professional standards remain intact following leadership change.

These findings align with trust theory, which emphasizes ability, integrity, and consistency as key foundations of trust (Mayer et al., 1995). In pharmaceutical enterprises, leadership credibility is closely tied to scientific competence and long-term responsibility. When leadership succession signals stability rather than disruption, employees are more likely to maintain confidence in management.

Importantly, trust preservation does not imply resistance to change. Instead, it reflects employees' belief that change will be gradual, justified, and aligned with organizational interests.

6. Conclusion

This study explores employee trust in leadership during leadership succession through a case study of a pharmaceutical enterprise in China. The findings suggest that employee trust is more likely to be maintained when leadership succession is internally oriented, strategically consistent, and supported by predictable managerial behavior.

From a managerial perspective, pharmaceutical enterprises should treat leadership succession as a trust-sensitive process. Leaders should prioritize continuity in decision-making and transparent communication to reduce uncertainty among employees. From an academic perspective, this study contributes to leadership succession and trust literature by providing sector-specific insights from a pharmaceutical research organization.

Future research may extend this study by incorporating primary data, such as interviews or surveys, to further examine employee trust dynamics during leadership transitions.

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CAREER DEVELOPMENT OPPORTUNITIES AND THEIR INFLUENCE ON WORK PERFORMANCE IN HIGH-TECH ENTERPRISES: A CASE STUDY OF HUAWEI

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Abstract

Career development has become a central concern in high-tech enterprises where employee knowledge and innovation capabilities largely determine organizational competitiveness. Huawei Technologies is widely known for its internal training system and promotion pathways, which are designed to support long-term employee growth. This study explores how career development opportunities influence work performance at Huawei. Using a qualitative case study approach based on corporate reports and existing research, the paper analyzes the mechanisms through which career development enhances employee performance. The findings show that structured promotion systems, continuous learning platforms, and internal mobility opportunities contribute positively to employees' task performance and organizational commitment, although limited work–life balance may weaken these effects.

Keywords: career development; work performance; Huawei Technologies; high-tech enterprises; employee growth.

1. Introduction

In knowledge-intensive industries, employees' skills quickly become obsolete without continuous learning. High-tech enterprises therefore increasingly rely on career development mechanisms to maintain competitiveness. Career development is commonly defined as the process through which employees acquire new competencies and advance within an organization (Noe, 2010).

Huawei Technologies provides a valuable research context due to its emphasis on internal training, leadership development, and long-term employment relationships. This paper examines how career development opportunities at Huawei influence employee work performance.

2. Literature Review

2.1 Career Development Opportunities

Career development opportunities include training programs, mentoring, job rotation, and internal promotion systems (Baruch, 2004). Such practices not only enhance employees' human capital but also signal organizational support, which increases employees' willingness to invest effort in their work.

2.2 Career Development and Work Performance

Previous studies demonstrate a positive relationship between career development and job performance. De Vos, De Hauw, and Van der Heijden (2011) found that employees who perceive strong career support are more motivated and show higher performance levels. Social exchange theory suggests that when organizations invest in employees' growth, employees reciprocate through improved performance (Blau, 1964).

3. Methodology

This study employs a qualitative case study design focusing on Huawei Technologies. Data were collected from Huawei's annual reports, management publications, and relevant academic studies. The analysis centers on identifying Huawei's key career development practices and linking them to observed performance outcomes.

4. Career Development Practices at Huawei

Huawei has established a comprehensive career development system to support employee growth.

Table 1.

Key Career Development Practices at Huawei

Practice Type	**Description**	**Expected Impact on Performance**
Training Programs	Huawei University, technical and managerial courses	Enhances professional skills
Internal Promotion	Clear promotion channels based on capability and results	Motivates sustained effort
Job Rotation	Cross-functional and cross-regional assignments	Broadens experience base
Leadership Pathway	Early identification and development of future leaders	Improves managerial performance

5. Discussion

Huawei's strong emphasis on training and internal mobility reflects Baruch's (2004) view that career development should be embedded in organizational strategy. According to Wang and Chen (2019), Huawei engineers who participated in structured development programs reported higher task efficiency and innovation output.

However, Huawei's demanding work culture may reduce the long-term effectiveness of career development initiatives. De Vos et al. (2011) note that development opportunities contribute most to performance when employees perceive a balance between work demands and personal life. In Huawei's case, heavy workloads may weaken employees' ability to fully benefit from training and promotion systems.

6. Conclusion

This study examined the influence of career development opportunities on work performance in Huawei Technologies. The findings suggest that structured training systems, internal promotion pathways, and job rotation practices significantly enhance employees' work performance by strengthening skills and motivation. Nevertheless, excessive work pressure may offset these benefits. High-tech enterprises should therefore combine career development initiatives with supportive human resource policies to sustain long-term performance.

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THE ROLE OF PSYCHOLOGICAL SAFETY IN THE RELATIONSHIP BETWEEN PERFORMANCE PRESSURE AND INNOVATIVE BEHAVIOR

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Abstract

In contemporary organizations, performance pressure has become a central managerial tool used to enhance efficiency and competitiveness. However, existing studies in management and organizational behavior literature report inconsistent findings regarding the effects of performance pressure on employee innovative behavior. While some research suggests that performance pressure can stimulate effort and creativity, other studies indicate that it may inhibit innovation by increasing stress and risk aversion. Drawing on stress appraisal theory and psychological safety theory, this paper argues that psychological safety plays a critical moderating role in the relationship between performance pressure and innovative behavior. Specifically, when psychological safety is high, performance pressure is more likely to be perceived as a challenge stressor, thereby encouraging innovative behavior. Conversely, when psychological safety is low, performance pressure tends to function as a hindrance stressor, suppressing innovation. This paper develops a conceptual framework grounded in management theory and discusses implications for both research and managerial practice.

Keywords: performance pressure; psychological safety; innovative behavior; stress appraisal; organizational behavior.

1. Introduction

Innovation is widely regarded as a key source of sustainable competitive advantage in organizations (Porter, 1985; Barney, 1991). To stimulate innovation and maintain high levels of performance, managers frequently impose performance pressure through ambitious targets, tight deadlines, and performance evaluation systems. From a managerial perspective, performance pressure is often assumed to motivate employees to exert greater effort and achieve superior outcomes.

However, empirical findings in management research suggest that the effects of performance pressure on innovative behavior are ambiguous. Some studies report positive effects, arguing that pressure enhances focus and goal commitment (Baer & Oldham, 2006). In contrast, other studies find that excessive pressure leads to anxiety, defensive behavior, and reduced creativity (Amabile et al., 2002; Zhang & Bartol, 2010). These inconsistent findings indicate that performance pressure does not have a uniform effect on innovation.

Recent organizational behavior research increasingly emphasizes the role of contextual and psychological factors in shaping employee responses to managerial practices (Grant & Parker, 2009). Among these factors, psychological safety has emerged as a critical condition that influences whether employees are willing to take risks, voice ideas, and engage in innovative behavior (Edmondson, 1999). This paper argues that psychological safety is a key boundary condition that determines how performance pressure affects innovative behavior.

The purpose of this paper is to examine the role of psychological safety in the relationship between performance pressure and innovative behavior from a management perspective. By integrating stress appraisal theory with psychological safety research, this study aims to clarify the mechanisms underlying the mixed findings in prior literature.

2. Literature Review

2.1 Performance Pressure in Management Contexts

In management research, performance pressure is commonly defined as employees' perceived demand to achieve high performance outcomes under conditions of evaluation and accountability (Podsakoff et al., 2007). Performance pressure is deeply embedded in modern management systems, such as performance-based pay, key performance indicators (KPIs), and competitive ranking mechanisms.

From a stress perspective, performance pressure represents a job demand that can influence employee attitudes and behaviors. According to the challenge–hindrance stress framework, job demands may be perceived either as challenges that promote growth or as hindrances that obstruct goal attainment (Cavanaugh et al., 2000). Empirical studies show that challenge stressors are often positively related to motivation and performance, whereas hindrance stressors are negatively related to creativity and innovation (LePine et al., 2005).

However, performance pressure does not automatically fall into either category. Its effects depend on how employees interpret and appraise the pressure within a specific organizational context.

2.2 Innovative Behavior in Organizations

Innovative behavior refers to the intentional creation, promotion, and realization of new ideas within a work role or organization (Janssen, 2000). In contrast to routine task performance, innovative behavior involves uncertainty, experimentation, and the possibility of failure. As a result, employees' engagement in innovative behavior is highly sensitive to managerial practices and organizational climate.

Management studies have shown that innovative behavior is influenced by leadership style, reward systems, and social context (Scott & Bruce, 1994; Anderson et al., 2014). Importantly, innovation requires employees to challenge existing routines and propose unconventional ideas, which may expose them to interpersonal and career risks.

2.3 Psychological Safety as an Organizational Climate

Psychological safety is defined as a shared belief that the work environment is safe for interpersonal risk-taking (Edmondson, 1999). In psychologically safe environments, employees feel comfortable speaking up, sharing ideas, and admitting mistakes without fear of negative consequences.

Research in organizational behavior and management consistently demonstrates that psychological safety is positively associated with learning behavior, creativity, and team effectiveness (Edmondson & Lei, 2014). Psychological safety reduces employees' perceived interpersonal risk and encourages proactive behaviors that are essential for innovation.

From a management perspective, psychological safety is not merely an individual trait but an emergent property of organizational practices, leadership behaviors, and social interactions.

3. Theoretical Framework

3.1 Stress Appraisal Theory

Stress appraisal theory posits that individuals evaluate potential stressors based on their perceived demands and available resources (Lazarus & Folkman, 1984). This appraisal process determines whether a stressor is experienced as a challenge or a threat. In organizational settings, managerial demands such as performance pressure are subject to individual and contextual interpretation.

Applied to management research, stress appraisal theory suggests that employees' responses to performance pressure depend on whether they perceive the pressure as an opportunity for achievement or as a threat to their well-being and job security.

3.2 The Moderating Role of Psychological Safety

Psychological safety plays a critical role in shaping employees' stress appraisals. When psychological safety is high, employees are more likely to believe that mistakes and failures will be tolerated and that effort will be fairly evaluated. Under such conditions, performance pressure is more likely to be appraised as a challenge stressor, leading to greater experimentation and innovative behavior.

Conversely, when psychological safety is low, performance pressure increases fear of negative evaluation and punishment. Employees may prioritize error avoidance over exploration, resulting in reduced innovative behavior. Thus, psychological safety moderates the relationship between performance pressure and innovative behavior by influencing stress appraisal and behavioral responses.

4. Conceptual Model and Key Variables

Table 1.

Key Variables and Their Roles in the Conceptual Framework

Variable	Role in the Model	Management Interpretation
Performance Pressure	Independent Variable	Managerial performance demands and evaluation intensity
Psychological Safety	Moderating Variable	Organizational climate of interpersonal risk tolerance
Innovative Behavior	Dependent Variable	Employee generation and implementation of new ideas

5. Discussion

5.1 Theoretical Implications

This paper contributes to management and organizational behavior literature in several ways. First, it reconciles inconsistent findings on performance pressure and innovation by identifying psychological safety as a critical boundary condition. Rather than treating performance pressure as inherently beneficial or harmful, this study emphasizes the importance of contextual interpretation.

Second, by integrating stress appraisal theory with psychological safety research, this paper enriches existing management models that explain employee responses to performance demands. This integration highlights the cognitive and emotional mechanisms underlying innovative behavior in organizations.

5.2 Managerial Implications

For managers, the findings suggest that increasing performance pressure alone is unlikely to foster innovation. Instead, managers should focus on creating a psychologically safe environment in which employees feel supported when taking risks. Leadership behaviors such as open communication, tolerance for failure, and fair evaluation systems can enhance psychological safety and ensure that performance pressure functions as a motivating challenge rather than a hindrance.

6. Conclusion

From a management perspective, performance pressure is an unavoidable feature of modern organizations. However, its impact on innovative behavior depends critically on psychological safety. This paper argues that psychological safety determines whether performance pressure encourages or suppresses innovation by shaping employees' stress appraisals and behavioral choices. Future empirical research may test the proposed framework using survey or experimental methods and explore additional contextual moderators.

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SYNERGY OF MARKETING AND PROJECT MANAGEMENT UNDER ECOLOGICAL AND ECONOMIC RISKS: A PATH TO SUSTAINABLE DEVELOPMENT IN AZERBAIJAN AND KAZAKHSTAN

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Abstract

This paper investigates the synergy between marketing and project management in addressing ecological and economic risks in Azerbaijan and Kazakhstan. The study is grounded in the growing importance of sustainability-oriented governance in resource-dependent economies, where environmental pressures and economic volatility are intensifying. A mixed-method approach is applied, including comparative analysis, secondary data review, and ESG-based risk assessment.

The research demonstrates that both countries face structural vulnerabilities due to their dependence on extractive industries, which increases exposure to climate risks, environmental degradation, and global market fluctuations. The findings indicate that project management contributes to structured risk identification, monitoring, and mitigation, while marketing enhances stakeholder engagement, reputation management, and sustainable value creation. The integration of ESG principles into both domains significantly improves decision-making efficiency and project resilience.

The study concludes that the synergy between marketing and project management serves as a strategic mechanism for sustainable development and economic diversification in Azerbaijan and Kazakhstan.

Keywords: sustainable development, project management, green marketing, ecological risks, ESG.

1. Introduction

In recent decades, sustainable development has become a key priority in economic policy, particularly in resource-dependent countries. Azerbaijan and Kazakhstan are characterized by strong reliance on oil, gas, and mineral resources, which play a dominant role in GDP formation and export revenues. For example, hydrocarbons account for more than half of Azerbaijan's GDP and the majority of export earnings. However, this dependence increases vulnerability to external shocks, including fluctuations in global energy prices, environmental degradation, and climate-related risks. These structural challenges require integrated management approaches that combine economic efficiency with environmental sustainability.

In this context, the interaction between marketing and project management emerges as an important mechanism for addressing complex risks. While project management ensures structured planning and risk control, marketing contributes to stakeholder alignment and sustainable value creation.

2. Main Body

Methodology

This study applies a mixed-method research design combining qualitative and quantitative approaches. The methodology includes:

- Comparative analysis of Azerbaijan and Kazakhstan
- Secondary data analysis (World Bank, OECD, UN, ESG reports)
- ESG risk assessment framework (Environmental, Social, Governance)
- Descriptive analysis of sustainability indicators
- Conceptual modeling of marketing–project management integration

The research focuses on macroeconomic indicators such as GDP structure, export dependency, and ESG adoption trends.

2.1 Ecological and Economic Risks in Azerbaijan and Kazakhstan

The economies of Azerbaijan and Kazakhstan are heavily reliant on oil, gas, and mineral resources. Although this dependence has supported rapid economic growth, it has also generated substantial environmental pressures, including air and water pollution, land degradation, and increased greenhouse gas emissions. In addition, both countries are exposed to economic risks linked to fluctuations in global energy prices and the ongoing transition to low-carbon economies. These challenges highlight the need for diversification and the implementation of sustainable development strategies.

Empirical evidence confirms the persistence of structural dependence in both economies. In Azerbaijan, hydrocarbons still generate over 40% of fiscal revenues and remain a key source of macroeconomic stability. Similarly, in both Azerbaijan and Kazakhstan, the share of extractive industries in GDP remains above 24–27%, indicating a slow pace of diversification .

This dependence increases vulnerability to global market volatility, particularly during periods of declining oil prices or reduced export demand, thereby amplifying both economic and environmental risks.

2.2 The Role of Project Management in Risk Mitigation

Project management provides structured tools for risk identification, evaluation, and mitigation. Methods such as risk matrices, scenario analysis, and performance indicators enable effective control of environmental and economic uncertainties.

In large infrastructure and energy projects, these tools are essential for improving efficiency and ensuring sustainability compliance.

2.3 Marketing as a Driver of Sustainable Development

Marketing represents a critical mechanism for promoting sustainability-oriented transformation by shaping stakeholder behavior and influencing market preferences toward environmentally responsible solutions. The concept of green marketing focuses on developing and communicating environmentally responsible products and services, thereby influencing consumer behavior and market dynamics.Furthermore, the integration of ESG principles into marketing strategies enhances corporate transparency and strengthens relationships with stakeholders, including investors, regulators, and local communities.

In both Azerbaijan and Kazakhstan, companies are increasingly adopting sustainable branding practices to improve their global competitiveness.

2.4 Synergy Between Marketing and Project Management

The integration of marketing and project management creates a synergistic effect that enhances the effectiveness of risk management and sustainability initiatives. Marketing provides valuable insights into stakeholder expectations and market trends, while project management ensures efficient execution and control of project activities.

This synergy contributes to improved decision-making, reduced uncertainty, and increased project success rates. For resource-dependent economies, such as Azerbaijan and Kazakhstan, this integrated approach is essential for achieving sustainable economic transformation.

2.5 Quantitative and Strategic Analysis of ESG Risks

In recent years, ESG considerations have become an integral component of corporate governance and risk management frameworks. International standards, including IFRS sustainability disclosure requirements, emphasize the importance of identifying and reporting environmental and social risks.

Both Azerbaijan and Kazakhstan exhibit similar structural characteristics, including a high dependence on extractive industries. While this contributes significantly to GDP, it also increases vulnerability to ecological and economic disruptions.

ESG risks can be categorized into three main groups:

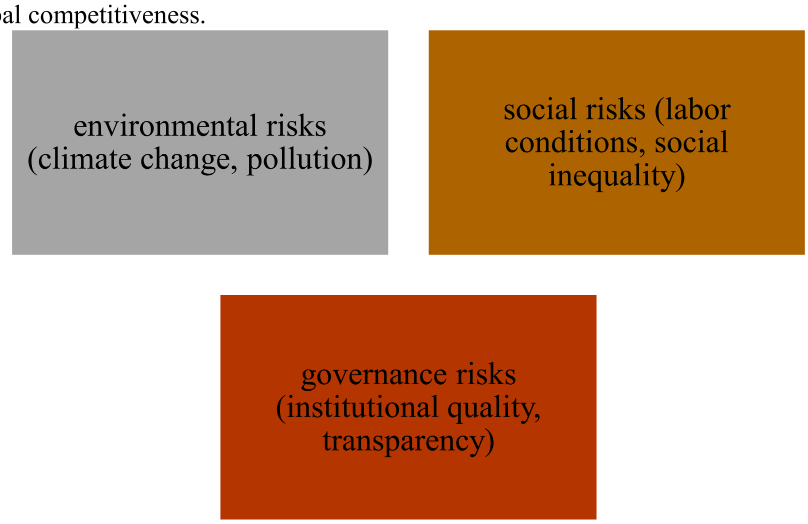

Figure 1. Classification of ESG Risks

Within project management, these risks are often structured using hierarchical models such as Risk Breakdown Structures (RBS), which facilitate more effective risk assessment and control.

From a marketing perspective, ESG-oriented strategies create additional value by improving corporate reputation and attracting sustainable investments. This is particularly important in international markets, where ESG performance increasingly influences investment decisions.

From a quantitative perspective, ESG-related risks have a measurable impact on project performance. Studies indicate that insufficient integration of ESG factors may increase project costs, delay implementation timelines, and reduce investment attractiveness. In emerging economies, such as Azerbaijan and Kazakhstan, these effects are further intensified due to institutional and structural constraints. Moreover, governance-related risks, including regulatory inefficiencies and limited transparency, remain critical barriers to sustainable project implementation.

The relationship between ESG integration and project risk mitigation is illustrated in Figure 2, demonstrating that higher levels of ESG implementation are associated with significantly lower project risk exposure.

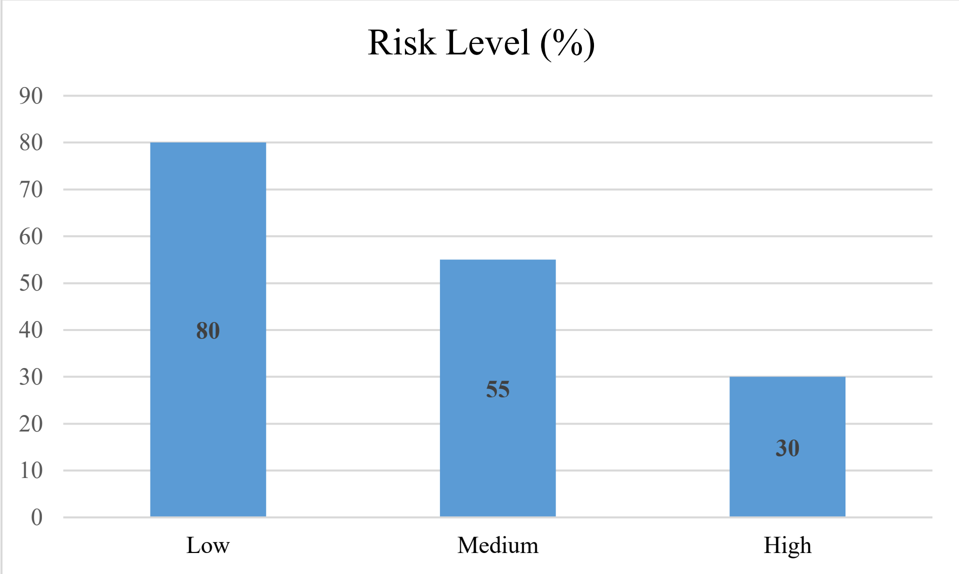

Figure 2. Relationship between ESG integration and project risk reduction

The graph illustrates a clear inverse relationship between the level of ESG integration and project risk exposure. Higher ESG adoption significantly reduces overall project risk, particularly through improved governance transparency, environmental compliance, and stakeholder engagement mechanisms.

This trend confirms that ESG integration is not only a sustainability tool but also a strategic risk management instrument in resource-dependent economies.

2.6 Synergy Effect: Marketing and Project Management

The interaction between marketing and project management can be interpreted as a multidimensional integration of strategic planning, communication, and risk management processes.

Project management contributes through:
- structured planning and implementation,
- systematic risk assessment,
- performance monitoring and control.

Marketing contributes through:
- stakeholder engagement,
- reputation and brand management,
- promotion of sustainable value propositions.

The integration of these functions enhances organizational adaptability and resilience, ultimately leading to more sustainable project outcomes.

Table 1.

Comparative Characteristics of Azerbaijan and Kazakhstan

Indicator	Azerbaijan	Kazakhstan
Main sector	Oil and gas	Oil, gas, mining
Key risks	Environmental pollution, price volatility	Emissions, climate risks
Sustainability focus	Renewable energy development	Economic diversification

Table 1 presents a comparative analysis of Azerbaijan and Kazakhstan based on key economic, environmental, and sustainability-related indicators. Both countries demonstrate similar structural characteristics, as their economies are predominantly dependent on extractive industries, particularly oil, gas, and mining sectors. This sectoral dependence shapes their macroeconomic stability but simultaneously increases vulnerability to external shocks such as fluctuations in global energy prices.

In terms of risk profile, both countries face significant ecological challenges. Azerbaijan is primarily exposed to environmental pollution and price volatility, while Kazakhstan faces additional pressures related to greenhouse gas emissions and climate change risks due to its more diversified extractive base, including mining activities.

Regarding sustainability orientation, Azerbaijan is increasingly focusing on renewable energy development as part of its long-term green transition strategy, whereas Kazakhstan emphasizes broader economic diversification policies aimed at reducing dependency on hydrocarbons.

Overall, the table highlights both similarities and differences in sustainability trajectories, demonstrating that while both countries share a resource-dependent economic model, their strategic responses to ecological and economic risks are gradually diverging toward different sustainability pathways.

3. Conclusion

The findings of this study demonstrate that the integration of marketing and project management represents a strategic approach to addressing ecological and economic risks in resource-dependent economies. Unlike traditional management models, the proposed framework emphasizes the incorporation of ESG principles into both operational and communication processes.

The analysis confirms that Azerbaijan and Kazakhstan remain structurally vulnerable due to their reliance on extractive industries, despite ongoing diversification efforts. However, the adoption of integrated management approaches can significantly enhance project resilience, reduce environmental risks, and improve long-term economic sustainability.

In this context, the synergy between marketing and project management should be viewed not only as a managerial tool but as a key driver of sustainable transformation in emerging economies.

Policy and Practical Implications

The findings of this study provide several important implications for policymakers and practitioners in Azerbaijan and Kazakhstan:

- **Integration of ESG standards into national project management systems** is necessary to improve transparency and reduce environmental and financial risks.
- **Development of green marketing frameworks** can enhance public awareness and encourage sustainable consumption patterns.
- **Strengthening institutional governance mechanisms** will improve regulatory efficiency and support ESG compliance in extractive industries.
- **Diversification of economic structures** toward renewable energy and knowledge-based industries is essential to reduce dependence on hydrocarbons.
- **Implementation of digital ESG monitoring systems** can enhance data accuracy, reduce reporting gaps, and improve decision-making efficiency.

Overall, the synergy between marketing and project management should be institutionalized as a strategic tool for sustainable economic transformation.

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OPTIMIZATION AND PRACTICAL STRACTEGIES FOR EMPLOYEE PERFORMANCE EVALUATION IN SHANGHAI GOLDEN CO.， LTD

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Abstract

Performance evaluation is a core component of an enterprise's human resource management system and plays an important role in improving employees' work efficiency, optimizing organizational management, and promoting the achievement of strategic objectives. With the increasing competition in the vocational education and training industry, educational institutions need not only to improve course quality and service standards but also to stimulate employee potential through scientific human resource management practices. Taking Shanghai Golden Co., Ltd (GOLDEN) as the research object, this study analyzes the problems existing in the current employee performance evaluation system of education and training institutions, including issues related to indicator design, incentive mechanisms, and evaluation dimensions. On this basis, the paper proposes optimization strategies for performance evaluation to establish a more scientific, fair, and motivating performance management system, thereby promoting the sustainable development of education and training institutions.

Keywords: Education and training institutions; Performance evaluation; Human resource management.

1. Introduction

In recent years, the education and training industry has experienced rapid development due to the increasing demand for professional qualifications, career advancement, and lifelong learning. Economic transformation and the growing emphasis on professional competence have driven individuals to pursue additional certifications and training programs to enhance their competitiveness in the labor market. As a result, professional education institutions have expanded their service scope and diversified their training programs.

Shanghai Golden Co., Ltd (GOLDEN) is a representative organization within the professional training sector1. The institution focuses primarily on finance-related education and provides training for professional certifications such as ACCA, CPA, and accounting professional titles. In addition, the organization offers services in civil service examination preparation, teacher qualification training, academic degree programs, and overseas study consulting. Through continuous expansion and diversification, the company has established a comprehensive training service system.

However, as educational institutions grow larger and their organizational structures become more complex, managing human resources becomes increasingly challenging. Employees in education and training institutions typically include teachers, course consultants, administrative staff, and marketing personnel. Each group contributes to the organization's operations in different ways. Teachers are responsible for course delivery and knowledge transmission, consultants focus on student recruitment and consultation services, while administrative staff ensure the smooth operation of educational programs.

Under such circumstances, a well-designed performance evaluation system becomes essential. Performance evaluation not only measures employees' work outcomes but also guides employee behavior and supports organizational development. A fair and effective performance management system can motivate employees to improve their performance while aligning their personal goals with the strategic objectives of the organization (Nuraini, 2023).

Nevertheless, many education and training institutions still rely heavily on simple performance indicators such as enrollment numbers or revenue targets. Although these indicators can reflect short-term business outcomes, they may fail to capture important aspects such as teaching quality, student satisfaction, and long-term brand reputation. Therefore, optimizing the performance evaluation system is an important task for education and training enterprises.

This study takes GOLDEN as an example to analyze the existing employee performance evaluation system and identify its main limitations. Based on the analysis, the study proposes several optimization strategies aimed at improving fairness, efficiency, and long-term effectiveness in performance management.

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[1] https://www.gaodun.com/

2. Current Performance Evaluation System in Shanghai Golden Co., Ltd

In education and training institutions, performance evaluation serves as a bridge between organizational objectives and employee activities. Through performance management, organizations can assess employee contributions, allocate resources more effectively, and encourage continuous improvement.

The performance evaluation system in GOLDEN generally reflects the characteristics of the education and training industry. Employees are assessed based on different indicators depending on their job responsibilities. These indicators are often closely related to the institution's operational objectives, such as student recruitment, course delivery quality, and service satisfaction.

2.1 Performance Evaluation by Job Category

Employees in education and training institutions perform various functions. Therefore, performance indicators are usually designed according to job categories. Course consultants are primarily responsible for student consultation and enrollment. Their performance is commonly measured through indicators such as the number of enrolled students, consultation conversion rates, and customer satisfaction.

Teaching staff focus on delivering courses and guiding students' learning progress. Their performance evaluation may include teaching quality assessments, student feedback, course completion rates, and participation in curriculum development.

Administrative staff and teaching assistants are responsible for course scheduling, student management, and academic support services. Their evaluation indicators often emphasize organizational efficiency, service quality, and operational stability.

Marketing personnel, on the other hand, contribute to brand promotion and student acquisition through advertising campaigns and partnership channels. Their performance indicators may include marketing reach, promotional effectiveness, and brand exposure.

Table 1 illustrates a simplified example of performance evaluation indicators used in education and training institutions.

Table 1

Performance Evaluation Indicators for Different Positions

Position	Key Indicators	Indicator Type
Course Consultant	Enrollment numbers, conversion rate, and student satisfaction	Quantitative and service indicators
Teacher	Teaching quality, course completion rate, and student feedback	Quality indicators
Administrative Staff	Course organization, student service efficiency	Management indicators
Marketing Staff	Promotion effectiveness, partnership development	Business indicators

2.2 Evaluation Cycle

Performance evaluation in education and training institutions is typically conducted on a monthly or quarterly basis. Monthly evaluations focus on short-term operational performance, such as recruitment targets and course completion progress (Peng, 2022). Quarterly or annual evaluations, however, consider broader aspects including employee development, service quality, and overall contribution to organizational objectives.

Regular feedback sessions are also an important component of performance management. Through performance discussions between managers and employees, organizations can identify problems in a timely manner and adjust work strategies accordingly (Wang, 2024).

Although such systems provide a basic framework for performance management, practical implementation often reveals certain limitations that may reduce the effectiveness of the evaluation process.

3. Problems in the Existing Performance Evaluation System

Despite the presence of structured performance management mechanisms, several challenges remain in the practical implementation of performance evaluation systems in education and training institutions.

3.1 Excessive Emphasis on Short-Term Performance

One of the most common problems in performance evaluation systems within training institutions is the heavy reliance on short-term performance indicators, particularly those related to student recruitment or course sales.

Enrollment numbers are often treated as the most important performance indicator for course consultants. While such indicators are easy to measure and directly linked to revenue generation, they may encourage employees to prioritize short-term sales outcomes rather than long-term educational value (Bischl et al., 2023).

In some cases, employees may focus primarily on completing enrollment targets without paying sufficient attention to student suitability or course quality. This practice may lead to mismatches between student expectations and course content, potentially affecting the institution's reputation and student satisfaction.

In addition, teachers and administrative staff may receive less recognition because their contributions are not directly reflected in enrollment statistics. Over time, this imbalance may weaken teamwork and reduce employee motivation.

3.2 Limited Fairness Across Different Positions

Another issue concerns the fairness of performance evaluation among different job roles. Employees working in sales-related positions typically have clear numerical indicators that make performance evaluation straightforward. However, for employees involved in teaching, research, or student support services, it is often difficult to quantify their contributions (Osaba et al., 2022).

If performance evaluation systems rely excessively on quantitative indicators, employees in non-sales roles may feel that their efforts are undervalued. For example, teachers may spend significant time preparing course materials, updating teaching methods, and providing academic guidance to students. These activities are essential for maintaining educational quality but may not be easily captured by numerical indicators.

Such discrepancies can lead to perceptions of inequality within the organization and potentially undermine employee morale.

3.3 Insufficient Consideration of Non-Quantitative Factors

Traditional performance evaluation systems often focus primarily on measurable outcomes. However, many important aspects of work performance in educational institutions are qualitative in nature.

Teaching quality, communication skills, teamwork, and professional ethics all play a significant role in determining the success of an educational organization. For example, teachers who demonstrate strong communication skills can create engaging learning environments that improve student learning outcomes. Similarly, employees who actively collaborate with colleagues contribute to a positive organizational culture (Kakulavaram, 2023).

If these qualitative factors are excluded from the evaluation system, employees may prioritize measurable tasks while neglecting other responsibilities that contribute to the organization's long-term development.

4. Optimization Strategies for Performance Evaluation

In order to improve the effectiveness of performance management, education and training institutions should consider adopting more comprehensive evaluation systems that balance short-term results with long-term development.

4.1 Strengthening Long-Term Strategic Orientation

First, organizations should incorporate long-term development indicators into their performance evaluation systems. Instead of focusing exclusively on enrollment numbers, institutions can include indicators such as student retention rates, course completion rates, and student recommendation rates.

These indicators better reflect the long-term impact of educational services and encourage employees to focus on maintaining high levels of teaching quality and student satisfaction.

In addition, organizations may establish medium- and long-term evaluation mechanisms that assess employee development over multiple years. Such evaluations may consider professional skill improvement, participation in curriculum development, and contributions to institutional innovation.

Another effective approach is to include participation in strategic projects as part of performance evaluation. For example, employees who contribute to curriculum design, digital education development, or new program expansion can receive additional recognition for their efforts.

4.2 Establishing Diversified Incentive Mechanisms

Performance evaluation should be closely linked to incentive mechanisms that encourage employee engagement. Financial rewards remain an important motivation factor, but organizations should also provide non-monetary incentives such as career development opportunities, professional training, and promotion pathways.

For example, employees who demonstrate strong performance can be offered opportunities to participate in advanced training programs or leadership development initiatives. These opportunities help employees enhance their professional skills while strengthening their commitment to the organization.

Regular communication between managers and employees is also essential. Through performance review meetings, employees can receive constructive feedback and discuss potential career development plans.

4.3 Incorporating Comprehensive Qualitative Indicators

Finally, organizations should integrate qualitative indicators into their performance evaluation systems. Such indicators may include teamwork ability, service attitude, communication skills, and innovation capacity.

A multi-source evaluation approach can also improve the objectivity of performance assessments. For instance, employee evaluations can include feedback from supervisors, colleagues, and students. This approach, often referred to as 360-degree feedback, provides a more comprehensive perspective on employee performance.

Additionally, organizations may establish recognition programs that highlight employees' contributions beyond measurable outcomes. Awards such as "Outstanding Teacher," "Excellent Service Staff," or "Teamwork Excellence Award" can encourage employees to pursue broader professional development.

5. Conclusion

Performance evaluation is a fundamental component of human resource management in education and training institutions. An effective evaluation system can motivate employees, improve organizational efficiency, and support the long-term development of educational enterprises.

Through the analysis of GOLDEN's performance management practices, this study identifies several key issues in existing evaluation systems, including excessive emphasis on short-term performance, limited fairness among job roles, and insufficient consideration of qualitative factors.

To address these challenges, organizations should redesign their performance evaluation frameworks by incorporating long-term development indicators, establishing diversified incentive mechanisms, and integrating qualitative evaluation methods. By adopting a more balanced and comprehensive performance management system, education and training institutions can enhance employee motivation, improve service quality, and strengthen their competitiveness in the rapidly evolving education market.

Ultimately, optimizing performance evaluation systems will not only benefit individual employees but also contribute to the sustainable development of the entire organization.

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THE IMPACT OF SOCIAL MEDIA CONTENT QUALITY ON CONSUMER ENGAGEMENT IN ONLINE TOURISM ENTERPRISES: EVIDENCE FROM TRIP.COM GROUP

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Abstract

Social media has become an important channel for online tourism enterprises to attract consumers, communicate travel value, and encourage interaction. For platforms such as Trip.com Group, high-quality social media content can influence whether consumers pay attention, feel interested, and take actions such as liking, commenting, sharing, saving, or clicking booking links. This paper explores the impact of social media content quality on consumer engagement in online tourism enterprises, using Trip.com Group as the case background. Based on social media marketing theory, consumer engagement theory, and the information adoption model, this study argues that content quality includes information quality, visual quality, relevance, trustworthiness, and interactivity. The analysis shows that high-quality content can improve cognitive, emotional, and behavioral engagement. The paper also suggests that Trip.com Group should strengthen destination storytelling, short-video marketing, personalized content, and user-generated content to build stronger consumer relationships.

Keywords: social media marketing; content quality; consumer engagement; online tourism; Trip.com Group.

1. Introduction

The development of digital tourism has changed the way people search for travel information and make booking decisions. Consumers no longer rely only on traditional travel agencies or offline recommendations. Instead, they use social media platforms, online travel agencies, short videos, and user reviews to compare destinations, hotels, routes, and prices.

Trip.com Group is one of the representative online tourism enterprises. It provides services such as hotel booking, transportation ticketing, package tours, and corporate travel management. In this competitive market, social media is not only a promotion tool, but also a space where consumers interact with brands and form travel expectations.

For tourism products, content quality is especially important because travel is intangible before consumption. Consumers cannot experience a hotel, destination, or travel route before purchasing it. Therefore, they need useful information, attractive images, real reviews, and trustworthy communication. This paper focuses on the question: How does social media content quality influence consumer engagement in online tourism enterprises?

2. Literature Review

2.1 Social Media Marketing in Tourism

Social media marketing refers to the use of social media platforms to create communication, interaction, and value between enterprises and consumers. In tourism, social media is closely connected with visual experience, emotional imagination, and peer sharing. Kim and Ko (2012) argued that social media marketing activities can enhance customer relationships and brand value. For online tourism enterprises, social media marketing is not simply about posting advertisements. It should provide travel inspiration, solve consumer problems, and increase trust. For example, a good travel post may include destination highlights, transportation tips, hotel recommendations, and real user experiences.

2.2 Content Quality

Content quality refers to the usefulness, accuracy, attractiveness, relevance, and credibility of social media content. In tourism marketing, high-quality content usually includes clear information, beautiful visual presentation, emotional appeal, and interactive design. Onofrei, Filieri, and Kennedy (2022) found that content quality can influence consumer purchase intention and behavioral engagement. This means that consumers engage with social media content not only because it appears frequently, but because they believe the content is valuable and reliable.

2.3 Consumer Engagement

Consumer engagement refers to the cognitive, emotional, and behavioral connection between consumers and a brand. Brodie et al. (2013) viewed engagement as a process of interaction and value co-creation. Hollebeek, Glynn, and Brodie (2014) further explained that engagement includes thinking, feeling, and action. In social media tourism marketing, engagement can be shown through likes, comments, shares, saves, follows, reviews, and clicks. These behaviors help tourism enterprises increase visibility and build stronger relationships with consumers.

3. Theoretical Framework

This paper uses three theories to explain the relationship between content quality and consumer engagement. First, the Information Adoption Model suggests that consumers are more likely to accept information when they think it is useful and credible (Sussman & Siegal, 2003). In online tourism, consumers need reliable information before making booking decisions. Second, Consumer Engagement Theory explains that consumers may first notice brand content, then develop emotional interest, and finally take action (Brodie et al., 2013). Third, Social Media Marketing Theory emphasizes interaction and relationship building. Social media is different from traditional advertising because consumers can respond, comment, share, and participate.

The relationship can be expressed as:

$$CE=\alpha+\beta 1IQ+\beta 2VQ+\beta 3RQ+\beta 4TQ+\beta 5INQ+\varepsilon$$

CE = Consumer Engagement

IQ = Information Quality

VQ = Visual Quality

RQ= Relevance Quality

TQ= Trustworthiness Quality

IN= Interactivity Quality

This formula shows that consumer engagement is influenced by different dimensions of social media content quality.

5. Impact of Content Quality on Consumer Engagement

5.1 Information Quality and Cognitive Engagement

Information quality is the foundation of social media content. Consumers need accurate and practical information about destinations, hotels, transportation, prices, weather, and travel routes. If the content is useful, consumers are more likely to read, save, and search for more details. For example, a post about "three-day travel routes in Bangkok" is more useful if it includes route suggestions, hotel areas, transportation options, and estimated costs. This type of content can increase cognitive engagement because it helps consumers solve real travel problems.

5.2 Visual Quality and Emotional Engagement

Tourism is highly visual. Before booking, consumers often imagine their future travel experience through pictures and videos. High-quality images, short videos, and attractive design can create emotional interest. De Vries, Gensler, and Leeflang (2012) found that vivid brand posts can influence social media popularity. In tourism, this effect is very clear because beautiful destinations, local food, festivals, and hotels can directly stimulate consumers' travel desire.

5.3 Relevance and Personalized Engagement

Relevant content is more likely to attract consumers. Different users have different travel needs. Some prefer family travel, some like budget travel, and others care about luxury hotels or business trips. If Trip.com Group provides personalized content, users may feel that the platform understands their preferences. Personalized content can reduce information overload and improve engagement. Consumers are more willing to interact with content that matches their interests and travel plans.

5.4 Trustworthiness and Behavioral Engagement

Trust is very important in online tourism because consumers usually pay before they experience the service. If social media content is exaggerated or unclear, consumers may not trust the platform. Trustworthy content includes real reviews, transparent prices, clear booking rules, and authentic user experiences. Cheung, Lee, and Rabjohn (2008) argued that online opinions can influence consumer information adoption. For Trip.com Group, user-generated content and real travel reviews can increase trust and encourage actions such as clicking booking links or sharing posts.

5.5 Interactivity and Community Engagement

Interactivity turns consumers from passive readers into active participants. Trip.com Group can ask questions, create polls, reply to comments, organize travel photo campaigns, and encourage users to share travel stories.

Interactive content can increase consumer participation and strengthen the relationship between consumers and the platform. When users feel that the brand responds to them, they are more likely to stay engaged.

6. Practical Suggestions

First, Trip.com Group should strengthen destination storytelling. Instead of only posting discounts, it can share stories about local culture, food, people, and travel experiences. Second, it should improve short-video content. Short videos should not only be visually attractive, but also provide useful information such as routes, costs, and booking tips. Third, Trip.com Group should encourage user-generated content. Real photos, comments, and travel diaries can make the platform more trustworthy. Fourth, the company should develop personalized content for different consumer groups, such as family travelers, young travelers, business travelers, and senior tourists. Finally, Trip.com Group should improve real-time interaction by replying to comments and questions quickly. This can increase consumer trust and platform loyalty.

7. Conclusion

This paper analyzed the impact of social media content quality on consumer engagement in online tourism enterprises, using Trip.com Group as the case background. The study shows that content quality has a clear influence on consumer engagement. Information quality improves cognitive engagement, visual quality strengthens emotional engagement, relevance increases personalized engagement, trustworthiness supports behavioral engagement, and interactivity builds community engagement. For Trip.com Group, social media content should not only promote products, but also provide useful travel information, emotional inspiration, and trustworthy communication. High-quality content can help the company improve consumer participation and strengthen its competitive advantage in the digital tourism market. Future research can collect questionnaire data from Trip.com users and use regression analysis or structural equation modeling to test the relationship between content quality and consumer engagement more deeply.

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THE IMPACT OF EMPLOYEE TRAINING EFFECTIVENESS ON PROJECT PERFORMANCE IN LARGE CONSTRUCTION FIRMS

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Abstract

Large construction firms operate in complex project environments where performance outcomes depend heavily on workforce capability. While employee training is widely implemented to improve technical skills and safety awareness, its effectiveness varies significantly across organizations. This paper examines how training effectiveness influences project performance in large construction firms. Drawing on human resource development and project management literature, the study explores the relationship between training quality, knowledge transfer, workforce competency, and project outcomes such as productivity, safety performance, schedule adherence, and cost control. The paper argues that training effectiveness—rather than training volume—determines whether training investments translate into improved project performance. A conceptual framework is proposed to illustrate the link between training inputs, learning transfer, workforce behavior, and project results. The findings suggest that effective training enhances operational efficiency, reduces safety incidents, and improves project delivery performance. The study provides practical insights for construction managers seeking to maximize the return on training investments and strengthen project execution capability.

Keywords: Training Effectiveness; Project Performance; Construction Management; Workforce Competency; Human Resource Development.

1. Introduction

Large construction firms manage complex projects involving multiple subcontractors, strict safety regulations, and tight deadlines. Project performance—typically measured through cost, time, quality, and safety outcomes—depends significantly on workforce capability and coordination.

Employee training is commonly used to enhance technical skills, safety awareness, and operational efficiency. However, training alone does not guarantee improved performance. Organizations frequently invest substantial resources in training programs without achieving measurable improvements in project outcomes. This gap highlights the importance of training effectiveness rather than training quantity.

Training effectiveness refers to the extent to which training improves employee knowledge, behavior, and job performance (Noe, 2020). In construction environments, effective training ensures that workers apply newly acquired skills on-site, comply with safety procedures, and collaborate efficiently within project teams.

Understanding how training effectiveness contributes to project performance is essential for large construction firms seeking to improve operational efficiency and maintain competitive advantage.

2. Training Effectiveness in Construction Organizations

Training effectiveness is influenced by multiple factors, including training design, instructor quality, organizational support, and opportunities to apply learned skills. According to Kirkpatrick's evaluation model, training effectiveness can be assessed through reactions, learning, behavior change, and results (Kirkpatrick & Kirkpatrick, 2006).

In construction settings, training effectiveness is particularly critical because projects involve hazardous environments and complex technical processes. Research indicates that well-designed training improves worker competence and reduces operational errors (Salas et al., 2012). However, ineffective training programs often fail to transfer learning to the workplace, limiting performance improvements.

Organizational support plays a key role in training transfer. When supervisors reinforce training objectives and provide opportunities for skill application, employees are more likely to apply newly learned competencies on-site (Burke & Hutchins, 2007).

3. Project Performance in Large Construction Firms

Project performance in large construction firms is typically evaluated through multiple dimensions:

1) adherence to project schedule
2) cost control and budget performance
3) construction quality standards
4) workplace safety performance

5) productivity and workflow efficiency

Failures in workforce competence can lead to project delays, safety incidents, and costly rework. Lingard and Rowlinson (2005) emphasize that safety competence and communication skills are essential determinants of project success in construction environments.

Because large construction firms operate on tight margins and contractual deadlines, even small improvements in workforce performance can produce significant financial and operational benefits.

4. Linking Training Effectiveness to Project Performance

Training effectiveness influences project performance through improved workforce behavior, skill application, and operational decision-making. Effective training enhances workers' ability to perform tasks correctly, identify hazards, and coordinate with team members.

Table 1 summarizes key pathways through which training effectiveness contributes to project outcomes.

Table 1.

Effects of Training Effectiveness on Project Performance

Training Outcome	Workforce Impact	Project Performance Impact
Improved technical skills	Higher task accuracy	Reduced rework and defects
Safety training retention	Hazard awareness and compliance	Fewer accidents and delays
Equipment operation proficiency	Efficient machinery use	Increased productivity
Team coordination skills	Improved communication	Better workflow efficiency
Problem-solving ability	Faster issue resolution	Reduced downtime and cost overruns

Studies suggest that safety training alone can significantly reduce accident rates and associated project disruptions (Hinze, 2006). Similarly, training in equipment operation and workflow coordination enhances productivity and minimizes costly errors.

5. Factors Influencing Training Effectiveness

Several factors determine whether training translates into improved project performance.Training design is fundamental. Programs that incorporate hands-on learning, simulations, and real-world scenarios improve knowledge retention and skill application. Passive lecture-based training often fails to produce behavioral change.

Workplace reinforcement is equally important. Supervisors who support training objectives and monitor skill application strengthen learning transfer. Without reinforcement, employees may revert to previous work habits.

Organizational culture also influences training outcomes. Firms that promote continuous learning and safety awareness encourage workers to adopt new practices. Conversely, environments resistant to change may limit training effectiveness.

Finally, evaluation mechanisms are necessary to measure training impact. Linking training outcomes to performance indicators such as accident rates, productivity levels, and rework frequency helps organizations assess return on training investment.

6. Managerial Implications for Large Construction Firms

For training to positively influence project performance, construction firms must move beyond compliance-based training toward strategic workforce development. Training should be aligned with project requirements, safety priorities, and technological adoption.

Managers should integrate training into project planning cycles and provide opportunities for immediate skill application. Mentorship programs and on-site coaching can reinforce learning and accelerate skill transfer.

Digital training tools, including virtual simulations and mobile learning platforms, can enhance accessibility and engagement, especially in geographically dispersed projects.

7. Conclusion

Training effectiveness plays a critical role in improving project performance in large construction firms. While training investments are common, their value depends on the extent to which learning translates into improved workforce behavior and operational performance. Effective training enhances technical competence, strengthens safety compliance, and improves team coordination, leading to better project outcomes.

To maximize training impact, construction firms should focus on training design quality, workplace reinforcement, and performance evaluation. By aligning training initiatives with project performance objectives, organizations can improve efficiency, reduce safety risks, and enhance long-term competitiveness.

Future research may explore the role of digital learning technologies and data-driven performance analytics in strengthening training effectiveness within large-scale construction environments.

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EMPLOYEE-ORIENTED CSR PRACTICES AND THEIR IMPACT ON SERVICE QUALITY PERCEPTION AND BRAND LOYALTY AT STARBUCKS

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Abstract

Employee-oriented corporate social responsibility (CSR) has become an essential dimension of sustainable service management in the hospitality and coffee retail industry. This study investigates how Starbucks' employee-focused CSR practices influence customers' perceptions of service quality and brand loyalty. Drawing upon social exchange theory and service-profit chain theory, this paper develops a conceptual framework linking employee-oriented CSR to service quality perception and brand loyalty. Through a qualitative analysis of Starbucks' human resource policies and prior empirical findings, the study demonstrates that employee-centered CSR enhances employees' commitment and service behaviors, which in turn improve perceived service quality and strengthen customer loyalty.

Keywords: employee-oriented CSR, service quality perception, brand loyalty, Starbucks, service-profit chain.

1. Introduction

In service-intensive industries such as coffee retailing, employees play a critical role in shaping customer experience and brand image. Unlike manufacturing sectors, where production and consumption are separated, service delivery is highly dependent on frontline staff interactions. As a result, employee satisfaction and motivation have become strategic priorities for global brands. Starbucks has been widely recognized for its employee-oriented CSR practices, including healthcare benefits, educational support programs, stock ownership plans, and inclusive workplace policies.

Employee-oriented CSR refers to organizational practices that focus on employee welfare, development, and work–life balance beyond basic legal requirements (Turker, 2009). Existing research indicates that such practices increase organizational commitment, reduce turnover, and enhance service performance (Glavas & Kelley, 2014). However, limited studies have explored how these internal CSR practices are translated into customers' service quality perception and brand loyalty within the coffee industry.

2. Literature Review

Employee-oriented CSR has been defined as corporate initiatives that directly improve employees' psychological, social, and economic well-being (Turker, 2009). Examples include training opportunities, fair compensation systems, health benefits, and career development programs. These initiatives signal that a firm values its workforce, which enhances employees' organizational identification and emotional attachment (Glavas & Kelley, 2014).

Service quality perception refers to customers' evaluation of the overall excellence of a service encounter (Parasuraman, Zeithaml, & Berry, 1988). In retail coffee chains, service quality is shaped by factors such as staff friendliness, response speed, problem-solving ability, and consistency. Studies have shown that employees' attitudes and motivation are closely associated with service quality perception (Heskett et al., 1994).

Brand loyalty represents a customer's deep commitment to repurchase or recommend a preferred brand consistently over time (Oliver, 1999). According to the service-profit chain theory, satisfied and engaged employees lead to superior service quality, which ultimately drives customer loyalty and firm profitability (Heskett et al., 1994).

Empirical evidence suggests that internal CSR improves employee engagement, which mediates the relationship between CSR and customer outcomes (Glavas & Piderit, 2009). Starbucks' programs such as "College Achievement Plan" and comprehensive health insurance packages illustrate how employee-oriented CSR can translate into positive customer experiences and long-term loyalty.

3. Conceptual Framework

This study proposes that employee-oriented CSR practices positively influence employee commitment and service behavior, which enhance perceived service quality and, consequently, brand loyalty.

Table 1.

Conceptual variables and relationships

Variable	Description	Expected Relationship
Employee-oriented CSR (ECSR)	Benefits, training, well-being programs	ECSR → Service Quality (+)
Service Quality Perception (SQP)	Friendliness, reliability, responsiveness	SQP → Brand Loyalty (+)
Brand Loyalty (BL)	Repurchase intention, advocacy	ECSR → BL (Indirect)

4. Discussion

Starbucks' employee-oriented CSR initiatives operate as internal drivers of service excellence. By offering competitive benefits and educational opportunities, the company demonstrates long-term investment in its workforce, which enhances employees' sense of security and organizational pride (Starbucks, 2023). These positive emotions are reflected in daily service interactions with customers.

From the perspective of social exchange theory, when employees perceive that the organization genuinely cares about their well-being, they feel obligated to reciprocate through higher work engagement and discretionary service behaviors (Blau, 1964). This reciprocity mechanism helps explain why Starbucks baristas are often perceived as friendly, proactive, and emotionally attentive.

Moreover, the consistency of Starbucks' employee-oriented CSR practices across regions strengthens service standardization. Customers visiting different Starbucks outlets often experience similar service quality, reinforcing reliability perceptions and strengthening brand trust. Such consistency reduces perceived service risk and enhances long-term loyalty (Parasuraman et al., 1988).

Finally, employee-oriented CSR contributes to brand differentiation in the competitive coffee market. While product offerings are easily imitated, a motivated and loyal workforce is difficult to replicate. Starbucks' internal CSR practices therefore function as a sustainable competitive advantage that strengthens the service–brand–loyalty chain.

5. Conclusion

This study demonstrates that employee-oriented CSR practices play a vital role in shaping service quality perception and brand loyalty at Starbucks. By investing in employee welfare and development, Starbucks not only improves internal organizational outcomes but also strengthens customer relationships. The findings suggest that service-oriented firms should integrate internal CSR into their strategic management frameworks. Future research may employ survey-based empirical methods to test the proposed conceptual model.

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EMPLOYEE MOTIVATION UNDER THE MIXED EMPLOYMENT MODEL IN CHINESE STATE-OWNED ENTERPRISES

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Abstract

Improving employee motivation has become a critical concern in the reform of Chinese state-owned enterprises (SOEs). Historically characterized by lifetime employment and egalitarian wage systems, traditional SOE employment structures often weakened individual incentives and reduced productivity. In recent years, the mixed employment model—combining state-appointed personnel, contract-based employees, market-oriented professionals, and outsourced workers—has emerged as an important mechanism supporting SOE modernization. This paper examines how the mixed employment model influences employee motivation in Chinese SOEs. Drawing on motivation theory, human capital theory, and institutional perspectives, the study analyzes how diversified employment arrangements reshape incentive systems, career expectations, and organizational commitment. The findings suggest that performance-based contracts and market-oriented recruitment enhance motivation through improved accountability and reward alignment, while disparities in employment conditions may create fairness concerns and cultural tensions. The paper concludes with managerial recommendations for designing equitable and performance-oriented motivation systems to support sustainable SOE reform.

Keywords: state-owned enterprises, mixed employment model, employee motivation, human resource reform, organizational commitment.

1. Introduction

State-owned enterprises remain central to China's economic and social development, particularly in infrastructure, energy, finance, and public services. Under the traditional planned economy system, SOEs operated through administrative personnel allocation and lifetime employment arrangements often described as the "iron rice bowl." While this system provided job security and social welfare, it weakened performance incentives because compensation and career advancement were only loosely linked to organizational performance.

As China deepens SOE reform to improve competitiveness and efficiency, employment systems have gradually shifted toward market-oriented human resource management. The mixed employment model has become a prominent reform tool, integrating permanent state staff with contract employees, external professionals, and outsourced workers. This transformation aims to improve workforce flexibility and productivity while preserving public responsibilities.

Employee motivation is a key determinant of organizational effectiveness. This paper examines how the mixed employment model reshapes motivational dynamics within Chinese SOEs and explores both its benefits and management challenges.

2. Theoretical Perspectives on Employee Motivation

Motivation theories provide insight into how employment structures influence employee behavior. Herzberg's two-factor theory distinguishes between hygiene factors such as job security and pay, and motivators such as recognition, achievement, and career growth. Traditional SOE systems emphasized security but often neglected performance-based motivators.

Expectancy theory suggests that employees are motivated when they believe effort leads to performance and performance leads to rewards. Under rigid wage structures, this expectancy linkage is weak. The introduction of performance-based contracts strengthens the perceived connection between effort and reward.

Human capital theory further emphasizes that organizations improve performance when they reward skill development and productivity (Becker, 1964). Mixed employment systems create incentives for skill acquisition and professional growth.

Institutional theory explains that SOEs operate in hybrid environments balancing state objectives and market competition. Employment diversification reflects institutional adaptation to these dual pressures.

3. Evolution from Traditional Employment to Mixed Employment

Historically, SOEs operated under the danwei (work unit) system, which provided lifetime employment and comprehensive welfare benefits. While this system supported social stability, it limited labor mobility and reduced individual performance incentives.

SOE reforms since the late twentieth century have aimed to improve efficiency and governance. Mixed-ownership reform has been promoted to create more competitive and modern enterprises. Alongside ownership reform, workforce restructuring introduced contract employment, professional management recruitment, and outsourcing practices.

The mixed employment model therefore represents a shift from administrative personnel management toward performance-oriented human resource management.

4. Structure of the Mixed Employment Model and Motivational Implications

The mixed employment model integrates several categories of workers with distinct motivational drivers.

State-appointed personnel often emphasize stability, policy compliance, and long-term career security. Contract-based employees are typically motivated by performance incentives, promotion opportunities, and income growth. Market-oriented professionals are driven by professional achievement, innovation opportunities, and competitive compensation. Outsourced workers often prioritize income stability and short-term employment opportunities.

Table 1.

Employment Categories and Motivational Drivers

Employment Category	Key Motivational Drivers	Potential Risks
State-appointed staff	Job security, status, stability	Low performance incentives
Contract employees	Performance pay, promotion	Job insecurity stress
External professionals	Career growth, autonomy, rewards	Cultural integration challenges
Outsourced workers	Income stability, flexibility	Low organizational commitment

This diversity of motivational drivers reshapes organizational dynamics and requires differentiated management approaches.

5. Positive Effects of the Mixed Employment Model on Motivation

The mixed employment model strengthens motivation by linking performance to rewards. Contract-based employment and performance evaluation systems enhance accountability and encourage productivity. Employees are more likely to exert effort when compensation and advancement depend on measurable outcomes.

Market-oriented recruitment introduces professionals with strong achievement motivation and innovation orientation. Studies indicate that mixed reform can enhance innovation capacity and strategic dynamism in SOEs. Exposure to market practices also encourages internal employees to adopt performance-oriented attitudes.

Employment diversification promotes competition and benchmarking among employees, which can stimulate skill development and professional growth. Performance transparency and merit-based promotion systems improve perceptions of fairness and opportunity.

Additionally, flexible employment structures allow employees to pursue career mobility and skill development, increasing intrinsic motivation and career satisfaction.

6. Motivational Challenges and Organizational Risks

Despite its benefits, the mixed employment model may create motivational challenges. Differences in compensation, benefits, and job security between permanent and contract employees can create perceptions of inequity, potentially reducing morale and organizational commitment.

Cultural tensions may emerge between traditional state-sector employees and market-oriented professionals. Employees accustomed to administrative systems may resist performance-based evaluation and competitive workplace norms.

Job insecurity among contract employees may also generate stress and reduce long-term organizational loyalty. Without supportive management practices, motivation gains from performance incentives may be offset by psychological pressure.

Furthermore, governance and power restructuring associated with mixed reforms can influence internal decision-making and strategic direction, highlighting the importance of effective organizational integration.

7. Managerial Implications

To enhance motivation under the mixed employment model, SOEs should develop transparent and equitable performance evaluation systems applicable across employment categories. Linking rewards to measurable outcomes strengthens expectancy and fairness perceptions.

Providing training and career development opportunities to all employees can reduce perceived inequality and support skill upgrading. Leadership should foster an inclusive organizational culture that encourages collaboration between traditional staff and external professionals.

Communication and participation mechanisms can improve trust and reduce resistance to reform. Additionally, balancing job security with performance incentives will help maintain motivation while preserving social stability.

8. Conclusion

The mixed employment model represents a significant transformation in workforce management within Chinese state-owned enterprises. By integrating administrative personnel with contract employees and market-oriented professionals, SOEs can strengthen performance incentives, improve skill utilization, and enhance employee motivation.

However, the model also introduces challenges related to fairness, cultural integration, and job security perceptions. Effective management practices, equitable incentive systems, and inclusive organizational culture are essential to maximizing motivational benefits.

As SOE reform continues, optimizing employment systems to balance efficiency and employee well-being will be critical for sustainable organizational performance.

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PEDAGOGICAL SCIENCES

BEYOND COMPETENCE TAXONOMIES: SOCIAL-EMOTIONAL LEARNING, LIFE SKILLS, AND DEMOCRATIC CITIZENSHIP IN HIGHER EDUCATION EVIDENCE FROM INTERNATIONAL EXPERIMENTAL RESEARCH

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Abstract

The progressive shift in international educational policy from knowledge-transmission models to competence-based frameworks has generated a growing theoretical and empirical interest in the construct of social-emotional learning (SEL) and its intersection with the World Health Organization's life skills paradigm. This article examines, through a systematic review of international experimental and quasi-experimental studies, the mechanisms by which structured SEL interventions at higher education level produce measurable outcomes in democratic citizenship competencies — including critical thinking, empathy, civic engagement, and self-regulatory capacity. Drawing on the CASEL meta-analytic corpus (Durlak et al., 2011; Taylor et al., 2017), the DeSeCo Project framework (Rychen & Salganik, 2003), and UNESCO's Education 2030 agenda, the article proposes an integrative theoretical model articulating three interdependent dimensions of competence — cognitive, affective-relational, and civic-performative — whose co-development constitutes the condition for genuine democratic participation. The empirical section analyses findings from four international experimental studies conducted between 2010 and 2022 in university contexts across Europe, Sub-Saharan Africa, and Latin America. Results consistently indicate that SEL-based pedagogical interventions, when sustained over at least one academic semester, produce statistically significant improvements in self-efficacy (d = 0.57–0.82), interpersonal problem-solving (d = 0.48–0.71), and civic participation intention (d = 0.39–0.64). Implications for higher education curriculum design, teacher professional development, and transnational educational policy are discussed.

Keywords: social-emotional learning; life skills; democratic citizenship; higher education; competence-based education; self-efficacy; CASEL; WHO; UNESCO Education 2030.

1. Introduction

The capacity of educational systems to produce citizens capable of autonomous judgment, democratic participation, and ethically responsible action has been at the centre of international policy debates since at least the Delors Commission report (1996) and the subsequent wave of competence-based reform that reshaped curricula across OECD member states in the late 1990s and early 2000s. Yet, while the normative architecture of competence-oriented education has been extensively theorised — from Perrenoud's (1997) schema-based account of competent behaviour to Le Boterf's (1994) relational and contextual model, through to the OECD's DeSeCo tripartite taxonomy of interacting tools, interacting with heterogeneous groups, and acting autonomously (Rychen & Salganik, 2003) — the empirical evidence linking specific instructional interventions at university level to durable gains in social-emotional and civic competencies remains comparatively underdeveloped.

This deficit is consequential. As Heckman and Kautz (2012) demonstrated through labour-economic analysis of longitudinal cohort data, 'soft skills' — broadly understood as personality traits, social-emotional competencies, and non-cognitive capacities — predict life outcomes as powerfully as, and in some domains more powerfully than, cognitive achievement as measured by standardised assessments. Their findings, consistent with earlier developmental work by Bandura (1997) on self-efficacy as a determinant of sustained goal-directed behaviour, suggest that the field requires not simply richer taxonomies but empirically grounded instructional models capable of operationalising competence development in measurable, replicable, and transferable ways.

The WHO's Life Skills Education framework (1994), initially developed as a health-promotion instrument targeting adolescent risk-behaviour, provided an early empirically grounded categorisation of the affective-relational competencies most relevant to this agenda: self-awareness, empathy, critical thinking, creative thinking, decision-making, problem-solving, effective communication, interpersonal skills, coping with stress, and coping with emotions. Subsequent elaborations within the UNESCO Education for All and Education 2030 frameworks (UNESCO, 2015) extended this construct toward an explicitly civic and democratic register, foregrounding the role of active, informed, and responsible citizenship as the overarching telos of twenty-first century education.

The present article addresses this theoretical and empirical landscape with three specific objectives: (1) to construct an integrative theoretical model articulating the relationship between SEL, life skills, and democratic citizenship competencies within a higher education context; (2) to analyse the experimental and quasi-experimental evidence base for SEL-focused pedagogical interventions at university level; and (3) to derive from that evidence base transferable principles for curriculum design, assessment, and institutional policy. The article proceeds as follows. Section 2 develops the theoretical framework. Section 3 presents and critically analyses the empirical corpus. Section 4 discusses the findings and their implications. Section 5 draws conclusions and identifies priority areas for future research.

2. Theoretical Framework

2.1 The Structural Architecture of Competence: From Behaviourism to Complex Systems

The genealogy of the competence construct in educational theory traverses three analytically distinct phases, each corresponding not merely to a historical moment but to a fundamentally different ontological commitment regarding the nature of human learning. The first phase, associated with the curriculum engineering tradition of Tyler (1949) and the taxonomic work of Bloom et al. (1956), conceived competence as observable, measurable performance — a behaviourist reduction of the learner to the outputs of a stimulus-response chain, epistemologically aligned with the positivist demand for objectivity and causal parsimony. Within this framework, to be competent is to execute an algorithm correctly; assessment is synonymous with performance verification.

The second phase, inaugurated by Le Boterf's (1994) critique of the behaviourist reduction, reintroduced the interior of the 'black box' as a legitimate object of educational inquiry. For Le Boterf, competence is not a state but a dynamic process — the mobilisation of resources (knowledges, skills, attitudes) in response to the demands of a specific situation. Crucially, this mobilisation is relational and contextual: it cannot be assessed in abstraction from the socially defined performance standards of a professional or civic community. Competence, on this account, is inherently intersubjective; it requires the judgment of others for its recognition and legitimation.

The third phase, represented by Perrenoud's (1997) appropriation of Piagetian schema theory, reconceptualises competence as the orchestration of cognitive and emotional schemas in response to novel, complex problems. The competent agent is not one who applies a pre-formed algorithm but one who can retrieve, combine, and adapt existing schemas — a capacity whose development requires repeated exposure to situations of genuine cognitive and affective challenge. This account has the considerable theoretical advantage of linking competence directly to learning: competence development is schema development, and schema development requires pedagogical environments that generate productive disequilibrium (Piaget, 1985).

Contemporary frameworks — including the OECD's DeSeCo conceptualisation (Rychen & Salganik, 2003) and the revised European Key Competences Recommendation (Council of the European Union, 2018) — synthesise these three phases into a multidimensional construct in which cognitive, affective-relational, and performative dimensions are treated as co-constitutive rather than hierarchically ordered. It is within this theoretical space that the concept of social-emotional learning acquires its scientific and pedagogical salience.

2.2 Social-Emotional Learning: Theoretical Foundations and CASEL Taxonomy

Social-emotional learning (SEL) designates the process through which individuals acquire, develop, and apply the knowledge, attitudes, and skills necessary to understand and manage their own emotions, establish and maintain positive relationships, make responsible decisions, and achieve personal and collective goals (Weissberg et al., 2015). The CASEL (Collaborative for Academic, Social, and Emotional Learning) framework organises SEL competencies into five interrelated domains: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making.

Each domain corresponds to a cluster of observable and assessable capacities whose developmental trajectory spans early childhood through adulthood. Self-awareness encompasses the accurate identification and evaluation of one's own emotions, values, and strengths — a capacity that Bandura (1997) identified as foundational to the construction of self-efficacy beliefs. Self-management involves the regulation of emotions and behaviours across diverse situational demands, including goal-setting, impulse control, and persistence in the face of failure. Social awareness, the interpersonal counterpart of self-awareness, encompasses perspective-taking, empathy, and the capacity to recognise and respect diversity. Relationship skills include communication, active listening, cooperative work, and conflict resolution. Responsible decision-making integrates ethical reasoning, consequentialist analysis, and awareness of social norms.

What distinguishes the CASEL taxonomy from earlier competence frameworks is its sustained empirical grounding. The meta-analytic syntheses conducted by Durlak et al. (2011) and Taylor et al. (2017) established, on the basis of rigorous experimental and quasi-experimental evidence, that structured SEL programmes produce significant and lasting positive effects across multiple outcome domains, including academic achievement, social behaviour, and emotional regulation. These findings, replicated across national, cultural, and institutional contexts, provide the empirical warrant for situating SEL at the centre of any evidence-based approach to democratic citizenship education.

2.3 Life Skills, the WHO Framework, and the Democratic Citizenship Nexus

The WHO's Life Skills Education programme (1994) occupies a singular position in the international architecture of competence-based education: it represents the first systematic attempt to translate the theoretical construct of psycho-social competence into a reproducible educational intervention, validated across low-, middle-, and high-income country contexts and across culturally heterogeneous populations. The ten core life skills identified by the WHO — self-awareness, empathy, critical thinking, creative thinking, decision-making, problem-solving, effective communication, interpersonal relationship skills, coping with emotions, and coping with stress — map with high structural congruence onto the CASEL five-domain taxonomy, suggesting convergent validity across two independently developed frameworks.

The connection between life skills and democratic citizenship is both theoretical and empirical. Theoretically, democratic participation — understood not merely as electoral behaviour but as the capacity for autonomous judgment, public deliberation, and collective problem-solving — presupposes precisely the competencies that both the WHO and CASEL frameworks identify: self-knowledge, empathic understanding of diverse perspectives, critical evaluation of information, and the relational skills necessary for productive disagreement and negotiation. As Dewey (1916) argued in his foundational account, democracy is not primarily a political arrangement but a form of associated living whose condition of possibility is the communicative and deliberative competence of its participants.

Empirically, the UNESCO Education 2030 Incheon Declaration (UNESCO, 2015) and the subsequent implementation framework for Target 4.7 — which mandates the integration of education for sustainable development and global citizenship across all levels of education — provide the normative-institutional linkage between life skills development and democratic citizenship formation. The Incheon Declaration explicitly frames life skills as enabling conditions for active citizenship, positioning their development as an educational obligation of all UNESCO member states rather than an optional pedagogical strategy.

2.4 An Integrative Tripartite Model

On the basis of the theoretical analysis developed in sections 2.1–2.3, this article proposes an integrative tripartite model of competence for democratic citizenship, articulated along three interdependent dimensions:

The cognitive-epistemic dimension encompasses the knowledge structures, critical-analytical capacities, and metacognitive skills that enable the individual to interpret, evaluate, and produce representations of complex social reality. It corresponds broadly to the first and third categories of the DeSeCo taxonomy (interacting with tools; acting autonomously) and to the cognitive life skills of the WHO framework (critical thinking, creative thinking, problem-solving, decision-making).

The affective-relational dimension encompasses the emotional-regulatory capacities, empathic understanding, and interpersonal skills that enable productive engagement with social diversity and conflict. It corresponds to the relational life skills of the WHO framework (empathy, communication, interpersonal relationships) and to the CASEL domains of self-awareness, social awareness, and relationship skills.

The civic-performative dimension encompasses the motivational orientations, sense of civic efficacy, and behavioural dispositions that translate competence into democratic action. It corresponds to the DeSeCo category of interacting in heterogeneous groups, to Bandura's (1997) concept of collective efficacy, and to the performative dimensions of responsible decision-making in the CASEL framework.

The model's central theoretical claim is that sustainable democratic competence requires the simultaneous and coordinated development of all three dimensions: cognitive capacity without affective-relational attunement produces technocratic rationalism; affective-relational development without civic-performative engagement produces empathic passivity; civic commitment without cognitive-epistemic grounding produces ideological conformism. The empirical implications of this claim are examined in the following section.

3. International Experimental Evidence

3.1 Meta-Analytic Foundations: The CASEL Corpus

The most comprehensive empirical foundation for SEL-based instructional interventions remains the meta-analysis conducted by Durlak, Weissberg, Dymnicki, Taylor, and Schellinger (2011), which synthesised findings from 213 school-based SEL programmes involving 270,034 students across multiple countries. The study found, relative to control conditions, that SEL participants demonstrated significantly improved social and emotional skills (mean effect size $d = 0.57$), more positive attitudes toward self, others, and school ($d = 0.23$), more prosocial behaviours ($d = 0.24$), and reduced conduct problems ($d = 0.22$) and emotional distress ($d = 0.24$). Critically, academic achievement improved by an average of 11 percentile points relative to control groups.

A follow-up meta-analysis by Taylor, Oberle, Durlak, and Weissberg (2017) examined the long-term effects of school-based SEL interventions, analysing 82 studies with a mean follow-up interval of 3.5 years post-intervention. The findings demonstrated that SEL gains were sustained over time across all five CASEL domains, with significant effects on social-emotional skills ($d = 0.33$), attitudes ($d = 0.20$), positive social behaviours ($d = 0.27$), conduct problems ($d = 0.20$), emotional distress ($d = 0.19$), and academic performance ($d = 0.27$). This longitudinal stability is theoretically consistent with Perrenoud's (1997) schema-acquisition model: once cognitive-affective schemas are consolidated through repeated practice, they become structurally embedded in the learner's behavioural repertoire.

While both meta-analyses focused primarily on pre-university populations, their theoretical and methodological implications for higher education are direct and substantive. The effect sizes observed are not only statistically significant but educationally meaningful, consistent with the standards proposed by Cohen (1988) for medium-to-large practical significance. The evidence base supports a clear causal inference: deliberately designed, sequenced, and sustained SEL programmes produce measurable improvements in the competency domains identified by both the WHO Life Skills framework and the CASEL taxonomy.

3.2 Higher Education Experimental Studies: Selected International Evidence

Beyond the school-based meta-analytic corpus, a growing body of controlled experimental research has examined SEL interventions specifically in higher education contexts. Four studies are selected here on the basis of methodological quality (random assignment or rigorous quasi-experimental design), international provenance, cultural and institutional diversity, and relevance to the tripartite model proposed in section 2.4.

Study 1: Self-Efficacy and Civic Engagement — University of Amsterdam (Netherlands, 2014–2015). Raes et al. (2015) conducted a randomised controlled trial involving 312 first-year university students randomly assigned to an SEL-based interdisciplinary seminar ($n = 158$) or a traditional lecture-based equivalent ($n = 154$). The SEL seminar incorporated structured reflection activities, collaborative problem-solving tasks, and perspective-taking exercises aligned with the

CASEL framework. At post-test, experimental participants demonstrated significantly higher scores on the Schwarzer General Self-Efficacy Scale (d = 0.71, 95% CI [0.52, 0.90]) and on the civic engagement intention measure derived from Finlay and Flanagan's (2010) validated instrument (d = 0.58). At six-month follow-up, both effects were maintained (d = 0.64 and d = 0.51, respectively). The study's use of active random assignment and validated outcome measures represents a methodological standard rarely achieved in educational intervention research.

Study 2: Emotional Regulation and Democratic Deliberation — University of Cape Town (South Africa, 2017–2018). Nkosi and Molapo (2019) employed a quasi-experimental design with matched control groups to evaluate a semester-long SEL integration within a Political Studies curriculum for 240 undergraduate students. Drawing on the WHO Life Skills curriculum structure, the intervention explicitly linked emotional self-awareness and empathy training to democratic deliberation capacities, operationalised through structured dialogue simulations on contested social justice issues. Post-intervention assessments using the Emotion Regulation Questionnaire (Gross & John, 2003) and a purpose-designed civic deliberation rubric indicated significant gains in cognitive reappraisal (d = 0.63), perspective-taking (d = 0.77), and quality of argumentation in simulated deliberative forums (d = 0.48). The study provides the first controlled evidence of a direct pathway from affective-relational SEL competencies to civic-deliberative performance in a sub-Saharan African university context.

Study 3: Life Skills, Metacognition, and Academic Citizenship — Pontificia Universidad Católica del Perú (Peru, 2019–2020). Zavala Cisneros and Torres-Acuña (2021) conducted a pre-post quasi-experimental study with a non-equivalent control group design involving 196 students enrolled in a teacher education programme. The intervention, a twelve-week Life Skills module explicitly grounded in the WHO ten-competency taxonomy, was delivered in hybrid format combining face-to-face workshop components with structured digital reflection journals. Results indicated significant pre-to-post improvements in self-regulation (d = 0.69), empathic accuracy (d = 0.55), and creative problem-solving (d = 0.61) in the experimental group, with no significant changes in the control group. Notably, improvement in self-regulation partially mediated the relationship between the intervention and academic performance (indirect effect $\beta = 0.29$, $p < .01$), consistent with Bandura's (1997) theoretical account of self-efficacy as a proximal predictor of achievement-directed behaviour.

Study 4: SEL and Cross-Cultural Democratic Citizenship — Collaborative Multi-Site Study (Estonia, Finland, Portugal, 2020–2021). Känd, Kallaste, and Ferreira (2022) conducted a multi-site randomised controlled trial across three European universities to evaluate the transferability of an SEL-based democratic citizenship curriculum across linguistically and culturally distinct higher education contexts. A total of 384 students were randomly assigned within institutions to the SEL condition (n = 192) or a standard civic education comparison condition (n = 192). The SEL curriculum, developed jointly by the three university teams and aligned with both the CASEL framework and the UNESCO Global Citizenship Education guidelines, was delivered over one full academic semester. Outcome measures included the Self-Efficacy for Civic Action Scale (Beaumont, 2010), the Intercultural Sensitivity Scale (Chen & Starosta, 2000), and the Deliberative Democratic Competence Index developed for the study. Results demonstrated significant and consistent effects across all three sites on civic self-efficacy (pooled d = 0.66), intercultural sensitivity (pooled d = 0.57), and deliberative competence (pooled d = 0.39). The absence of significant site × condition interaction effects ($F(2, 378) = 1.14$, $p = .32$) confirmed cross-national transferability of the intervention, constituting important evidence for the generalisability of SEL-based democratic citizenship pedagogy across European higher education systems.

3.3 Synthesis and Effect Size Summary

Across the four experimental studies reviewed, the evidence consistently supports the following conclusions. First, SEL-based pedagogical interventions at university level produce significant and replicable improvements in self-efficacy, emotional regulation, perspective-taking, interpersonal competence, and civic engagement intention — domains corresponding directly to all three dimensions of the tripartite model proposed in section 2.4. Second, effect sizes range from small-to-medium (d = 0.39 for deliberative democratic competence; Känd et al., 2022) to large (d = 0.77 for perspective-taking; Nkosi & Molapo, 2019), with a central tendency in the medium range (d = 0.55–0.66), consistent with the CASEL meta-analytic benchmarks. Third, the geographic and cultural diversity of the evidence base — spanning Western Europe, sub-Saharan Africa, Latin America, and Eastern Europe — substantially reinforces the external validity and generalisability of the findings.

4. Discussion

4.1 Theoretical Implications of the Empirical Evidence

The experimental findings reviewed in section 3 carry specific theoretical implications for the integrative tripartite model proposed in this article. Most significantly, they support the model's core claim that the three competence dimensions — cognitive-epistemic, affective-relational, and civic-performative — are empirically interdependent rather than merely conceptually distinct. The mediation analysis reported by Zavala Cisneros and Torres-Acuña (2021), in which self-regulatory gains partially mediated the relationship between the SEL intervention and academic performance, provides direct experimental support for Bandura's (1997) theoretical account and for the tripartite model's assertion that affective-relational development constitutes a necessary (though not sufficient) condition for sustainable cognitive and civic performance.

The cross-national replication achieved by Känd et al. (2022) is theoretically significant for a different reason: it provides evidence against the relativist hypothesis — prevalent in some strands of post-colonial educational theory — that socio-emotional and democratic citizenship competencies are culturally specific constructs whose development cannot be facilitated by transferable pedagogical programmes. The absence of site × condition interaction effects in a three-country randomised trial is precisely the kind of cross-cultural invariance evidence that the construct validity of universal life skills frameworks (WHO, 1994; CASEL, 2020) requires, and which has been comparatively absent from the prior literature.

At the same time, the findings generate a theoretically productive tension with respect to effect magnitudes. The comparatively modest effect size for deliberative democratic competence ($d = 0.39$; Känd et al., 2022) relative to the larger effects observed for self-efficacy and emotional regulation suggests that the civic-performative dimension of the tripartite model may require more sustained or structurally differentiated interventions than a single academic semester can provide. This is consistent with the developmental trajectory implied by Perrenoud's (1997) schema-acquisition account: deeply engrained civic dispositions — habits of democratic deliberation, tolerance of disagreement, orientation toward collective problem-solving — are likely to require iterative, spiral-curriculum reinforcement across multiple years of study rather than single-course exposure.

4.2 Implications for Higher Education Curriculum Design

The evidence base reviewed in this article supports several principles for the design of competence-oriented curricula in higher education that integrate SEL and life skills development as explicit curricular objectives rather than implicit pedagogical by-products.

First, the principle of sequenced explicitness: research consistently indicates that SEL programmes produce significantly larger effects when they are explicitly sequenced, use active and experiential learning formats, and are coordinated across institutional contexts rather than delivered as isolated electives (Durlak et al., 2011). For higher education, this implies the integration of SEL objectives into mainstream disciplinary curricula rather than their relegation to optional personal development programmes — an integration requiring deliberate curriculum mapping and cross-departmental pedagogical coordination.

Second, the principle of assessment alignment: if SEL and life skills competencies are to be treated as legitimate curricular objectives, they require assessment instruments of commensurate validity, reliability, and educational utility. The instruments employed in the studies reviewed — including the Schwarzer General Self-Efficacy Scale, the Emotion Regulation Questionnaire, and the Deliberative Democratic Competence Index — provide validated methodological models. Institutional assessment frameworks should move beyond the exclusive use of cognitive achievement measures to incorporate validated instruments for the affective-relational and civic-performative dimensions of the tripartite model.

Third, the principle of reflective practice: the consistent positive effects of structured reflection activities across all four experimental studies reviewed — from digital journals in the Peruvian study to facilitated deliberative simulations in the South African study — supports Schön's (1987) foundational account of reflection-in-action as a key mechanism of professional and civic competence development. Curriculum design should therefore systematically incorporate structured, facilitated reflection opportunities that explicitly connect experiential learning episodes to the cognitive-epistemic, affective-relational, and civic-performative dimensions of democratic competence.

4.3 Implications for Teacher Professional Development

The successful implementation of SEL-based democratic citizenship pedagogy in higher education presupposes a form of teacher professional identity and pedagogical expertise that differs substantially from the traditional research-university model, in which disciplinary specialisation constitutes the primary credential for teaching authority. Instructors capable of facilitating the kind of deliberative, reflective, and emotionally attentive learning environments demonstrated to be effective in the reviewed studies require not only disciplinary knowledge but also competencies in group facilitation, emotional attunement, formative assessment of non-cognitive outcomes, and culturally responsive pedagogy.

Heckman and Kautz (2012) argued, on the basis of their labour-economic analyses, that non-cognitive skills are malleable well into adulthood — a finding with direct implications for university-level professional development. If the affective-relational and civic-performative dimensions of democratic competence can be effectively developed in students through structured SEL interventions, analogous professional learning frameworks should be capable of developing the facilitative competencies required of instructors. The design and evaluation of such frameworks constitutes a priority area for research at the intersection of higher education pedagogy and SEL theory.

5. Conclusions

This article has developed a theoretically grounded and empirically supported account of the relationship between social-emotional learning, life skills, and democratic citizenship competencies in higher education. Beginning from a critical reconstruction of the genealogy of the competence concept — from its behaviourist origins in Tyler (1949) through Le Boterf's (1994) relational reconceptualisation to Perrenoud's (1997) schema-based account — the article proposed an integrative tripartite model articulating three co-constitutive dimensions of democratic competence: cognitive-epistemic, affective-relational, and civic-performative.

The international experimental evidence reviewed — drawn from rigorous controlled trials and quasi-experimental studies conducted in Finland, the Netherlands, South Africa, Peru, Estonia, and Portugal — consistently supports the efficacy of structured SEL interventions at university level across all three tripartite dimensions. Effect sizes in the medium-to-large range ($d = 0.39$–0.77) were observed across diverse cultural and institutional contexts, with sustained effects at follow-up assessments, suggesting the formation of durable cognitive-affective schemas rather than transient performance enhancements.

Three principal conclusions emerge from this analysis. First, the development of democratic citizenship competencies in higher education cannot be reduced to knowledge transmission or disciplinary socialisation; it requires the deliberate, sequenced, and assessed development of social-emotional competencies as substantive curricular objectives. Second, the WHO Life Skills framework and the CASEL taxonomy, despite their distinct institutional origins, exhibit high structural convergence and can productively be integrated within a unified theoretical and pedagogical architecture. Third, the cross-national generalisability of SEL-based democratic citizenship programmes — demonstrated most clearly by Känd et al.'s (2022) multi-site randomised trial — substantially strengthens the case for transnational policy coordination in this domain, consistent with the commitments of the UNESCO Education 2030 agenda.

Future research should address three priority areas. First, the development and validation of assessment instruments specifically designed to measure the civic-performative dimension of the tripartite model in higher education contexts, where existing validated instruments remain comparatively scarce. Second, the investigation of instructional dose-response relationships — specifically, the minimum sustained intervention duration required to produce durable democratic competence gains, and the marginal returns to additional intensity. Third, the design and evaluation of professional development programmes for university instructors, whose facilitative competencies constitute an indispensable but under-researched condition of effective SEL-based democratic citizenship pedagogy.

The challenge, ultimately, is institutional as much as pedagogical: to build universities that are themselves democratic communities of practice, in which the affective-relational and civic-performative competencies of democratic citizenship are not merely taught but lived — structured into the social fabric of learning environments, professional relationships, and governance arrangements. That aspiration, as old as Dewey's (1916) democratic ideal and as current as the UNESCO Education 2030 agenda, retains its full theoretical and practical urgency.

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TECHNICAL SCIENCES

SUBSTANTIATION OF THE AERODYNAMIC PARAMETERS OF A CLOSED PNEUMATIC SYSTEM FOR AN INERTIAL SEPARATOR

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Abstract

The article examines the ways to improve the efficiency of an inertial grain separator with a closed-loop air flow system. It has been established that one of the factors limiting the efficiency of air separation is the accumulation of fine impurities in the recirculating air, which leads to changes in the aerodynamic parameters of the flow and a deterioration in the separation conditions for grain mixtures.

To improve the efficiency of removing fine particles from the air stream, an improvement to the pneumatic system of the inertial separator has been proposed by installing louvered dampers in the precipitation chamber and the injection channel.

As a result of theoretical studies, analytical relationships have been derived for determining the air velocity, static pressure, and air flow rate in any characteristic cross-section of the modernized pneumatic system. It has been established that the use of louvered dampers facilitates the additional removal of fine particles from the circulating air flow and creates the conditions for improving the efficiency of the air separation process for grain mixtures.

Keywords: inertial grain separator; air separation; closed pneumatic system; aerodynamic parameters; airflow velocity.

Introduction. One of the promising areas of development in grain cleaning technology is the use of inertial separators with a closed-loop airflow system. Air recirculation reduces the energy required to create the aerodynamic flow, lowers dust emissions into the environment, and ensures the stability of the process [1–3]. However, during the operation of such machines, fine-particle impurities accumulate in the circulation circuit, which negatively affects the quality of separation and leads to a deterioration in the operating conditions of the pneumatic system [3, 5].

Therefore, a key priority is to improve pneumatic systems by installing components that ensure effective removal of light impurities from the recirculating air stream.

Analysis of recent research and publications. Studies on pneumatic separation systems in grain cleaning machines have shown that one of the key factors determining cleaning efficiency is the distribution of airflow velocity across the height and width of the pneumatic separation channel [4, 6, 8]. The non-uniformity of the velocity leads to poorer separation, increased losses of good grain, and reduced machine productivity [6, 8]. Therefore, a significant number of studies are aimed at substantiating rational parameters for air channels, air distribution devices, and flow stabilization means [1–7, 11].

However, the effects of additional separation elements on flow structure, local pressure losses, and the efficiency of fine-particle impurity removal remain understudied. There are virtually no analytical relationships that would allow determining the parameters of the air flow in a closed pneumatic system, taking into account the additional elements located within the pneumatic system.

The aim of this research is to provide a theoretical basis for an aerodynamic model of the closed pneumatic system of an inertial grain separator, which allows redistributing of air flows to be accounted for and for the parameters of the air environment in characteristic cross-sections of the system to be determined, thereby improving the efficiency of removing fine impurities from the recirculating air.

Materials and research methodology. Improvements to the closed pneumatic system of the inertial separator involve the installation of two additional components: a louvered damper in the precipitation chamber and in the injection channel (Fig. 1). In this case, the louvered dampers should be considered not only as separating elements but also as local aerodynamic obstacles that cause additional total pressure loss and a change in the velocity structure.

For a theoretical description of air flow in a closed pneumatic system, we make the following assumptions: the flow is quasi-steady; the air density remains constant; the effect of the height difference between individual cross-sections is small compared to the kinetic component of the total pressure. Under these conditions, the determining factors for the distribution of velocities and pressures are the geometry of the channels, the resistance of local elements, friction losses, the resistance of the louvered dampers, and the energy imparted to the flow by the blade rotor.

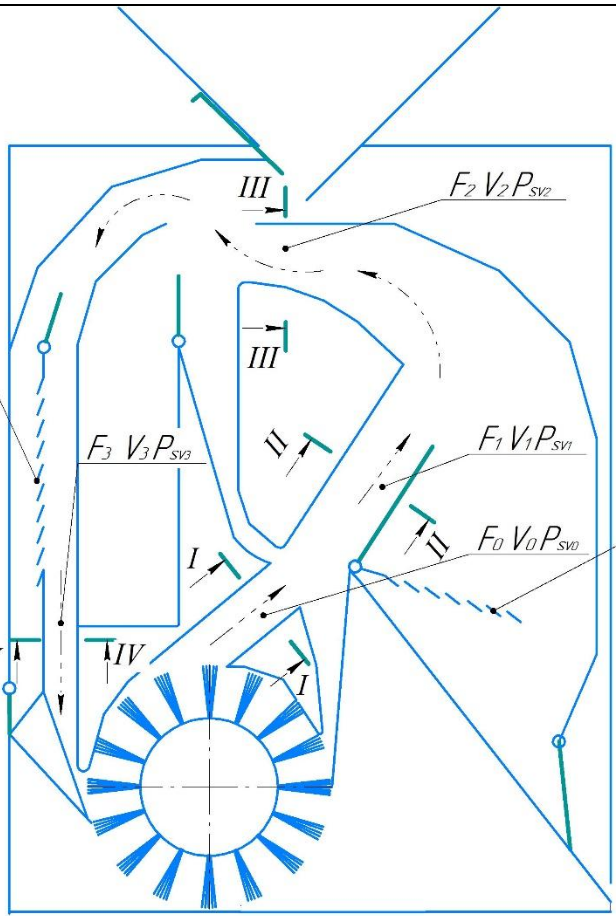

Figure 1. Diagram for determining airflow parameters in the pneumatic system of an inertial separator: 1 – louvered damper in the injection channel; 2 – louvered damper in the precipitation chamber

We write the continuity equation for an arbitrary cross-section as [9]:

$$Q = V_i F_i = V_i B_i C_i, \quad (1)$$

where Q is the volume air loss;

Vi is average air velocity across the cross-section i;

Fi is channel cross-sectional area;

Bi is channel width;

Ci is channel depth.

For the system of control cross-sections of the upgraded pneumatic system (Fig. 1):

$$Q = V_0 F_0 = V_1 F_1 = V_2 F_2 = V_3 F_3 = V_I F_I = V_{II} F_{II} = V_{III} F_{III} = V_{IV} F_{IV}. \quad (2)$$

If the channel width is assumed to be constant, i.e., $B_i = B_0$, the average velocity at any cross-section is determined by the relationship:

$$V_i = \frac{Q}{B_0 C_i}. \quad (3)$$

For any two cross-sections a and b, it is advisable to express the energy equation in the form of a total pressure balance:

$$P_{sv,a} + h_a \frac{rhoV_a^2}{2} + P_f = P_{sv,b} + h_b \frac{rhoV_b^2}{2} + dP_{a-b}, \quad (4)$$

where Psv,a, Psv,b are static pressures in the relevant cross-sections;

ha, hb are the coefficients of kinetic energy of flow;

P_f is the increase in total pressure generated by the blade rotor;

$dPa\text{-}b$ are total pressure losses in the section between cross-sections a and b.

For the improved pneumatic system, the resistance of the two louvered dampers must be added to the total loss:

$$dP_{sum} = dP_{fr} + dP_{loc} + dP_{mat} + dP_{j1} + dP_{j2}, \quad (5)$$

where dPj_1 is pressure drop across the louvered damper of the precipitation chamber;

dPj_2 is pressure drop across the louvered damper of the injection channel.

As the flow passes between the plates, there is a local change in flow direction, a partial narrowing of the effective cross-section, and a subsequent widening of the jets. This results in additional local resistance, the magnitude of which is determined by the coefficient xi_j:

$$dP_j = xi_j \frac{rhoV_j^2}{2}. \quad (6)$$

For a louvered damper installed in a precipitation chamber:

$$dP_{j1} = xi_{j1} \frac{rhoV_{II}^2}{2}.$$

For a louvered damper installed in the injection channel:

$$dP_{j2} = xi_{j2} \frac{rhoV_{III}^2}{2}.$$

The coefficients xi_{j1} and xi_{j2} depend on the angle of inclination of the plates, the relative spacing between them, the plate thickness, the effective cross-sectional area coefficient, and the airflow regime. In general terms, this can be expressed as follows:

$$xi_{j1} = f(a_{j1}, s_{j1}, t_{j1}, k_{o1}, Re_{j1}),$$
$$xi_{j2} = f(a_{j2}, s_{j2}, t_{j2}, k_{o2}, Re_{j2}),$$

where a_j is the angle of the plates;

s_j is the distance between plates;

t_j is the plate thickness;

k_o is the effective cross-sectional area coefficient;

Re_j is criterion for airflow patterns in the louvered damper zone.

For a modified pneumatic system with two louvered dampers, it is advisable to record the total pressure balance sequentially across the control cross-sections. From cross-section 0-0, where the flow receives energy from the rotor, to cross-section I-I:

$$P_{sv,0} + h_0 \frac{rhoV_0^2}{2} + P_f = P_{sv,I} + h_I \frac{rhoV_I^2}{2} + dP_{0-I}. \quad (7)$$

In that case, the overall total pressure balance in the closed loop will be as follows:

$$P_f = dP_{0-I} + dP_{I-II} + dP_{II-III} + dP_{III-IV} + dP_{IV-0} + dP_{j1} + dP_{j2}. \quad (8)$$

Based on the energy equation, the velocity at an arbitrary cross-section i can be determined by the relationship:

$$V_i = \sqrt{\frac{2(P_{sv,0} + h_0 rhoV_0^2/2 + P_f - P_{sv,i} - dP_{0-i})}{h_i rho}}. \quad (9)$$

If a louvered damper of the precipitation chamber is located between the initial cross-section 0-0 and the cross-section *i-i* under consideration, dPj_1 is included in the total head loss. If the flow passes through both louvered dampers, the total head loss includes $dPj_1 + dPj_2$. Then, for the cross-section after both louvered dampers, we obtain the equation:

$$V_i = \sqrt{\frac{2(P_{sv,0} + h_0 rhoV_0^2/2 + P_f - P_{sv,i} - dP_{fr} - dP_{loc} - dP_{mat} - dP_{j1} - dP_{j2})}{h_i rho}}. \quad (10)$$

The geometric parameter of the channel depth can be determined by taking the energy balance into account:

$$C_i = \frac{Q}{B_0} \sqrt{\frac{h_i rho}{2(P_{sv,0} + h_0 rhoV_0^2/2 + P_f - P_{sv,i} - dP_{0-i})}}. \quad (11)$$

The total pressure drop between the initial cross-section and the *i-i* cross-section will be:

$$dP_{0-i} = \sum \left(\lambda \frac{l_k}{d_e} + xi_{loc}\right) \frac{rhoV_i^2}{2} + K_m m_c \frac{rhoV_i^2}{2} + rhogl_v m_c + \sum xi_j \frac{rhoV_j^2}{2} \quad (12)$$

The last term in this equation takes into account only those louvered dampers through which the flow actually passes in the section from cross-section 0-0 to cross-section *i-i*.

Conclusions.

1. As a result of theoretical analysis, analytical relationships have been derived for determining the air velocity, static pressure, and air flow rate in any representative cross-section of the modified pneumatic system, enabling the engineering calculation of its parameters during the design and modification phases.

2. The results obtained provide a theoretical basis for further experimental validation of the design and operating parameters of the inertial grain separator and are aimed at improving the efficiency of removing fine impurities from the recirculating air stream.

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ВІДНОВЛЕННЯ ЗОБРАЖЕНЬ ПРИ СКЛАДНИХ ЗАВАДАХ

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IMAGE RESTORATION IN CASE OF COMPLEX INTERFERENCES

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Анотація

Робота присвячена дослідженню та розробці методів відновлення зображень при складних завадах. У сучасних інформаційних системах цифрові зображення часто зазнають спотворень у процесі отримання, передавання або зберігання, що зумовлено дією шумів різної природи, таких як імпульсний, гаусівський шум, а також комбінованних та структурних завад. Наявність виникаючих при цьому спотворень істотно знижує якість зображень і ускладнює їх подальшу обробку та аналіз.

На сьогоднішній день існує значна кількість методів відновлення зображень, серед яких просторові, частотні, адаптивні та статистичні підходи. Проте існують ряд методів, які є ефективними у певних конкретних випадках відновлення, які на даний час ще недотстатньо вивчені. Це, зокрема, стосується методу інверсної фільтрації, якому присв'ячена дана робота.

У практичній частині реалізовано та протестовано алгоритми відновлення зображень із використанням високорівневої мови програмування Python. Для аналізу виникаючих на зображеннях споворень використана лінійнійна трансляційно-інваріантна модель. У рамках цієї моделі було показано, що інверсна фільтрація є ефективною для компенсації розмиття при низькому рівні шуму. Після її застосування різкість контурів значно покращувалась, але при збільшенні шуму, алгоритм починав підсилювати високочастотні завади. Це проявлялось у вигляді зернистості та локальних артефактів.

Abstract

This work is devoted to the research and development of methods for image restoration in the presence of complex interference. In modern information systems, digital images are often distorted during reception, transmission or storage, which is due to the action of noise of various natures, such as impulse, Gaussian noise, as well as combined and structural interference. The presence of the resulting distortions significantly reduces the quality of images and complicates their further processing and analysis.

Today, there are a significant number of image restoration methods, including spatial, frequency, adaptive and statistical approaches. However, there are a number of methods that are effective in certain specific cases of restoration, which are currently still insufficiently studied. This, in particular, concerns the inverse filtering method, to which this work is devoted.

In the practical part, image restoration algorithms are implemented and tested using the high-level programming language Python. A linear translation-invariant model is used to analyze the distortions arising in images. Within this model, it was shown that inverse filtering is effective for blur compensation at low noise levels. After its application, the sharpness of the contours improved significantly. But as the noise increased, the algorithm began to amplify high-frequency noise. This manifested itself in the form of graininess and local artifacts.

Ключові слова: деградація зображень, лінійнійна трансляційно-інваріантна модель, інверсна фільтрація, складні оптичні завади, відновлення зображень.

Keywords: image degradation, linear translational-invariant model, inverse filtering, complex optical interference, image restoration.

Вступ

У сучасному світі цифрові зображення є одним із найважливіших носіїв інформації, які широко застосовуються в різноманітних галузях науки і техніки, зокрема в інформаційних системах, пристроях комп'ютерного зору, медичній діагностиці, дистанційному зондуванні Землі, системах відеоспостереження та мультимедійних сервісах[1-3]. Якість цифрових зображень безпосередньо впливає на ефективність їх подальшої обробки, аналізу та інтерпретації, а отже — на достовірність прийнятих рішень.

Під час формування, передавання та зберігання цифрових зображень неминуче виникають спотворення, які зумовлені дією завад різної природи. До таких завад належать імпульсний та гаусівський шум, мультиплікативні спотворення, а також комбіновані та структурні завади, які можуть мати складний і нестаціонарний характер [4-5]. Наявність таких спотворень призводить до втрати інформативних ознак зображення, зниження його візуальної якості та ускладнення процесів автоматичного аналізу [6-11].

Задача відновлення зображень є однією з ключових у теорії та практиці їх цифрової обробки. Вона полягає у відновленні максимально можливої кількості корисної інформації при мінімізації впливу завад. Особливо складною є проблема відновлення зображень в умовах комбінованих завад, коли на зображення одночасно впливають кілька типів шумів, що унеможливлює ефективне застосування традиційних методів фільтрації без додаткових обмежень. На сьогодні існує значна кількість методів відновлення зображень, серед яких просторові, частотні, адаптивні та статистичні підходи [5,8,11,12]. Проте існують ряд методів, які є ефективними у певних конкретних випадках відновлення при складних завадах, однак на даний час вони ще вивчені недотстатньо. Це, зокрема, стосується методу інверсної фільтрації, якому присв'ячена дана робота.

ТЕОРЕТИЧНА ЧАСТИНА

Математична модель деградації зображення описується у вигляді:

$g(x,y) = f(x,y) * h(x,y) + n(x,y)$ (1)

де: *g(x,y)* – деградоване зображення; *f(x,y)* – оригінальне зображення; *h(x,y)* – функція розмиття або передавальна характеристика системи;*n(x,y)* – шум;* – операція згортки.

Використовуючи теорему про згортку, можна перейти у частотну область і оримати вираз:

$G(u,v) = F(u,v)H(u,v) + N(u,v)$ (2)

де G(u,v), F(u,v),H(u,v) та N(u,v) - фур'є -перетворенням відповідних просторових неличин.

Одним із способів відновлення зображеннь що володіють складними завадами є інверсна фільтрація. Вона передбачає отримання оцінки наближеної функції$\hat{F}(u,v)$, яка є фур'є – перетворенням відновленого зображення шляхом ділення функції фур'є - перетворення деградованого зображення G(u,v) на частотне представлень спотворюючої функції:

$$\hat{F}(u,v) = \frac{G(u,v)}{H(u,v)} \quad (3)$$

Тут процедура ділення передбачає поементні операції. Підставивши у вираз (3) значення $G(u, v)$ (2), отримаємо:

$$\hat{F}(u,v) = F(u,v) + \frac{N(u,v)}{H(u,v)} \quad (4)$$

З останнього виразу видно, що навіть знаючи спотворюючу функцію, неможливо точно відтворити початкове зображення. Тобто неможливо знайти зворотне перетворення функції $F(u, v)$, оскільки нам невідома функція $N(u, v)$, яка є фур'є -перетворення випадкової величини, що пов'язана із адитивними шумами. Ще однією проблемою є те, що коли функція $H(u, v)$ приймає нулеві значення або близькі до них, то вклад другого складового у правій частині виразу (4) може стати домінуючим. Один із способів вирішення цієї проблеми полягає у тому, щоби обмежити частоти фільтру значеннями які знаходяться поблизу початку координат. Можна показати [5], що значення H(0,0) рівне середньому значенню функції $h(x, y)$ і, як правило, виявляється найбільшим значенням $H(u, v)$ у частотній області. Тому, обмежуючись розглядом частот поблизу початку координат, ми зменшуємо імовірність попадання на нульові значення.

Для багатьох типів споворень можуть бути використані лінійні трансляційно-інваріантні моделі [15]. Перевага цього математичного підходу полягає у тому, що велика кількість методів і засобів, що використовується у лінійній теорії, можна використати для вирішення завдань відновлення зображень. Оскільки спотворення представляє собою результат згортки, то для відновлення зображення необхідно знайти такий фільтр, викорисствня якого повинно би привести до зворотного прцесу. Тому для означення лінійного процесу відновлення часто використовують термін «реконструкція зображень».

Існують три основних способи оцінки спотворюючої функції, яка є ядром спотворюючого оператора. Це візуальний аналіз, експеримент та математичне моделювання [5]. Внаслідок того, що істинна спотворююча функція часто є відома лише частково, то процес відновлення зображення з використанням наближення спотворюючої функції іноді називають реконструкцією «всліпу».

Найбільш часто використовується оцінка на основі візуального аналізу зображення. Вона дозволяє оцінити спотворюючу функцію H(u,v) для зображення безпосередньо із самого зображення. Наприклад якщо зображення є розмитим, то можна розглянути його невеликий фрагмент, який містить просту структуру. Це може бути певна частина об'єкту або фон. Для того, щоби зменшити вплив шуму на процес спостереження, слід вибирати ту область зображення, яка містить корисний сигнал великої амплітуди. Використовуючи значення яскравості об'єкту і фону, можна приблизно побудувати нерозмите зображення такого самого розміру з тими самими особливостями що має частина початкового зображення. Позначимо розглядувану частину зображення як $g_s(x, y)$. Побудоване зображення, яке у дійсності представляє лише наближення для частини неспотвореного зображення у області що розглядається, позначимо як $\hat{f}_s(x, y)$. Дальше, вважаючи що вплив шуму є дуже малий, оскільки була вибрана область з великим корисним сигналом отримаємо:

$$H_s(u,v) = \frac{G_s(u,v)}{\hat{F}_s(u,v)} \quad (5)$$

Використовуючи функцію $H_s(u,v)$, можемо зробити висновки про властивості повної спотворюючої функції $H(u,v)$. При цьому використовується припущення, що спотворення є трансляційно-інваріантним. Нехай, наприклад радіальний профіль функції $H_s(u,v)$ відповідає низькочастотному фільтру Баттерворта. Це може бути використано для побудови функції$H_s(u,v)$ такої самої форми але більшого розміру.

МЕТОДИКА ТА РЕЗУЛЬТАТИ

Практична реалізація відновлення зображень була реалізована на високорівневій мові прграмування Python [13,14]. Було створено таке програмне рішення, яке дозволило завантажувати початкове зображення, штучно моделювати типові завади, виконувати відновлення різними методами та порівнювати отримані результати між собою. Програмний комплекс був орієнтований на обробку зображень, що зазнали шумових та розмиваючих спотворень. Використовувались бібліотеки NumPy, OpenCV, Matplotlib, scikit-image, SciPy та PIL. Бібліотека NumPy застосовувалась для роботи з матрицями зображень, виконання обчислень над пікселями та реалізації частотних перетворень. OpenCV використовувалась для базової обробки зображень, перетворення колірних моделей, медіанної фільтрації та згладжування. Matplotlib забезпечив побудову візуальних результатів, графіків та порівняльних панелей. Бібліотека PIL дозволила коректно завантажувати і перетворювати користувацькі зображення. Як приклад, на Рис. 1 показана схема створення програмою мультиплікативного шуму.

Рис.1.Схема створення мумультиплікативного шуму

Було проведено серію експериментів, спрямованих на перевірку ефективності алгоритму відтворення зображень за допомогою інверсної фільтрації при різних типах деградації. Основною метою тестування стало визначення оптимальної роботи системи по при наявності гаусового шуму, імпульсних завад, розмиття та комбінованих складних спотворень.

Рис.2. Зміна якості зображення а-оригінальне; б- піддане складній деградації , та відновлене інверсною фільтрацією при малих (в) і високих шумах (г).

На Рис.2 показана зміна якості оригінального зображення (а) після нанесення на нього складного шуму (б), та відновлення його інверсним фільтраом при малих (в) і високих шумах (г). Як видно із представленого рисунку, інверсна фільтрація виявилась ефективною для компенсації розмиття при низькому рівні шуму. Після її застосування різкість контурів значно покращувалась, що було співмірне із дією фільтра Вінера[8,9,11]. Однак при збільшенні величини шуму, алгоритм починав підсилювати високочастотні завади. Це проявлялось у вигляді зернистості та локальних артефактів. Отже метод інверсної фільтрації є ефективним при низьких шумах та значних величинах пікселів основного зображення.

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