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Objective

As mentioned above the aim of this journal is to provide a platform and a means for disseminating and exchanging of knowledge and experience pertaining to academic advancement and research findings which may be beneficial for academy and society as a whole.

Deadline - Period of Publication

The UBRU INTERNATIONAL JOURNAL is a four-month academic journal (4 months per issue or 3 issues per year); the first issue is from January-April; the second from May-August; and the third from September-December.

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EDITORIAL

Dear Esteemed Readers and Contributors,

On behalf of the Editorial Board, it is my privilege to extend our formal greetings as we enter the year 2026. We wish all members of the academic community continued success, good health, and scholarly advancement in the year ahead. Time progresses rapidly, and each academic year presents both challenges and opportunities for knowledge creation and dissemination.

Throughout 2025, the journal has remained steadfast in its commitment to upholding rigorous academic standards and ethical publishing practices. We have focused on the careful selection, peer review, and publication of high-quality research articles that contribute meaningfully to the advancement of knowledge across disciplines. Our objective has been to strengthen the journal's role as a credible academic platform that supports scholarly inquiry, critical analysis, and evidence-based discussion at both national and international levels.

The publication of Volume 6, Number 1 (January-April 2026) reflects our ongoing dedication to academic excellence and continuous improvement in editorial quality, review processes, and dissemination standards. In line with this commitment, we cordially invite researchers, scholars, and practitioners to submit original research articles, review papers, and academic studies for consideration in future issues of the journal.

Manuscripts and further information regarding submission guidelines are available through the ThaiJo online journal system at: <https://so04.tci-thaijo.org/index.php/ubruij>

We trust that the articles published in this issue will provide scholarly value, stimulate critical reflection, and support the academic and professional endeavors of our readership. The Editorial Board sincerely appreciates the continued trust, cooperation, and contributions of authors, reviewers, and readers, which remain essential to the journal's sustained development and academic standing.

Sincerely,



Assistant Professor Dr. Pimook Somchob
Editor

UBRU International Journal
April 2026

Contents

	Page
An Analyzing of The Tactical Performance Characteristics of Spain's Goals in the 2024 Uefa European Championship <i>Dongzheng Li, jakrin Duangkam, Pongsatorn Sukityarn</i>	1
Behaviors, Attitudes, and Knowledge of Exclusive Breastfeeding for 6 Months. In Health Service Zone 10 <i>Supawadee Nontapot, Anuvadh Vadhnapiyakul, Nonglek Kunwaradisai</i>	17
Public Satisfaction and Policy Implications of The National Fitness System Under the Healthy China Strategy <i>Hui Wang, Wiradee Eakronnarongchai</i>	29
An Intelligent Drip Irrigation Innovation for The Sustainable Development of Large Bird's Eye Chili Farming Communities <i>Jirapong Gosalavita, Panupong Boonrom, Udomdet Tarahom, Parada Boonrom</i>	41
A Descriptive Study of Mental Toughness in Youth Woodball Players <i>Ekasak Hengsuko, Unnop Naptheutrong, Dissaphon Boobphachart</i>	59
Startup Sustainability as A Governance Outcome: Funding Dynamics, ESG Legitimacy, and Institutional Amplification in Emerging Asia <i>Taisith Kruasom</i>	67
The Development of English Presentation Skills Through the Integration of Digital Technology and Team-Based Learning for Higher Vocational Certificate Students <i>Natthanan Taisrikhotr, Watcharee Saengboonruang, Sarit Srikhao</i>	93
The Role of Self-Congruence in Active Social Media Engagement Among Lurkers <i>Phattharinthara Athiphatthananan, Nattawat Visetsri, Akkarapong Taewsakul, Phatdhanant Setthanandhaphokin</i>	103
The Influence of In-Store Experience and Product Assortment on Consumer Purchase Intention: A Case Study of 7-Eleven and CJ More <i>Patchayatida Pranee, Jutharat Chuawiset, Nattapat Ngarnkumai, Teerata Sathavara, Touchakorn Sammasut</i>	115
Enhancing Creative Writing Ability Through AI-Integrated Learning Activities Among 10th-Grade Students <i>Jaturaporn Norasarn, Nisanart Sopapol, Pariya Pariput</i>	135
Potential Analysis of Creative Community-Based Tourism in The First Sunrise Area, Ubon Ratchathani Province <i>Kulvadee Lamaijeen, Jakawan Wongmanee, Nainnipa Samniengsanorh, Sathaporn Siri-opakham</i>	155

Contents (continued)

Project-Based Learning Management in Collaboration with Local Enterprises to Enhance Students' Entrepreneurial Skills <i>Parada Boonrom</i>	165
The Influence of Social Media on Impulsive Buying Decision Behavior Among Female Consumers in The Pre-Retirement and Retirement Age Groups in Thailand <i>Thanadda Thawut, Thunchanok Panwun, Pornwalai Longlaloeng, Wanwisa Taleesri, Touchakorn Sammasu</i>	179
Effects of Circuit Training Program on Improving the Physical Fitness of The Grade 6-Boys in Primary School <i>Jie Chang, Puntasiri Khamthoon, Chatpan Dusitkul</i>	195

An Analyzing of The Tactical Performance Characteristics of Spain's Goals in The 2024 Uefa European Championship

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Abstract

The purpose of this study was to analyze the goal-scoring characteristics of the Spanish national team in the UEFA Euro 2024. A total of 19 goals from 7 official matches were examined, focusing on four key variables: goal time, goal location, goal method, and pre-goal organizational patterns. Data were collected from official match videos and analyzed using heat map visualization and descriptive statistical methods.

The results were as follow:

1. Goal time: The results revealed a distinct “double-peak” pattern in goal timing, with the 16th-30th and 46th-60th minute intervals each contributing 27% of total goals (54% combined).
2. Goal location: In terms of spatial distribution, Zone 2 was the main scoring area with 10 goals (67%), while Zone 1, despite only three attempts, achieved 3 goals with a remarkable 75% conversion rate.
3. Goal method: Regarding goal methods, First-Time Shots demonstrated the highest efficiency with a 24% conversion rate and left-footed shots not only had the highest frequency (44.7%) but also achieved a conversion rate of 13%, slightly outperforming right-footed and header attempts.
4. Pre-goal organizational patterns: For pre-goal organizational patterns, positional attacks accounted for 53%, with 53% of goals initiated from the defensive third and 60% completed within five passes, reflecting a strategy of rapid and efficient offensive transitions.

This study was limited by the small sample size and descriptive analysis design. Nevertheless, the findings offer practical implications for coaches and trainers in developing training programs that emphasize timing-specific drills, central finishing efficiency, and rapid offensive transitions in football.

Keywords: Goal Characteristics, UEFA European Championship, Football

Introduction

Football is the most popular sport worldwide, with immense broadcasting value, cultural significance, and tactical diversity. The UEFA European Championship (Euro) is regarded as one of the most prestigious tournaments in international football, serving as both a platform for elite players and a concentrated stage for tactical innovations. Every four years, the competition highlights prevailing football trends, making it a valuable reference point for both research and coaching practice.

The recently concluded 2024 UEFA European Championship reinforced this perspective. Spain captured the title with a historic achievement: becoming the first team to win the tournament with a perfect record while also registering the highest number of goals scored in its history (ESPN, 2024; Spain national football team, n.d.). Traditionally celebrated for their possession-based style, Spain demonstrated notable tactical evolution by complementing controlled possession with vertical penetration, wide-area progression, and rapid transitions. This reflects the broader trend toward hybrid playing styles identified in longitudinal analyses of European Championships between 2012 and 2024, which show a shift from slower possession-based football to faster and more vertical attacking structures (Peng et al, 2025).

Goals, as the decisive element of match outcomes, provide critical insight into the effectiveness of offensive strategies. The study of goal-scoring opportunities whether through goal area analysis, pre-goal organization, or finishing patterns offers a deeper understanding of team offensive power, player role coordination, and spontaneous cooperation. Recent findings from the UEFA Youth League (2023–2024) confirm that tactical indicators and situational variables strongly influence scoring opportunities, further emphasizing the importance of systematic goal analysis for both academic research and applied coaching (Armatas et al., 2025).

Despite the increasing volume of research, analyses often fail to capture newly emerging tactical practices in a timely fashion. In rapidly changing contexts such as Euro 2024, delays in examining evolving strategies risk reducing the practical relevance of such findings. Therefore, a systematic and prompt investigation of Spain's attacking patterns and goal-scoring characteristics is necessary. Such research not only reflects the tactical practices of leading European teams but also provides grassroots coaches and youth academies with timely insights that can enhance player development and tactical training.

Therefore, this study aims to analyze "football performance efficiency is not only a technical indicator but also relates to the overall effectiveness and developmental value of the sport system" (Baert & Amez, 2018).

Objective

The objective of this study is to analyze Spain's goal-scoring tactical performance characteristics at UEFA Euro 2024 to provide transferable technical and tactical guidance for grassroots football development in China. In the Discussion, we explicitly compare Spain's patterns with selected Euro 2024 teams (e.g., high-possession vs. transition-oriented sides) and translate the findings into practical training implications for Chinese youth and school-based programs (e.g., timing-specific drills, central finishing patterns, and rapid transition play) while accounting for local constraints (coach education, training time, facility access).

Literature Review

1. Goal-Scoring Characteristics

The timing of goals is crucial for understanding the rhythm and decisive phases of football matches. Analyses of elite competitions consistently reveal that late goals especially in the final quarter of matches play a decisive role in determining outcomes due to fatigue, tactical substitutions, and increased offensive risk-taking (Armatas et al., 2025). Evidence from UEFA competitions shows similar clustering toward the end of each half (Michailidis et al., 2018), and the 2024 UEFA European Championship further illustrated this pattern as Spain broke the all-time goalscoring record while maintaining a perfect record (ESPN, 2024; UEFA, 2024). Beyond timing, team momentum and psychological factors also shape goal-scoring opportunities; coordinated collective organization under positive momentum is associated with successful attacking sequences, whereas negative momentum often precedes conceded goals (Gautier et al., 2024).

2. Goal Timing

Goal timing serves as a tactical indicator of offensive adaptation across matches and tournaments. In South American football, the distribution of goals depends not only on game phases but also on tournament context and external shocks such as the COVID-19 pandemic (Oliveira et al., 2025). UEFA Champions League analyses similarly show goal concentration in central periods particularly late in matches reflecting tactical persistence and emergent defensive vulnerabilities (Michailidis et al., 2018). At the same time, a shift toward faster, more vertical attacking since 2012 has altered when goals are most likely to occur, with rapid transitions creating earlier and more frequent attempts (Peng et al., 2025).

3. Goal Location

Spatial location provides a concrete readout of tactical effectiveness. Most successful attacks still conclude in the central corridor of the penalty area, underscoring positional play and central overloads (UEFA, 2024). Spain's record-breaking Euro 2024 campaign offers a contemporary illustration, with numerous finishes stemming from controlled build-ups into central spaces (ESPN, 2024). Yet modern play is increasingly hybrid: wide progression combined with rapid central penetration yields goals from cutbacks, crosses, and wider angles as well (Peng et al., 2025).

4. Pre-Goal Organizational Patterns

Pre-goal organization reveals the mechanisms that create high-quality chances. Situational variables such as the number of attackers involved and transition speed substantially raise the probability of scoring (Armatas et al., 2025). Immediately preceding goals, higher-intensity running and pressing are decisive determinants of outcomes in professional men's matches (Konefal et al., 2024). Organizational momentum also matters: positive momentum aligns with coordinated and efficient attacking sequences; negative momentum correlates with defensive disorganization (Gautier et al., 2024).

Research Methodology

1. Literature review method

According to the needs of the research content, in the process of research, the library, CNKI and other databases are mainly used to find reference materials, search by keywords such as "goal characteristics" and "European Cup", and collect, sort, summarize and analyze the relevant literature, aiming to explore the goal characteristics of the Spanish team and provide important reference materials for the research.

2. Video Observation Method

By watching by video from the competition of the Spanish team at Euro 2024, focusing on four variables: goal time, goal location, goal method, and pre-goal organizational patterns. A total of 19 goals from 7 official matches. The analytical framework adopted in this study followed the notational analysis principles proposed by Hughes and Franks (2005).

3. Mathematical and Statistical Analysis Method

The data of the Spanish football team of Euro 2024 was collected through the UEFA Euro 2024 summary report, and the statistics were carried out by SPSS27.0 performed analyzed by and heat map analysis program. Analyzed data were statistically analyzed by descriptive statistical frequency and percentages.

Conceptual Framework

The purpose of this research was to analyze the tactical performance characteristics of Spain's goal-scoring in the UEFA Euro 2024. The analysis focused on four major variables goal timing, goal location, goal method, and pre-goal organizational pattern which together represent the key components of goal-scoring performance.

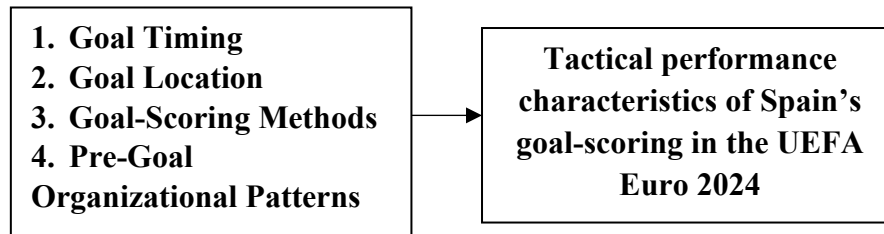


Figure 1: Conceptual Framework

Research Finding

1. Analysis of Goal Timing

Table1: Distribution of Spain's Goals by Time Periods (UEFA Euro 2024)

Goals by Time Periods	1-15 min	16-30 min	31-45 min	46-60 min	61-75 min	76-90 min	extra time	Total
Goals scored	1	4	2	4	1	2	1	15
Scored Percentage	7%	27%	13%	27%	7%	13%	7%	100%
Goals conceded	2	0	0	0	1	1	0	4
Conceded Percentage	50%	0%	0%	0%	25%	25%	0%	100%

Table 1 shows that overall, Spain's entire distribution of objectives in the tournament has a very clear “double-peak” form: 16th-30th and 46th-60th minute intervals are the most successful ones, comprising (54%) of all objectives. These two intervals fall on crucial intervals when the team has adapted to play rhythm completely and achieves its best organization conditionally and physically, due to which it performs very successful attacking combinations. Particularly, 46th-60th minute interval emphasizes Spanish talents to change very quickly to attacking mode after the interval and demonstrate very good tactical play and attacking effectiveness. During the UEFA Euro 2024, Spain conceded a total of four goals. Two goals were conceded in the 1th-15th minute period, accounting for 50% of all concessions.

One goal was conceded in the 61th-75th minute period (25%), and another in the 76th-90th minute period (25%). No goals were conceded in the other time intervals or during extra time. Overall, the distribution of goals conceded shows that concessions occurred primarily in the opening and final phases of matches, with fewer goals conceded during the middle stages.



Figure 2: Goal in The Second Half Time

2. Analysis of Goal location

Table2: Shot And Goal Distribution by Zone (Spatial Analysis)

Zone	Shots	Goals	Avg. Shots/Match	Avg. Goals/Match	Shot Conversion Rate
Zone 1	4	3	0.57	0.43	75%
Zone 2	60	10	8.57	1.43	17%
Zone 3	0	0	0.00	0.00	0%
Zone 4	59	2	8.43	0.29	3%
Zone 5	0	0	0.00	0.00	0%

Table 2 shows that overall distribution perspective, Zone 2 emerged as the most concentrated attacking area for Spain, accounting for 48.8% of total shots (60 out of 123) and contributing 10 out of 15 goals (66.7%), thus confirming its role as the team's primary offensive zone. Located centrally within the penalty area, Zone 2 offers a wider shooting angle and shorter distance to goal, which facilitates higher-quality shot attempts and greater scoring potential. In terms of efficiency, its shot conversion rate stands at 17%, which, although slightly lower than that of Zone 1, still reflects a favorable scoring yield.

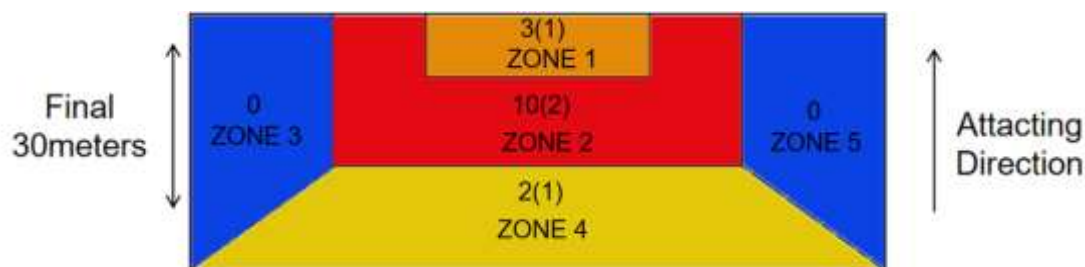


Figure 3: Shot and Goal Heat Map with Numbered Zones (1-5) in The Final 30 M

3. Analysis of Goal method

Table 3: Goal Distribution and Efficiency by Method

Goal method	Goal conceded	Goals scored	Shots	Avg. Shots/Match	Avg. Goals/Match	Shot Conversion Rate
Controlled Finish	2	4	43	6.14	0.57	9.3%
Dribble and Shot	0	2	32	4.57	0.29	6.3%
First-Time Shots	0	6	25	3.57	0.86	24.0%
Header	1	2	19	2.71	0.29	10.5%
Own Goal	1	1	1	0.14	0.14	100.0%
Free Kick	0	0	3	0.43	0.00	0.0%

Table 3 shows that in terms of shooting methods, First-Time Shots proved to be the most efficient, with 6 goals from 25 attempts and a conversion rate of 24%, highlight the team's advantage in quick link-up play and one-touch finishing. In contrast, Controlled Finishes and Dribble and Shots, despite being attempted more frequently, showed much lower efficiency, with conversion rates of 9.3% and 6.3% respectively. On the defensive side, most goals conceded came from opponents' Controlled Finishes and Headers, indicating certain weaknesses in penalty-area defense and aerial duels.



Figure 4: First-Time Shots

Body part used for shots

According to the statistical data shows that the Spanish national football team made a total of 123 attempts at goal, successfully converting 14 of them into goals (excluding own goals) during the UEFA Euro 2024, thereby achieving an 11% shot-conversion rate. A scrutiny of the data with regard to the body parts used in shots makes it clear that shots from the left foot dominated, making 55 attempts (around 44.7%) and scoring 7 goals, thereby achieving a conversion rate of 13%. This indicates that players who mostly used their left foot not only contributed more actively towards shooting attempts but also displayed more effectiveness towards conversion.

Table 4: Body Parts Used for Shots

Body Part	Number of goal shots	Goals scored	Shot Conversion Rate	Goal Conceded
Right Foot	48	5	10%	1
Left Foot	55	7	13%	2
Head	20	2	10%	1
Total	123	14	11%	4

For example, in the game against France, Lamine Yamal took the ball to the periphery of the penalty area, dribbled past a defender, and eventually took an exquisite long-range shot from his left foot, scoring a goal.



Figure 5: Left-Foot Shots

Right-foot shots were the second most common group, numbering 48, which represented 39.0% of all shots, leading to 5 goals scored and a corresponding 10% conversion rate. Though fewer frequent than their left-foot counterparts, these shots still showed a significant number of resultant goals, suggesting an equivalent ability to score goals by right-footed individuals when given individual consideration.

The headers total 20 shots, equivalent to 16.3%, accompanied by 2 goals, and hence constituted a conversion rate of 10%. This rate of efficiency was indicative of the results related to shots aimed at the goal using either foot; the direct goals scored through headers, however, were greatly restricted. This restriction can be attributed to Spain's tactical strategy, which included ground-based penetrating plays and lateral low crosses as compared to aerial attacks (Table 4). On goal concessions by body part, the left foot had the greatest frequency of

concessions, at 2, which represents 50% of the total. On the other hand, the right foot and the head each had one concession, representing 25% respectively.

4. Analysis Pre-Goal Organizational Patterns

1. Attacking Type

According to the chart, among Spain's 15 goals during the UEFA Euro 2024, positional attacks accounted for the largest share with 8 goals, representing 53% of the total. This indicates that the team, while continuing its traditional possession-based approach, maintained a structured and organized positional build-up as its primary offensive strategy, relying on multi-point ball circulation and spatial manipulation to create scoring opportunities. (See Table 5)

Table 5: Goals by Attacking Type

Attacking Type	Positional Attack	Counter-Attack	Second Phase Attack	Total
Goals Scored	8	5	2	15
Scored Percentage	53%	33%	13%	100%
Goals Conceded	1	3	0	4
Conceded Percentage	25%	75%	0%	100%

Table 5 shows that for instance, in a strategic build-up offensive, Rodri's shot provides an example of Spain's ability to move defensive units around. With sustained ball possession, the attacking group, in effect, pulled the opposing defenders out of a tight unit, leaving behind a good shooting chance near the penalty area's outer fringe, as shown in Figure 5. Exploiting available space, Rodri made a good long-range shot, illustrating tactical poise and spatial knowledge typical of Spain's build-up game.



Figure 6: Positional Attacking

Goals resulting from positional attacks tend to derive from sustained ball possession accompanied by effective passing sequences, illustrating Spain's ability to control tempo and implement complex passing frameworks, in particular through midfield organization and

coordinated thrusts down the wings. The counter-attack comprised the second most utilized approach, leading to the creation of 5 goals (33%).

These often resulted from rapid follow-ups following winning possession back in midfield or defended areas, more commonly after successful high pressing or interceptions. Spain made use of the gap immediately before reorganization of the enemy defense, relying on rapid vertical passing accompanied by rapid movement from offensive units to generate swift threats. That reflects Spain's ability to transition seamlessly from possession-based play to vertical attacking approaches as needed, strengthening their attacking ability. In addition, objectives from second-phase attacks comprised 2 goals, accounting for 13% of the sample, which ordinarily followed upon an initial attacking venture successfully repelled, when Spain inverted possession astutely and organized a future attacking thrust. Although not overly frequent, goals from second-phase attacks illustrate the team's ability to keep the pressure on in the attacking third and to marshal efficiently when dealing with loose balls or secondary interventions frequently following from set pieces or crosses.

In terms of goals given away grouped by attacking approach, counter-attacks were the leading group appearing 3 times, which represents 75% of all concessions. Conversely, positional attacks caused 1 goal to be given away, which represents 25%, while no goals were given away due to second-phase attacks.

2. Goal Initiation zones Before Scoring

The zone of attack refers to the area of the pitch where a team, upon regaining possession and transition from defense to offense, begins to organize an effective attacking movement. This section aims to examine the initiation zones corresponding to Spain's goals during the UEFA Euro 2024, in order to reveal their overall attacking organization and tactical structure (See Table 6).

Table 6: Goal Initiation Area Before Scoring

Goal Initiation Area Before Scoring	Attacking Third	Midfield Third	Defensive Third	Total
Number of Goals Scored	4	3	8	15
Goals Scored Percentage	26%	20%	53%	100%
Number of Goals Conceded	1	1	2	4
Goals Conceded Percentage	25%	25%	50%	100%

Table 6 shows that among the 15 goals scored by Spain in the tournament, 8 goals (53%) were initiated from the defensive third, 4 goals (26%) from the attacking third, and 3 goals (20%) from the middle third. This distribution suggests a pronounced tendency for Spain to launch attacks from deep areas. The frequent use of deep build-up reflects the team's strategic response to high pressing and compact defensive blocks, often opting for long balls, diagonal switches, or flank progression to bypass pressure and break defensive lines. This approach not only increased the efficiency of attacking transitions but also underscored the tactical discipline and technical quality of Spain's backline in initiating play. In a match against Germany, Spain's center-back initiated the attack from the defensive third with a direct pass to Morata, who had dropped back near the center circle. Drawing defenders toward him, Morata then released the ball to the right flank, quickly advancing the play behind the opponent's defensive line and showcasing the effectiveness of direct build-up from the back.



Figure 7: Attacking From Defensive Third

Initiating area of assault refers to that particular portion of play when, following gaining possession, a team shifts from a defense to an attacking strategy, initiating the construction of a shaped attacking maneuver. For this analysis, we aim to identify initiating areas engaged by Spanish goals in UEFA Euro 2024, to illustrate their overall attacking structure and tactical makeup. Within the tournament structure, Spain retained a total of 15 goals, 8 goals (53%) of which stemmed from the defensive third, 4 goals (26%) from the attacking third, and 3 goals (20%) from the middle third. This pattern reflects Spain's unique tendency to launch attacking transitions from deeper areas of the pitch. The overarching use of deep build-up tactics reflects the team's tactical response to high pressing and compact defense, more often using long passes, diagonal switches, or flank runs to avoid pressure and breach defensive frameworks. This approach not only improved the quality of attacking transitions but also emphasized the tactical unity and technical skill of Spain's defensive side in controlling the rhythm of the game. In a specific game against Germany, Spain's center defender triggered an offensive process from the defensive third using a direct pass to Morata, who had positioned himself close to the center circle. Through the involvement of defenders in front of him, Morata then released the ball to the right wing, taking the play quickly beyond the defensive line and showcasing the effectiveness of direct build-up approaches from deeper areas of the pitch (See Figure 8). While the middle third has long been viewed as the key area for possession-based football, less than 3 goals were created from this region during the tournament. Nevertheless, these attempts were often accompanied by quality combinations. In these instances, Spain utilized quick one-touch combinations to explore vertical space, often combining central penetration with wide support. With the spatial complexities and defensive solidity within the area of the midfield sector, effective attacking transitions from this region required a high level of tactical accuracy. Even though less common, these breakthroughs often presented major threats when launched.

The attacking third accounted for 4 goals, largely generated through high pressing or sustained pressure following set-piece situations. Attacks initiated from this zone placed greater emphasis on players' technical ability in tight spaces and clinical finishing, highlighting Spain's proficiency in capitalizing on advanced ball recoveries and second-ball situations. In the distribution of goals conceded by goal initiation area, the defensive third accounted for the highest number with 2 goals conceded (50% of total concessions). Both the attacking third and midfield recorded 1 goal conceded each, representing 25% respectively.

3. Passes Before Goals

In this study, the number of passes before a goal is defined as the number of passes completed by the attacking team without losing possession prior to the shot. Situations such as penalties, rebounds, and direct shots following interceptions are categorized as direct shots and are not included in the passing count. Among Spain's 15 goals during the UEFA Euro 2024, 9 goals (60%) were preceded by 1 to 5 passes, while only 5 goals (33%) involved more than 5 passes (See Table 7).

Table 7: Passes Completed Before Goals

Passes Before Goals	0 Passes	1-5 Passes	More than 5 Passes	Total
Goals Scored	1	9	5	15
Goals Scored Percentage	7%	60%	33%	100%
Goals Conceded	0	3	1	4
Goals Conceded Percentage	0%	75%	25%	100%

Table 7 shows that the highlights a key trend in high-level competitive football: the efficiency of attacking transitions is often linked to minimizing redundant passes and accelerating offensive tempo. Excessive passing not only reduces attacking efficiency but also increases the risk of turnovers, giving opponents opportunities to launch counterattacks. Particularly during transitions, lengthy passing sequences allow the defensive side time to regroup and organize, weakening the attacking team's ability to exploit imbalanced defensive structures. This is especially true in counter-attacking scenarios. Following a turnover or successful interception, the defending side requires time to recover its shape. If the attacking side can transition quickly, moving from ball recovery to penetration in one or two passes, it can maintain the tactical initiative and capitalize on the disorganization of the opponent. Thus, reducing lateral passes and unnecessary back passes has become an essential adjustment in Spain's approach to increasing offensive efficiency.

In the match against England, Spain scored through a concise and efficient passing sequence. The team required only three consecutive passes to dismantle the opposition's defensive structure: the central midfielder played a penetrating pass to an advancing teammate, who drew the Centre-back and quickly laid the ball wide. The winger then delivered a cross into the box, where a central runner applied the decisive finish. This goal exemplifies Spain's ability to create high-quality scoring opportunities within fewer than five passes, demonstrating remarkable attacking efficiency.

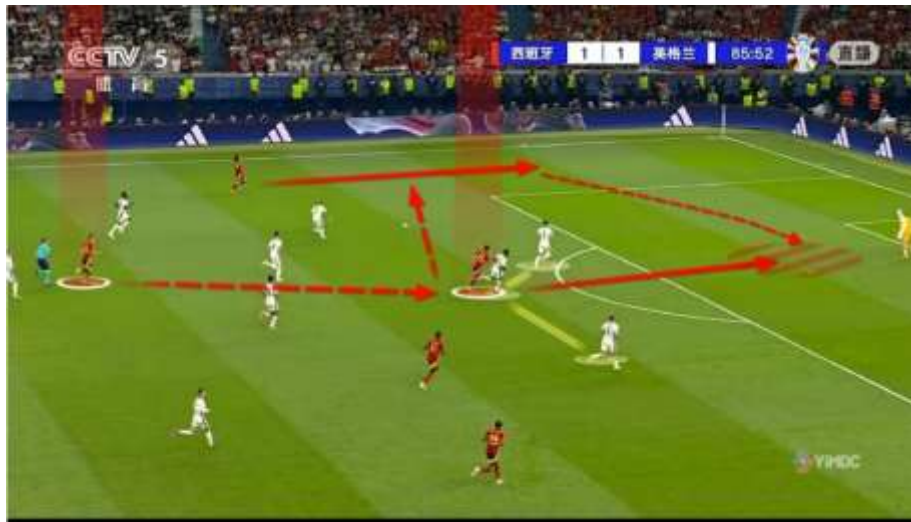


Figure 8: 1-5 Passes Before Goals

In terms of goals conceded by passes before goals, attacks involving 1-5 passes resulted in the highest number of concessions, with 3 goals conceded (75% of total concessions). Attacks involving more than 5 passes accounted for 1 conceded goal (25%), while no goals were conceded from situations with zero passes

Conclusion

1. Goal timing

Spain's goals in UEFA Euro 2024 showed a double-peak pattern, with most scored between the 16th - 30th and 46th - 60th minutes (54% in total). These periods reflected the team's best rhythm and physical condition. Additional goals in stoppage and extra time highlighted their resilience, while scoring in every interval indicated stable offensive output across the match

2. Goal location

In terms of spatial distribution, Zone 2 yielded the most goals due to its central positioning, wide shooting angle, and proximity to the goalkeeper, offering greater scoring opportunities. While Zone 1 produced only 3 goals, its exceptionally high conversion rate of 75% reflects Spain's acute awareness and decisiveness in capitalizing on close-range opportunities. In contrast, Zone 4 saw frequent shot attempts but resulted in only 2 goals, translating to a low 3% conversion rate. This can be attributed to the increased shooting distance and the extended reaction time afforded to the goalkeeper, making long-range shots less effective overall.

3. Goal method

Analysis of shooting methods reveals that Spain's scoring patterns primarily relied on controlled finishes and quick-touch opportunities. First-Time Shots demonstrated the highest conversion efficiency at 24%, indicating a tactical preference for rapid ball circulation and decisive one-touch finishes in the final third. This reflects the team's emphasis on attacking tempo and execution speed. In terms of shooting body parts, the distribution was relatively balanced: left-footed shots occurred most frequently and yielded slightly higher efficiency than right-footed ones. Although headers showed a decent conversion rate, the total number

of goals from headers was low, reflecting Spain's preference for ground-based penetration over aerial strategies

4. Pre-goal organizational patterns

In terms of attack organization, positional play accounted for the majority of Spain's goals (53%), supported by a notable share from counter-attacks (33%) and second-phase attacks (13%). Additionally, over half of the goals (53%) were initiated from the defensive third, indicating the team's preference for structured build-up play starting deep within their own half. Through vertical passing and wing progression, Spain effectively dismantled defensive lines and created scoring chances. Moreover, 60% of the goals were completed within five passes, reinforcing the tactical emphasis on fast, efficient, and minimalistic transitions between defense and attack. This strategic balance between patient build-up and rapid execution underlines Spain's adaptability and tactical coherence in the tournament.

Discussion

1. Analysis of goal timing

The double-peak distribution of Spain's goals between the 16th-30th and 46th-60th minutes indicates critical phases of enhanced physiological and tactical performance. From a sports physiology perspective, these periods correspond to optimal aerobic capacity and neuromuscular efficiency, which typically occur after the initial warm-up phase and immediately following halftime recovery. According to Michailidis et al. (2018), players reach peak oxygen uptake and improved decision-making accuracy after approximately 15 minutes of continuous play, enabling sharper attacking transitions. Similarly, post-halftime intervals allow partial glycogen replenishment and physiological reset, enhancing reaction speed and coordination (Oliveira et al., 2025). Spain's ability to exploit these physiological windows demonstrates a well-integrated conditioning and tactical structure that supports sustained offensive output throughout the match.

This pattern also reflects effective tactical management. During these phases, Spain frequently adjusted tempo and formation to maximize vertical penetration and exploit opponent fatigue. The synchronization between high physical readiness and tactical adaptability explains Spain's scoring efficiency and aligns with broader trends in elite football emphasizing rapid transitions and mid-phase dominance (Peng et al., 2025; UEFA, 2024).

2. Analysis of goal location

Spain's goals were predominantly concentrated in central scoring zones, especially Zone 2, which accounted for two-thirds of total goals. This spatial bias highlights the team's tactical focus on maintaining positional superiority within high-probability scoring areas. Physiologically, central penetrations minimize physical strain by shortening running distances and optimizing shooting angles, thereby conserving energy for repeated attacking efforts (Reilly, 2008; Kubayi, 2020).

The high conversion rate in Zone 1, though with fewer attempts, demonstrates the effectiveness of close-range positioning and rapid decision-making under pressure. This pattern aligns with Michailidis et al. (2018) and UEFA (2024), who observed that central-area finishes yield the highest expected goal values due to reduced goalkeeper reaction time and optimal shot trajectory. From a tactical performance standpoint, Spain's compact offensive shape emphasizing quick ball circulation and central overloads reflects an advanced application of "positional play" allowing players to exploit spatial gaps efficiently while maintaining physiological economy (Codina et al, 2025).

3. Analysis of goal method

Spain's dominance through first-time shots reflects the synergy between tactical tempo and physiological readiness. First-time finishes, requiring rapid visual-motor coordination and pre-activation of shooting muscles, depend heavily on fine neuromuscular control developed through high-intensity interval training. The 24% conversion efficiency of first-time shots suggests that Spain's players not only anticipated ball trajectories effectively but also executed within milliseconds indicative of superior cognitive-motor integration (Eusebio et al, (2025).

Left-footed and right-footed balance in scoring further indicates symmetrical muscular conditioning and bilateral skill training, reinforcing physical versatility. Compared with controlled finishes or dribble shots, which require longer preparation time and energy expenditure, first-time shooting optimizes both tempo and physiological efficiency. These findings correspond with Armatas et al. (2025) and Kyranoudis et al. (2024) who reported that high-speed technical executions following short passing sequences produce higher scoring success. Thus, Spain's goal-scoring methods illustrate an effective balance between tactical execution and physiological optimization.

4. Analysis of pre-goal organizational patterns

The predominance of positional attacks (53%) and the high proportion of goals initiated from the defensive third (53%) reflect Spain's tactical emphasis on structured buildup combined with rapid transition. Physiologically, this approach maintains moderate-intensity exertion for defenders and midfielders during ball circulation, allowing controlled heart rate and delayed fatigue accumulation. When opportunity arises, the team accelerates into high-intensity bursts a transition supported by anaerobic readiness and neuromuscular reactivity (Konefał et al., 2024).

Counter-attacks (33%) further demonstrate the team's ability to exploit opponents' temporary disorganization, requiring explosive sprinting and maximal power output over short distances. Such sequences correspond with studies by Gautier et al. (2024), indicating that positive momentum and coordinated collective runs are crucial for goal creation during transition phases. Kubayi and Toriola (2019) similarly reported that effective transition speed and sequence length strongly influence scoring probability in elite matches.

The predominance of short passing combinations (1-5 passes) before goals confirms Spain's strategy of rapid progression and low time-to-shot ratio, minimizing defensive recovery time. This efficiency reflects tactical intelligence and physical conditioning harmonized through high-intensity, small-sided training models an approach consistent with elite-level performance frameworks (Armatas et al., 2025; Peng et al., 2025).

Suggestion

Suggestions for Research

1. Spain scored most often between the 16th–30th and 46th–60th minutes, showing peak efficiency during these phases. Training should therefore simulate time-specific match scenarios, focusing on controlled build-up early and rapid offensive transitions after halftime.

2. Most goals came from Zone 2 and Zone 1, while Zone 4 showed low efficiency. Training should emphasize quick combinations and finishing in central areas, poaching in close range, and improving long-range shot quality and decision-making.

3. First-Time Shots were the most efficient, and left-footed attempts showed both higher frequency and accuracy. Training should highlight one-touch shooting, bilateral foot coordination, and heading in set-piece contexts to maximize finishing variety and precision.

Suggestions for Future Research

1. Opponent-adjusted spatial models: Build zone-based xG/xThreat controlling for opponent strength, match state, and defensive shape to test generalizability of Zone-2 dominance and Zone-1 efficiency across tournaments.
2. Causal mechanisms of timing and finishing: Use mixed-effects or quasi-experimental designs to identify effects of late substitutions/pressing and final-pass type/preparation time on conversion in central zones; extend to set-pieces vs. open play and men's vs. women's competitions.

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Behaviors, Attitudes, and Knowledge of Exclusive Breastfeeding for 6 Months. In Health Service Zone 10

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Abstract

The objectives of the quantitative research were to: 1) Study the level of behavior, attitude, and knowledge 2) Study the relationship between behavior, attitude, and knowledge of breastfeeding for 6 months of postpartum mothers in Health Service Zone 10, a sample of 514 people, randomized by strata between June 2023 and January 2024. Statistical significance is set at 0.05.

The results of the study showed that a total of 56.31% of postpartum mothers breastfed their babies for 6 months and 46.69 percent who were breastfeeding for less than 6 months. Postpartum mothers have an overall breastfeeding behavior level of more than 70.00 percent. ginger tea It has the highest frequency of the practice level. 95.91 percent. There was a high level of attitude about breastfeeding for 6 months, and the overall level was very high ($\bar{X} = 4.47$, S.D. = 0.46). 50.39 percent is very high. 47.08 percent, respectively. The overall score was the highest ($\bar{X} = 21.92$, S.D. = 1.74). 94.16 percent, medium knowledge level, 5.84 percent, respectively

The relationship between behavior attitudes and knowledge were found to be about breastfeeding It was found that behavior, attitudes, and knowledge were statistically significant correlated with breastfeeding at the level of 0.05. Proper attitude and knowledge for mothers after giving birth so that breastfeeding alone can be completed for the next 6 months.

Keywords: Behavior, Attitudes, Knowledge, Breastfeeding Exclusive

Introduction

By 2025, the World Health Organization and the United Nations Children's Fund (UNICEF) The goal is to increase the rate of exclusive breastfeeding in the first six months to at least 50%. It was found that only 44% (World Health Organization, 2023) even though breast milk contains more than 200 nutrients, including white blood cells, hormones, and immunomodulators. It can help reduce the illness of infants (Siraporn Sawasdiwan, 2010). Breast milk also strengthens bonds. Whereas not receiving breast milk increases the risk of infection and diarrhea several times (Chananchida Somsuk, 2013). It also creates a burden of millions of dollars per year for mixed milk and disease treatment (UNICEF, 2016) for Thailand. Statistics in 2012 showed that the rate of breastfeeding alone in 0-1 month, 3 months, and 6 months was only 30%, 15% and 12.3%, respectively. MICS Data 2015-2016 It increased to 23.17%, but it was still below the target. MICS6 data in 2019 indicates that it

is only 14% below the global average and is considered the lowest in Southeast Asia (National Statistics Office, 2020).

The main problem is due to a lack of knowledge, skills, and preparation before returning to work. Mothers who work outside the home often do not breastfeed their babies for 6 months due to a lack of environment and support in the workplace. Kanchanasit and Pannatat In addition, social changes to single families and migration have led to a decrease in assistance (National Statistics Office, 2021).

Health Service Zone 10 (Sisaket, Ubon Ratchathani, Yasothon, Amnatcharoen and Mukdahan) The rate of breastfeeding alone for 6 months fluctuated between 2013 and 2022, with many provinces still clearly lower than the WHO target (National Health Security, Region 10, 2022). Next 6 months.

Objectives

The specific research objectives that guided this study were as follows:

1. To study the level of behavior, attitude, knowledge and breastfeeding for 6 months.
2. To study the relationship between behavior, attitude, and knowledge and breastfeeding for 6 months.

Literature Review

Breastfeeding behaviors are high initial success, followed by a sharp decline over time. For example, the EBF rate may decrease from 95.3 percent in a 1-month-old infant to only 45.5 percent at 6 months of age. (Sisay Awoke and Belete Mulatu, 2021) The difference between a high onset rate and a sharp decline in the baby's 3-6 months He emphasized that the real challenge of promoting EBF is to maintain continuity, not just initiation. The fact that working mothers in Bangkok had a 6-month EBF rate of 38.1 percent, while the 3-month EBF practice rate reached 78.6 percent, further underscores the problem of maintaining continuity over the 3-6 months. (Nesrain Mubarak Alhamedi et al., 2025)

Although the majority of mothers (93.6 percent) had been informed about EBF, only a minority (34.7 percent) had accurate knowledge of the recommended duration of 6 months. (Nesrain Mubarak Alhamedi et al., 2025) Inequality has a direct impact on the success of EBF due to a lack of understanding of the rigor of the definition of EBF (that is, it is forbidden to give even plain water). This causes a number of mothers to make mistakes early on. It has been reported that some mothers give their babies water or other food from the first month of life (more than 38 percent in one study). The fact that healthcare professionals are the primary source of information (62.7 percent) but knowledge of the rigors of the definition remains low suggests that the communication of transferred knowledge may focus on raising awareness rather than emphasizing the technical validity required for a complete EBF practice. This lack of operational clarity is a major factor in the mispractice of infant health. (Peter Nwenfu Kakute et al., 2005)

The attitude of most mothers towards EBF is positive, with 89.5 percent expressing a desire to breastfeed only their babies. However, a positive attitude is often not strong enough to resist negative pressure or conflicting beliefs. In addition, cultural barriers, such as the belief that breast milk does not gain weight, or pressure from elders to feed traditional supplements, undermine efforts to treat EBF. (Niguse Tadele et al., 2016) Breastfeeding Self-Efficacy (BFSE) is a critical psychosocial variable that acts as a bridge between knowledge and attitude and behavior. (Wu, S.-F.V. et al., 2021) If the mother has a positive

attitude but is faced with common problems such as pain or concerns about perceived insufficient milk supply (PIMS), the feeling of low BFSE will weaken the positive attitude and lead to early termination of EBF. Effective interventions must therefore focus on building BFSE through counseling that helps mothers build "performance mastery". Overcoming challenges to strengthen a sense of self-efficacy leads to a commitment to sustainable EBF practices. (Roseline Galipeau. et al., 2018)

Research Conceptual Framework

This study conducts a review of concepts, theories, and related research and develops into a research conceptual framework, divided into primary variables consisting of behavior, attitude and knowledge. Breastfeeding for 6 months and breastfeeding for less than 6 months as shown in Figure 1

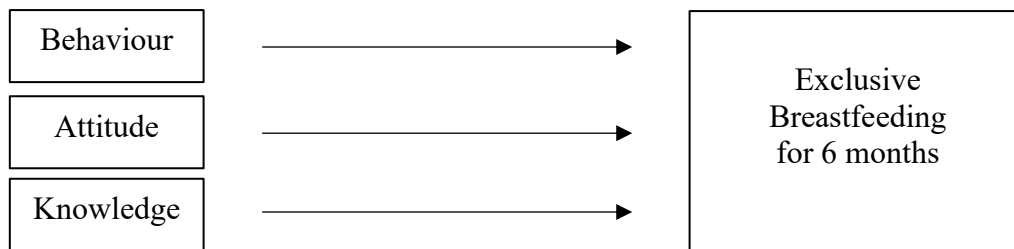


Figure 1: Research Conceptual Framework

Research Methodology

Research Format This study is a quantitative research and data was collected in January 2024.

Population After giving birth in Health Service Zone 10, namely Sisaket, Ubon Ratchathani, Yasothon, Amnatcharoen, and Mukdahan, 25,279 people (Department of Health, 2022)

Inclusion Criteria:

1. Postpartum mothers with children aged 7-12 months in the area of Health Service Region 10

2. Willing to participate in the research

Exclusion Criteria:

1. postpartum mothers whose children are sick and unable to breastfeed.

2. Postpartum mothers with severe complications from childbirth, such as postpartum hemorrhage, etc.

The sample used in this study was postpartum mothers in Health Service Zone 10, calculated the sample size using the Taro Yamane formula (Boonchom Srisat, 2013). In order to prevent mortality during the study, the researchers determined an additional 30 percent of the sample size for 119 people, for a total of 514 people.

Research Tools

The tool used in this research is a questionnaire developed by the researcher from the review of the documents. Theories and related research are divided into 3 parts as follows:

1. Part 1 is a questionnaire about the characteristics of respondents, consisting of: Question General Information Factors of Respondents The questions are close-ended questions and open-ended questions in a check-list format.

2. Part 2 is a questionnaire on breastfeeding behavior. There are 14 questions, requiring respondents to choose to answer 2 options: Yes and No. as follows Answer Yes has a score of 1 point. Answer No, there is a score equal to 0 points.

3. Part 3 is a questionnaire about breastfeeding attitudes and knowledge only. It is divided into 2 areas: attitude and knowledge. The question is as follows:

3.1) Attitudes about breastfeeding only 16 questions were positive and negative. It is characterized by a rating scale that requires respondents to choose 5 options: strongly agree, moderately agree, and disagree. Strongly disagree, there are scoring criteria. as follows.

Comment level, positive messages, negative messages Strongly agree 5 Rating 1 score Agree 4 Rating 2 score Medium 3 Rating 3 score Disagree 2 Rating 4 score Strong Disagreement 1 Rating 5 score

The evaluation criteria divided the attitude level towards breastfeeding exclusively for 6 months, divided into 5 levels. An average score of 4.51-5.00 means that there is an attitude about breastfeeding exclusively for 6 months. An average score of 3.51-4.50 means that there is an attitude about breastfeeding exclusively for 6 months. An average score of 2.51-3.50 means that there is an attitude about breastfeeding exclusively for 6 months. An average score of 1.51-2.50 means that there is an attitude about breastfeeding exclusively for 6 months. An average score of 1.00-1.50 means that there is an attitude about breastfeeding exclusively for 6 months

3.2) In terms of knowledge of breastfeeding alone for 6 months, a total of 23 questions, the respondents are required to answer 2 options: yes and no. as follows Answer correctly, have a score equal to 1 point. Wrong answer has a score of 0 points. The researcher divided the level of knowledge into 3 levels based on the arithmetic criteria of the score. The level of knowledge is determined into 3 levels, based on knowledge which is based on the interpretation criteria. Using numbers to indicate the level of quality. (Prakong Kornsut, 1999) Score in the range of more than 19.00-23.00 points. Average knowledge, score in the range of 14.00-18.00 points. Low level of knowledge, score in the range of less than 0-13.00 points.

Instrument Quality Inspection

Instrument Quality Inspection 1. Content Validity by 5 experts to consider the Index of item objective congruence (IOC) of the question and the research objective from 0.75 or higher. It shows that the question is consistent with the issue to be evaluated and can be used (Waltz, Strickland, and Lenz, 2010). 2. Reliability Test: Try out the revised questionnaire with 30 non-sample postpartum mothers and analyze the Alpha-Coefficient according to Cronbach's Alpha Coefficient method (Teerawut Ekakul, 2009). It was found that the Kronbach's alpha coefficient of the attitude questionnaire was 0.806 and the knowledge was 0.772

Data Collection

After approval by the Human Research Ethics Committee. Ubon Ratchathani University We took the following steps:

1. Request a letter from Ubon Ratchathani University to the Director of Public-Private Hospitals Public-private organizations to obtain permission to conduct research and collect data.
2. Quantitative data collection The researcher collected the data by himself. 514 people
3. Check the completeness, accuracy, clarity and completeness of the data in order to analyze the questionnaire further

Data Analytics

After collecting all the information, Bring a questionnaire to check the integrity of the data. The scoring and coding of the data were prepared for computation using a ready-made computer program, including the distribution of frequencies, percentage, mean, and standard deviation, and chi-square, with a statistical significance level of 0.05

Research Ethics

This research has been accredited by the Human Research Ethics Committee. Ubon Ratchathani University for Human Research Ethics Certification No. UBU-REC-98/2566 dated October 19, 2023.

Research Finding

Part 1 Personal information

Most of the postpartum mothers were between the ages of 20-34 years old, 77.04 percent had marital status, and 83.46 percent had the highest level of education in high school, diploma/diploma/or equivalent. 46.30 percent have general contract occupations, 22.76 percent have an income of less than 15,000 baht per month. 56.61 percent had extended family characteristics (parents/children/grandparents/ Grandparents / relatives) 72.76 percent and the right to medical treatment with a gold card 59.14 percent.

Part 2 Breastfeeding Behavior

Breastfeeding behavior of postpartum mothers It was found that 53.31% of mothers after giving birth had breastfeeding behavior for 6 months and breastfeeding behavior for less than 6 months 46.69% as shown in Table 1

Table 1: Percentage of Breastfeeding Behavior (N=514)

Breastfeeding Behavior	Amount	Percent
Breastfeeding for 6 months	274	53.31
Breastfeeding for less than 6 months	240	46.69
Overall	514	100.00

The breastfeeding behavior of the postpartum mothers is classified according to the presence and absence of breastfeeding behavior. It was found that most postpartum mothers have breastfeeding behavior. In the list, mothers often eat milk-nourishing foods such as tubers. ginger tea It has the highest frequency of the practice level. 95.91 percent, followed by mothers who regularly breastfeed their babies every 3 hours (92.22 percent) and mothers who breastfeed their babies from the breast from 30 minutes after birth (90.86 percent). The mother was on fire according to the advice of relatives. The mother regularly squeezes milk into a refrigerated bottle for her child. The percentage of practice was the lowest compared to the whole category, which was 70.23% and 70.62%, and when looking at the overall picture, it was found that the level of practice related to breastfeeding behavior of mothers after childbirth exceeded 70.00%, respectively, as shown in Table 2

Table 2: Number and percentage of postpartum mother's breastfeeding behavior and non-behavior (n=514)

List	Behaviour	
	Yes (percentage)	None (percentage)
1. Mothers often eat milk-nourishing foods such as tubers. ginger tea	95.91	4.09
2. Mothers regularly feed their babies every 3 hours.	92.22	7.78
3. Mothers let their babies suckle from the breast from 30 minutes after birth.	90.86	9.14
4. Mothers reduce work to have time to breastfeed their babies.	88.52	11.48
5. My mother used to take herbal medicine to stimulate milk.	79.57	20.43
6. My mother received 5 massages and herbal compresses from Thai traditional medicine.	73.54	26.46
7. My mother has been treated with herbs 5 times by Thai traditional medicine.	72.37	27.63
8. My mother was crushed by the doctor 5 times. Thai Plan	71.98	28.02
9. My mother used to consult herbal medicines from local doctors when the milk river did not flow.	71.60	28.40
10. The mother regularly squeezes milk into a refrigerated bottle for her child.	70.62	29.38
11. The mother was on fire according to the advice of relatives.	70.23	29.77

Part 3 Breastfeeding attitudes

Postpartum mothers' attitudes about breastfeeding were found to have a high level of attitude towards breastfeeding for 6 months, with the overall level ($\bar{X} = 4.47$, S.D.= 0.46). 259 people, 50.39 percent, very high. 242 people, 47.08% as shown in Table 3

Table 3: Number And Percentage of Samples Classified by Level of Attitude Towards Exclusive Breastfeeding of The Postpartum Mother Sample (N=514)

Attitude Level	Score Range	Amount	Percent
most	4.51 – 5.00	259	50.39
very	3.51 – 4.50	242	47.08
moderate	2.51 – 3.50	13	2.53
little	1.51 – 2.50	0	0.00
least	1.00 – 1.50	0	0.00
Overall		517	100.00
$\bar{X} = 4.47$ S.D. = 0.46			

Results of the analysis of attitude data on breastfeeding of postpartum mothers. When considering attitudes about breastfeeding exclusively for six months, it was found that postpartum mothers had an attitude about breast milk that was probably the best food for newborns up to six months. Breast milk is more valuable than anything else for the baby ($\bar{X} = 4.76$, S.D. = 0.49) and breastfeeding increases the love and bond with the baby ($\bar{X} = 4.75$, S.D. = 0.52). The item with the lowest average value is that mixed breastfeeding is not as convenient as breastfeeding but increases the cost of buying mixed milk ($\bar{X} = 3.86$, S.D. = 1.39) as shown in Table 4.

Table 4: Mean and Standard Deviation Attitudes About Breastfeeding Exclusively

Attitude	$\bar{x}$	S.D.	Results
1. Breast milk is probably the best food for newborns up to six months.	4.80	0.44	most
2. Breast milk is more valuable than anything else for the baby.	4.76	0.49	most
3. Feeding your baby from the breast increases the love and attachment to the baby.	4.75	0.52	most
4. If there is not enough milk, the mother should find every way to get enough milk.	4.72	0.59	most
5. Breastfeeding saves money.	4.72	0.56	most
6. Even if you are tired from work, it is important to let your baby suckle from the breast.	4.65	0.59	most
7. Completing 6 months of breastfeeding leave is an important period of life.	4.64	0.68	most
8. It is very important to express or pump chilled milk to deliver to the baby during the mother's work in a remote area.	4.58	0.71	most
9. Pumping milk in the refrigerator and heating it for your baby to eat is very valuable.	4.42	0.93	very
10. It is necessary to work to earn money to buy mixed milk for your child.	4.42	0.91	very
11. The use of mixed milk to feed the baby is necessary when the mother has to work outside the home.	4.37	0.89	very
12. Mixed milk should be given when breast milk is insufficient.	4.34	0.95	very
13. Mixed breastfeeding is used when breast milk is not enough.	4.34	0.95	very
14. Working to earn money to buy mixed milk to feed your baby only increases the cost and also has lower nutrients than breast milk and is not more necessary than breastfeeding.	4.19	1.17	very
15. Breastfeeding, although it makes the breast shrink, will give the baby good immunity. Have a healthy body.	3.96	1.20	very
16. Mixed breastfeeding is not as convenient as breastfeeding, but it increases the cost of buying formula.	3.86	1.39	very
Overall	4.47	0.46	very

Part 4 Knowledge about breastfeeding

Knowledge of breastfeeding of postpartum mothers was found to have a knowledge level score on breastfeeding alone for 6 months ($\bar{X}$ = 21.92, S.D. = 1.74). 484 people, 94.16 percent, moderate knowledge, 30 people, 5.84 percent, respectively, as shown in Table 5

Table 5: Number and Percentage of 6 Months of Exclusive Breastfeeding Knowledge (N=514)

Level	Score Range	Amount	Percent
high	19.00-23.00	484	94.16
moderate	14.00-18.00	30	5.84
low	0-13.00	0	0.00
Overall		514	100.00
$\bar{X}$ = 21.92 S.D. = 1.74			

Part 5 The relationship between behavior and breastfeeding

Breastfeeding behavior the correlation with breastfeeding was statistically significant at the level of 0.05 (χ^2 = 31.85 and p-value = 0.00), showing that mothers with appropriate breastfeeding behaviors were more likely to breastfeed for a longer period of time than those without improper breastfeeding behaviors. In the group with breastfeeding habits. It was found that mothers who breastfed their babies for 6 months had a high rate of 58.13%, while the group without breastfeeding behavior for 6 months had only 41.72%. 6 months, up to 58.28% as shown in Table 6

Table 6: Number and Percentage of Behavioral Levels Related to Breastfeeding for 6 Months

Behaviour	Breastfeeding				Overall	
	6 months		Less Than 6 months			
	amount	percent	amount	percent	amount	percent
yes	211	58.13	152	41.87	363	100.00
none	63	41.72	88	58.28	151	100.00
total	274	53.31	240	46.69	514	100.00
x ²	31.85*					
p	0.00					

*p-value < .05

Part 6 The Relationship Between Attitude and Breastfeeding

Attitudes toward breastfeeding are statistically significantly correlated with breastfeeding at the level of breastfeeding. 0.05 ($\chi^2 = 18.78$ and p-value = 0.01) indicates that mothers with moderate breastfeeding attitudes have the highest breastfeeding rate of 77.03% for 6 months. The highest breastfeeding rate for 6 months reached 61.15%, which corresponds to mothers with the highest attitude towards breastfeeding at 44.79%, respectively, as shown in Table 7

Table 7: Number and Percentage of Attitudes About Breastfeeding at 6 Months

Attitude	Breastfeeding				Overall	
	6 months		Less Than 6 months			
	amount	percent	amount	percent	amount	percent
moderate	10	77.03	3	22.97	13	100.00
very	148	61.15	94	38.85	242	100.00
most	116	44.79	143	55.21	259	100.00
total	274	53.31	240	46.69	514	100.00
x ²	18.78*					
p	0.01					

*p-value < .05

Part 7 The Relationship between Knowledge and Breastfeeding

Knowledge was correlated with breastfeeding at a significance level of 0.05 ($\chi^2 = 2.780$ and p-value = 0.43), indicating that the level of knowledge of the mother directly influenced breastfeeding decisions. The group of mothers with high knowledge is more likely to breastfeed their babies. 6 months (54.13%) Meanwhile, mothers with moderate knowledge breastfed their babies for less than 6 months at a higher proportion (60.00%) as shown in Table 8.

Table 8: Relationship Between Knowledge and Breastfeeding

Knowledge	Breastfeeding				Overall	
	6 months		Less Than 6 months			
	amount	percent	amount	percent	amount	percent
moderate	12	40.00	18	60.00	30	100.00
high	262	54.13	222	45.87	484	100.00
total	274	53.31	240	46.69	514	100.00
x ²	2.780					
p	0.43					

*p-value < .05

Discussion/Conclusion

Behavior is directly related to breastfeeding and is an important predictor of complete breastfeeding. According to the recommendations of the World Health Organization (WHO), an important behavior is to allow the baby to breastfeed within the first hour after birth to stimulate effective milk production and secretion. (Kusumali Bothipassa et al., 2022), which increases the chances of continuous breastfeeding. Breastfeeding babies frequently for 2-3 hours (Health Center 9, 2020) instead of other supplementary feeding is a practical behavior that affects the maintenance of milk levels. Inadequate behaviors to deal with breastfeeding problems, such as breast compresses, drinking ginger tea, eating nourishing milk from the supply of family members, etc. (Acharya Srisuvaphan, 2012), as well as expressing or pumping milk for proper storage. (Sunanda Sitvej et al., 2023) are all the main behaviors that help mothers maintain exclusive breastfeeding until 6 months.

Maternal attitudes are psychosocial factors that correlate with the intention and outcome of completing exclusive breastfeeding. 6 months (Acharobol and Pinkaew, 2023) Mothers with a positive attitude towards breastfeeding. It is confident that breast milk is highly nutritious and optimal for babies. There is a tendency to have the intention to complete breastfeeding alone. Therefore, encouraging mothers to have a positive attitude towards breastfeeding is an important strategy to increase the success rate of breastfeeding alone. 6 months.

A mother's knowledge of breastfeeding is classified as a modifiable factor that correlates with the success of complete breastfeeding. 6 months, mothers who have the correct knowledge and understanding of the benefits of breast milk (Kusumali Bothipassa et al., 2022), such as the most complete nutrition or strengthening immunity, etc., the correct practice, such as breastfeeding the baby as soon as possible within 1 hour after birth, or pumping as often as the baby wants, etc. This correct knowledge influences the mother's decision to choose breastfeeding exclusively and also strengthens the mother's confidence and self-efficacy in breastfeeding (Mayura Story Seri and Warathip Kaenkarn, 2019), which leads to correct and sustainable behaviors. 6 months because knowledge is the cornerstone to change attitudes and behaviors in accordance with the right practices.

Suggestion

1. Utilization of research findings: Promoting knowledge, attitudes, and behaviors in accordance with the cultural context of the mother after childbirth.
2. Suggestions for the next research: The structure of the problem and solutions should be studied with the single mother group. Teenage mothers or low-income mothers

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Public Satisfaction and Policy Implications of The National Fitness System Under The Healthy China Strategy

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Abstract

This study aimed to 1) examine the level of public perceptions of the national fitness system based on satisfaction-related indicators in China, and 2) To examine demographic differences in public perceptions of the national fitness system based on satisfaction-related indicators. The study emphasizes satisfaction dimensions and their implications for governance and public service delivery under the Healthy China strategy. A quantitative survey design was adopted, and data were collected through a structured questionnaire administered to 1,034 respondents in Zhejiang Province using a random sampling approach. Descriptive statistics, independent-samples t-tests, and one-way analysis of variance (ANOVA) were employed to analyze the data using SPSS version 27.0.

The results indicate that overall public satisfaction with the national fitness system is at a moderate to relatively high level. However, statistically significant differences in satisfaction were observed across age groups, educational backgrounds, and residential environments, while no significant differences were found by gender. In particular, younger respondents and individuals with higher educational attainment reported greater satisfaction, whereas middle-aged groups and urban residents expressed comparatively lower levels of satisfaction. These findings provide empirical evidence for improving the effectiveness of national fitness policies, optimizing public service provision, strengthening governance coordination, and promoting more equitable access to national fitness resources in support of the Healthy China strategy.

Keywords: National Fitness System, Public Satisfaction, Healthy China, Sports Governance, China

Introduction

National fitness has become a central pillar of public health governance in China under the implementation of the Healthy China strategy. As China transitions from a development model focused primarily on economic growth to one that emphasizes comprehensive human development and quality of life, physical fitness has been elevated from an individual lifestyle choice to a national strategic priority. Policy frameworks such as the Healthy China 2030 Planning Outline and the National Fitness Plan (2021-2025) explicitly identify national fitness as a foundational mechanism for improving population health, preventing chronic diseases, and promoting social well-being (State Council of the People's

Republic of China, 2016; General Administration of Sport of China, 2021). Within this policy context, national fitness is no longer regarded solely as a sports issue but as an integral component of public governance, social equity, and sustainable development.

Over the past two decades, substantial progress has been made in the construction of China's national fitness system. Government-led investments have significantly expanded sports infrastructure, community fitness facilities, and public exercise programs, while institutional reforms have promoted the integration of national fitness with healthcare, education, and community governance (Dong, 2005; Pei, 2003). Existing research has contributed valuable insights into system design, policy frameworks, and service supply, often adopting a top-down perspective to analyze governance structures, administrative mechanisms, and policy effectiveness (Wang & Li, 2011; Chen et al., 2025). These studies have laid a solid foundation for understanding how the national fitness system operates at macro and meso levels.

However, as public service systems mature, policy success can no longer be evaluated solely on the basis of institutional completeness or service availability. Public satisfaction has increasingly been recognized as a critical indicator of policy effectiveness and governance quality in public administration and public health research. Satisfaction reflects citizens' subjective evaluations of whether public services meet their needs, expectations, and values, thereby serving as a bridge between policy supply and social demand (Bouckaert & Van de Walle, 2003). In the context of national fitness, public satisfaction captures not only the adequacy of facilities and programs but also perceptions of accessibility, fairness, convenience, and cultural relevance.

From a governance perspective, public satisfaction plays a dual role. First, it functions as an outcome indicator, signaling the extent to which national fitness policies achieve their intended social objectives. Second, it serves as a feedback mechanism, enabling policymakers to identify gaps between policy intentions and public experiences, thus supporting evidence-based policy adjustment and service optimization (Van de Walle & Bouckaert, 2007). In China's governance system, which emphasizes people-centered development and social harmony, understanding public satisfaction is particularly important for enhancing policy legitimacy and strengthening public trust in government institutions (Xi, 2021).

Despite its importance, empirical research on public satisfaction with the national fitness system remains relatively limited. Many existing studies focus on participation rates, behavioral motivations, or awareness levels of fitness policies, while fewer studies systematically examine satisfaction as a multidimensional construct linked to governance performance and service delivery (Shi, Mo, & Sun, 2012). Moreover, satisfaction is not uniformly distributed across social groups. Prior research in public service evaluation suggests that demographic factors such as age, education, income, and residential environment can significantly influence individuals' perceptions of public services (Ma & Wu, 2016; Lin, 2018). In the context of national fitness, disparities in urban-rural development, educational resources, and lifestyle constraints may lead to differentiated satisfaction outcomes that warrant closer examination.

The Healthy China strategy explicitly calls for equitable access to fitness resources and the coordinated development of urban and rural public services. However, empirical evidence suggests that disparities persist in terms of facility accessibility, program diversity, and service quality across regions and population groups (Chen et al., 2025). Evaluating public satisfaction across demographic groups therefore provides a practical lens through which the inclusiveness and effectiveness of the national fitness system can be assessed. Such analysis not only reveals which groups benefit most from existing policies but also

highlights populations that may be underserved or overlooked in current governance arrangements.

Furthermore, national fitness is increasingly linked to broader governance objectives, including social integration, community cohesion, and cultural development. Fitness activities function as social spaces where individuals interact, form social networks, and develop shared norms and values. As Fan (2009) argues, the cultural dimension of national fitness-encompassing values, attitudes, and social participation-is essential for sustaining long-term engagement and policy effectiveness. Public satisfaction, in this sense, reflects not only material service provision but also the symbolic and cultural alignment between fitness policies and citizens' lived experiences.

Against this background, this study focuses on public satisfaction with the national fitness system under the Healthy China strategy. By adopting a quantitative survey approach and analyzing satisfaction differences across demographic groups, the study seeks to contribute to a more people-centered evaluation of national fitness governance. The findings aim to provide empirical evidence to support policy refinement, enhance governance coordination, and promote more equitable and responsive public fitness services. In doing so, this research complements existing system- and awareness-oriented studies and advances understanding of how national fitness policies are experienced and evaluated by the public in contemporary China.

Objectives

1. To examine the level of public perceptions of the national fitness system based on satisfaction-related indicators in China.
2. To examine demographic differences in public perceptions of the national fitness system based on satisfaction-related indicators.

Literature Review

1. Research on the National Fitness System Framework

Previous studies on national fitness in China have primarily focused on the construction and optimization of system frameworks. Scholars have proposed various structural models emphasizing governance, service provision, institutional support, and cultural development within the national fitness system (Pei, 2003; Dong, 2005). These studies highlight the importance of coordinated policy design and systematic operation in achieving national fitness goals. More recent research has further examined the integration of national fitness with public health, education, and community governance under the Healthy China strategy (General Administration of Sport of China, 2021). While these contributions provide a solid theoretical foundation, most remain concentrated on system design rather than public evaluation outcomes.

2. Public Awareness and Participation in National Fitness

Another major research stream examines public awareness, participation, and behavioral motivation related to national fitness. Studies suggest that awareness of fitness policies, health knowledge, and access to information significantly influence individuals' participation in physical activity (Shi, Mo, & Sun, 2012). Empirical research has shown that demographic factors such as age, education, and residential environment shape levels of awareness and participation in national fitness programs (Ma & Wu, 2016). Although these

studies contribute to understanding behavioral mechanisms, awareness and participation alone cannot fully capture public evaluations of policy effectiveness.

3. Public Satisfaction as an Indicator of Policy Effectiveness

In public administration and public service research, satisfaction is widely regarded as a key indicator of policy effectiveness and governance performance. Satisfaction reflects citizens' subjective assessments of whether public services meet their needs, expectations, and perceived rights (Bouckaert & Van de Walle, 2003). Studies have demonstrated that satisfaction is influenced by service quality, accessibility, transparency, and perceived fairness in service delivery (Van de Walle & Bouckaert, 2007). Applying this perspective to national fitness allows researchers to move beyond objective indicators and examine how policies are experienced by the public in everyday life.

4. Demographic Differences in Public Satisfaction with Public Services

A substantial body of literature indicates that public satisfaction with public services varies significantly across demographic groups. Factors such as age, education level, income, and urban-rural residence affect individuals' expectations, service usage patterns, and evaluations of service quality (Lin, 2018). In the field of sports and health services, younger and more educated populations often report higher satisfaction due to greater access to information and resources, while middle-aged and urban populations may experience time constraints and higher expectations (Chen et al., 2025). These findings suggest the necessity of differentiated policy strategies in national fitness governance.

5. National Fitness, Governance, and the Healthy China Strategy

Under the Healthy China strategy, national fitness is increasingly viewed as an essential component of modern governance and social development. Policy documents emphasize people-centered development, equitable access, and the coordination of public services across regions and social groups (State Council of the People's Republic of China, 2016). Scholars argue that evaluating public satisfaction with national fitness services provides critical feedback for improving governance capacity, enhancing policy legitimacy, and promoting sustainable health outcomes (Xi, 2021; Fan, 2009). However, empirical studies explicitly linking public satisfaction with national fitness governance remain limited, highlighting the need for further research in this area.

Research Methodology

Research Design

This study adopted a quantitative cross-sectional survey research design to examine the level of public satisfaction with the national fitness system and to analyze differences in satisfaction across demographic groups. The research design was appropriate for capturing participants' perceptions and evaluations at a single point in time and for identifying patterns of variation among different population groups. A structured questionnaire was used as the primary data collection instrument, allowing for systematic measurement and statistical comparison of public satisfaction levels. The cross-sectional approach enabled the study to efficiently assess current conditions of the national fitness system and provided empirical evidence to support policy evaluation and governance improvement under the Healthy China strategy.

Population and Sample Size

The target population of this study comprised residents of Zhejiang Province, China. To improve representativeness across key demographic characteristics, a stratified random sampling procedure was employed. The province was categorized based on residential

background (urban, rural, and urban–rural fringe areas), and respondents were proportionally selected from community fitness centers, public sports venues, and residential communities within these strata. Within each selected site, participants were randomly invited to complete the questionnaire.

A total of 1,086 questionnaires were distributed. After screening for completeness and response consistency, 1,034 valid questionnaires were retained for analysis, yielding a response rate of 95.2%. The final sample size was considered sufficient to ensure adequate statistical power for independent-samples t-tests and one-way ANOVA.

Research Tools

The research instrument used in this study was a structured questionnaire designed to measure public satisfaction with the national fitness system. The questionnaire consisted of two main sections. The first section collected demographic information, including age, gender, education level, and residential background. The second section assessed public satisfaction across multiple dimensions of the national fitness system using a five-point Likert scale, ranging from 1 (strongly dissatisfied) to 5 (strongly satisfied). The questionnaire items were developed based on relevant literature and national fitness policy documents and were reviewed by experts to ensure content validity.

Data Collection

Data were collected using a questionnaire survey administered through both online and offline methods. The questionnaires were distributed to the general public in Zhejiang Province, China, using a random sampling approach. Prior to data collection, participants were informed of the purpose of the study and assured of the confidentiality and anonymity of their responses. A total of 1,086 questionnaires were distributed, and after screening for completeness and validity, 1,034 valid responses were retained for data analysis.

Data Analysis

The collected data were analyzed using SPSS version 27.0. Descriptive statistics were employed to summarize demographic characteristics and overall levels of public satisfaction with the national fitness system. Independent-samples t-tests and one-way analysis of variance (ANOVA) were conducted to examine differences in public satisfaction across demographic groups. Statistical significance was set at the 0.05 level.

Conceptual Framework

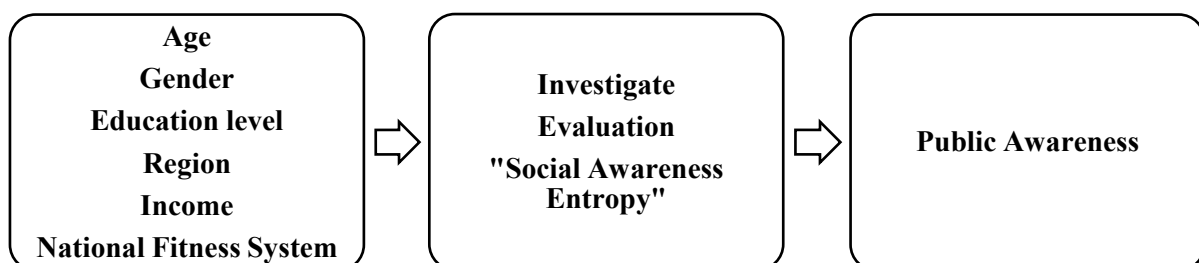


Figure 1: Conceptual Framework

The conceptual framework presented in Figure 1 is grounded in public service satisfaction theory and governance evaluation perspectives, which emphasize citizens' perceptions as a crucial indicator of policy effectiveness and governance quality (Bouckaert & Van de Walle, 2003; Van de Walle & Bouckaert, 2007). In this study, demographic characteristics including age, education level, and residential background are conceptualized as antecedent variables that shape individuals' expectations, access conditions, and usage experiences of national fitness services. These demographic factors influence citizens' perceptions of key dimensions of the national fitness system, such as management effectiveness, service supply adequacy, institutional guarantees, and cultural environment. Public satisfaction, operationalized through the concept of "social awareness entropy," is treated as the outcome variable reflecting the overall evaluative judgment of citizens toward the national fitness system. The framework therefore assumes that variations in demographic characteristics contribute to differentiated perceptions and satisfaction levels, thereby providing a structured basis for examining equity, governance performance, and policy responsiveness under the Healthy China strategy.

Research Finding

1. To examine the level of public perceptions of the national fitness system based on satisfaction-related indicators in China.

To examine the basic situation of the "awareness entropy" of the national population towards the national fitness system, we conducted descriptive statistics on the scores of "awareness satisfaction entropy (dis)", "awareness dissatisfaction entropy (des)", and "total awareness entropy (ds)" of the 1034 respondents participating in this survey. The results are shown in Figure 2.

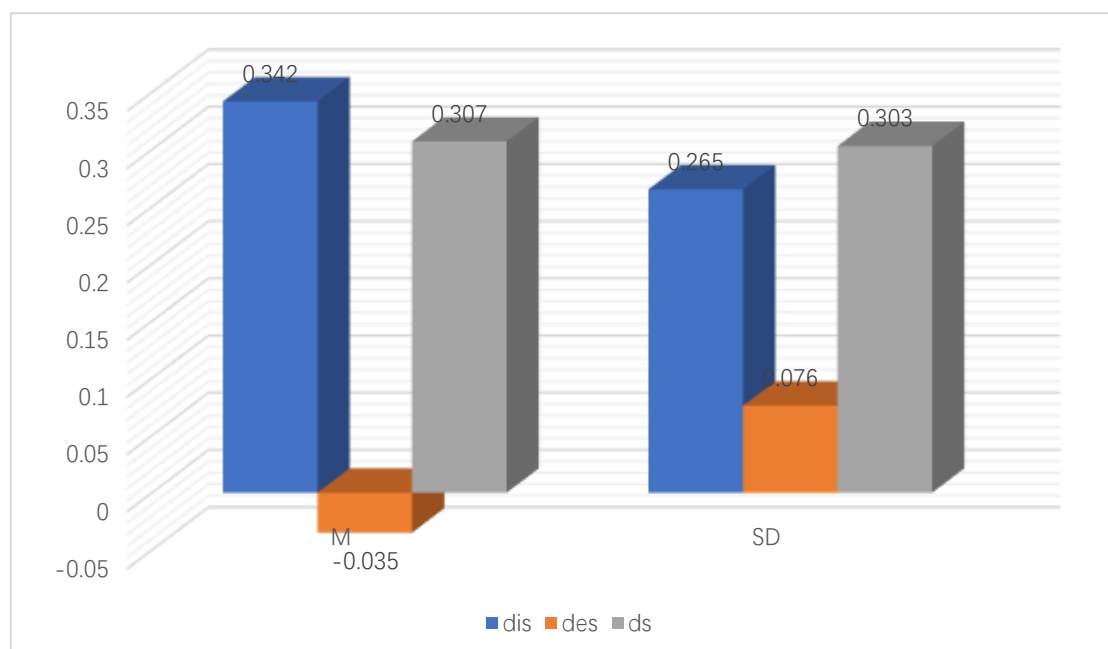


Figure 2: Statistical Analysis and Comparison of Public Awareness and Satisfaction with the National Fitness System

According to the derived calculation formula of the "social awareness entropy" of the national fitness system, the range of the "total awareness entropy" is (-1, 1). From the descriptive statistics results shown in the above figure, it can be found that the average "total awareness entropy" of the public for the national fitness system is 0.307. It is not difficult to see that the public's evaluation of the national fitness system tends to be satisfactory, but compared with its value range, the degree of satisfaction is still relatively low.

The standard deviation is an important indicator for measuring the stability and reliability of data. From the perspective of standard deviation, the data values of "awareness satisfaction entropy", "awareness dissatisfaction entropy" and "total entropy" of the national fitness system are closely distributed around the average value, and the differences among the data are relatively small. This indicates that the degree of recognition of the national fitness system by the public is tending to be stable at present.

2. To examine demographic differences in public perceptions of the national fitness system based on satisfaction-related indicators.

2.1) Demographic Differences in Satisfaction-Related Public Perceptions across Age Groups

To examine age-related differences in public perceptions of the national fitness system based on satisfaction-related indicators, one-way analysis of variance (ANOVA) was conducted across different age groups. The results are presented in Table 1.

Table 1: Comparison of Satisfaction-Related Public Perceptions of The National Fitness System Across Different Age Groups

	F	P	Effect size	LSD	Homogeneity of variance test
Ds (Total)	8.578	.000	.968	1>2,1>3,1>4,2>3	Normal
Ds (Management)	10.465	.000	.989	1>2,1>3,1>4	Normal
Ds (Supply)	7.820	.000	.946	1>2,1>3,1>4,2>3	Normal
Ds (Guarantee)	7.416	.001	.938	1>3,1>4, 2>3,2>4	Normal
Ds (Culture)	6.728	.001	.906	1>3,1>4, 2>3,2>4	Normal

*P<0.05, **P<0.01, ***P<0.001;1=<18,2=18-44,3=45-59,4=>60

2.2) Demographic Differences in Satisfaction-Related Public Perceptions across Educational Levels

To examine differences in satisfaction-related public perceptions of the national fitness system across educational levels, a one-way analysis of variance (ANOVA) was conducted. The results are presented in Table 2.

Table 2: Comparison of Satisfaction-Related Public Perceptions of The National Fitness System Across Educational Levels

	F	P	Effect size	LSD	Homogeneity of variance test
Ds (Total)	8.037	.000	.957	2>1, 2>3	Normal
Ds (Management)	4.167	.016	.735	2>1, 2>3	Normal
Ds (Supply)	10.246	.000	.987	2>1, 2>3, 3>1	Normal
Ds (Guarantee)	6.956	.001	.926	2>1, 2>3	Normal
Ds (Culture)	6.596	.001	.911	2>1, 2>3	Normal

*P<0.05, **P<0.01, ***P<0.001, 1=High School,2=Undergraduate,3=Postgraduate

As shown in Table 2, statistically significant differences in satisfaction-related public perceptions were observed across different educational levels ($p < .05$). Respondents with a bachelor's degree reported the highest level of positive perception, whereas those with a high school education or below reported the lowest level. This finding suggests that educational attainment plays an important role in shaping public evaluations of the national fitness system.

2.3) Demographic Differences in Satisfaction-Related Public Perceptions across Residential Backgrounds

To examine differences in satisfaction-related public perceptions of the national fitness system across residential backgrounds, an independent-samples t-test was conducted. The results are presented in Table 3.

Table 3: Comparison of Satisfaction-Related Public Perceptions of The National Fitness System Across Residential Backgrounds

	F	P	Effect size	LSD	Homogeneity of variance test
Ds (Total)	8.476	.000	.962	2>1, 2>3	Normal
Ds (Management)	7.898	.000	.945	2>1, 2>3	Normal
Ds (Supply)	7.658	.000	.933	2>1, 2>3	Normal
Ds (Guarantee)	9.251	.000	.977	2>1, 2>3, 3>1	Normal
Ds (Culture)	10.923	.000	.991	2>1, 2>3, 3>1	Normal

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, 1=Urban, 2=Rural, 3=Urban-Rural Fringe

As shown in Table 3, statistically significant differences in satisfaction-related public perceptions were found between respondents from urban and rural areas ($p < .05$). Rural residents reported higher levels of positive perception compared to urban residents. This result highlights the influence of residential context on public evaluation of the national fitness system and has important implications for urban–rural equity in national fitness governance.

Conclusion

This study examined public satisfaction with the national fitness system in China and explored demographic differences in public perceptions based on satisfaction-related indicators under the Healthy China strategy. The findings indicate that the overall level of public satisfaction with the national fitness system is moderate to relatively high, suggesting that existing policies and service provisions have achieved a generally positive evaluation from the public. Nevertheless, the results also imply that there remains considerable room for further improvement in enhancing service quality, accessibility, and responsiveness to public needs.

In addition, the analysis revealed significant demographic differences in satisfaction-related public perceptions. Age, educational level, and residential background were found to play important roles in shaping how individuals perceive and evaluate the national fitness system. Younger respondents and those with higher educational attainment tended to report more positive perceptions, while middle-aged groups and urban residents exhibited comparatively lower levels of satisfaction-related perception. These differences highlight the uneven experiences of public fitness services across population groups and suggest that a uniform policy approach may not adequately address diverse social needs.

Overall, the results underscore the importance of incorporating public satisfaction and perception-based indicators into the evaluation of national fitness policies. By understanding how different demographic groups perceive the national fitness system, policymakers can

better assess policy effectiveness and identify gaps in service provision. This study contributes empirical evidence to support more people-centered, equitable, and targeted approaches to national fitness governance, thereby advancing the implementation of the Healthy China strategy.

Discussion

The findings of this study indicate that public satisfaction with the national fitness system in China is at a moderate to relatively high level. From a public service satisfaction and governance evaluation perspective, this suggests that the current institutional framework has achieved a basic alignment between service provision and citizen expectations (Bouckaert & Van de Walle, 2003; Van de Walle & Bouckaert, 2007). At the same time, national fitness development under the Healthy China strategy has benefited from sustained government investment, policy coordination, and institutional support (Pei, 2003; Dong, 2005; General Administration of Sport of China, 2021; State Council of the People's Republic of China, 2016). However, the fact that satisfaction remains moderate rather than high indicates that service expansion alone may not fully address issues related to perceived quality, accessibility, and responsiveness. In governance theory, satisfaction reflects not only objective service supply but also citizens' subjective evaluations of fairness and policy performance (Bouckaert & Van de Walle, 2003).

The observed demographic differences further reinforce the theoretical assumption that public evaluations are shaped by social positioning and access conditions. Younger and more educated respondents reported more positive perceptions, which may be linked to higher health literacy, greater adaptability to public fitness programs, and stronger policy awareness (Shi, Mo, & Sun, 2012; Lin, 2018). These findings are consistent with previous research indicating that socio-demographic characteristics significantly influence participation behavior and satisfaction in national fitness initiatives (Ma & Wu, 2016). From a theoretical standpoint, such variation reflects differences in expectations and perceived benefits across social groups, highlighting that public satisfaction is socially structured rather than uniformly distributed.

Residential disparities provide further insight into governance equity under the Healthy China strategy. Although urban areas typically possess more developed fitness infrastructure, urban residents reported lower levels of positive perception. This finding echoes research on regional disparities and governance performance in national fitness development (Chen et al., 2025). It suggests that infrastructure density alone does not guarantee higher satisfaction; instead, factors such as service congestion, competition for facilities, and elevated expectations may influence evaluative judgments. The Healthy China 2030 Planning Outline emphasizes equitable access and coordinated urban-rural development (State Council of the People's Republic of China, 2016), and the present findings indicate that equity should be assessed not only in terms of resource allocation but also in terms of perceived service experience.

Overall, these results demonstrate that public satisfaction with the national fitness system is shaped by governance structure, socio-demographic characteristics, and contextual conditions. Incorporating satisfaction-related perception indicators into policy evaluation mechanisms can enhance evidence-based governance and strengthen people-centered development (Van de Walle & Bouckaert, 2007; Xi, 2021). By systematically monitoring differences across age, education, and residential groups, policymakers can refine differentiated service strategies and improve the responsiveness and legitimacy of national fitness governance. In this regard, public satisfaction should be institutionalized as a core

performance indicator within the implementation framework of the Healthy China strategy (General Administration of Sport of China, 2021).

Suggestion

Suggestions for Research

1. Policymakers and practitioners should incorporate public satisfaction and perception-based indicators into the routine evaluation of the national fitness system in order to improve service quality, accessibility, and responsiveness to public needs.

2. Targeted fitness programs and service delivery strategies should be developed to address the specific needs of different demographic groups, particularly middle-aged populations and urban residents, who reported relatively lower levels of satisfaction-related perception.

Suggestions for Future Research

1. Future studies should adopt mixed-methods approaches, combining quantitative surveys with qualitative interviews, to gain deeper insights into the underlying reasons for public satisfaction and dissatisfaction with the national fitness system.

2. Longitudinal research designs are recommended to examine changes in public satisfaction and perceptions over time and to assess the long-term effects of national fitness policies under the Healthy China strategy.

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An Intelligent Drip Irrigation Innovation for The Sustainable Development of Large Bird's Eye Chili Farming Communities

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Abstract

This study aimed 1) to develop an intelligent drip irrigation system for large bird's eye chili production in order to enhance the potential of large-scale chili farming communities, and 2) to transfer knowledge and raise awareness of the importance of technology in developing the intelligent drip irrigation system for large bird's eye chili production to strengthen the capacity of large-scale chili farming communities. The target group consisted of 32 farmers from large-scale chili farming communities, selected through purposive sampling. To evaluate the system's performance and the success of the knowledge transfer and technology awareness, the Black Box Testing method was employed, with five experts serving as evaluators. Additionally, the results of the satisfaction assessment regarding the knowledge transfer were analyzed using descriptive statistics, specifically mean and standard deviation.

The research findings are:

1. The developed system for knowledge transfer and promoting technological Awareness comprising a NodeMCU ESP microcontroller that controls sensors detecting temperature, humidity, water flow, water usage rate, and electricity consumption, as well as reporting environmental data from the cultivation area and handling system errors such as lack of water flow through a developed web application-achieved an overall efficiency at the highest level ($\bar{x} = 4.71$, S.D. = 0.50)
2. The evaluation of participants' satisfaction with the training on knowledge transfer regarding the development of the intelligent drip irrigation system for large bird's eye chili production indicated that overall satisfaction in all aspects was at the highest level ($\bar{x} = 4.72$, S.D. = 0.57)

Keywords: Intelligent Drip Irrigation Innovation, Large Bird's Eye Chili, Farmer Community

Introduction

Chili peppers belong to the Solanaceae family, alongside tomatoes, eggplants, potatoes, tobacco, and petunias. They possess high nutritional value, particularly high amounts of vitamin A and vitamin C (Department of Agriculture, 2019). They can be utilized either as fresh produce or dried and processed into various food products such as chili paste,

curry paste, chili sauce, dipping sauce, and pickled chilis. They are also used as flavor-enhancing ingredients in snacks and instant noodles. Chili colorants, chili oil (oleoresin), and chili extracts (capsaicin) can be utilized in the pharmaceutical and dietary supplement industries (Kasetkaona et al., 2020). Chili is also a crucial economic vegetable crop. There are several varieties of chilis in Thailand, including large-fruited bird's eye chili, spur chili, garden bird's eye chili, banana pepper, and bell pepper. Regarding the chili import and export situation in 2018, there was an increase in the importation of chilis and chili products. This was due to the prices of imported chilis being cheaper than those produced domestically, particularly those from India and China. Additionally, the export volume in 2018 increased from the previous year, with exports destined for countries such as Singapore and Malaysia (Office of Agricultural Economics, 2019). Currently, the market is continuously expanding, and prices remain at a favorable level. For example, cultivating approximately 1 rai of chilis can generate an average income of 60,000-100,000 THB. Farmers can grow chilis year-round, but the most optimal period is between October and February. This allows the harvest to occur during the dry season, which is convenient for sun-drying. The ideal temperature range for chili growth is between 24 and 29 degrees Celsius (Department of Agricultural Extension, 2018). To secure high market prices, planting must be done during April-May and August-September, which are the most challenging periods for chili cultivation.

In Khan Rai Subdistrict, Sirindhorn District, Ubon Ratchathani Province, the majority of farmers prefer to cultivate chilis. The produce can be distributed to various provinces, especially in the southern region, and exported to Malaysia and Indonesia. Consequently, most farmers engage in chili cultivation as a primary source of household income. A problem survey conducted by the research team revealed that cultivating a 3-rai chili plot in Khan Rai Subdistrict requires farmers to spend 4 to 6 hours manually watering the crops. Furthermore, it was found that over 90% of these farmers lack the knowledge and skills to apply technology and innovation to alleviate their farming workload. Therefore, the research team developed the concept of creating an intelligent drip irrigation system for large bird's eye chili production. This system is intended to serve as a learning plot and demonstration site, acting as a district-level agricultural learning prototype center for the community. It aims to demonstrate the application of innovation and technology to enhance the efficiency of large bird's eye chili production for the fresh produce market. Furthermore, this initiative is driven by the Bio-Circular-Green (BCG) Economy Model (National Science and Technology Development Agency [NSTDA], 2021) within a Smart Farm framework, utilizing Internet of Things technology (Jaidee et al., 2021) to assist farmers in reducing labor time during cultivation. The time saved through the use of technology can be redirected towards generating alternative income, ultimately resulting in an increase in the farmers' household income.

Objectives

1. To develop a drip irrigation system for large bird's eye chili production.
2. To transfer knowledge and raise awareness of the importance of technology in developing an intelligent drip irrigation system for large bird's eye chili production.

Literature Review

The objective of this research is to develop an intelligent drip irrigation system for large bird's eye chili production, aiming to enhance the capacity of chili farming communities

in large-scale plots. The research team studied relevant theories and literature to establish a conceptual foundation, which guided the analysis and the formulation of the research framework. The details are presented sequentially as follows:

Botanical Characteristics and Production of Large Bird's Eye Chili

Large bird's eye chili (*Capsicum frutescens*) belongs to the family Solanaceae. It is a perennial herbaceous plant with an erect stem, reaching a height of approximately 0.5-1.2 meters, depending on the variety and cultivation practices. This chili type has a taproot system that penetrates deeply and spreads well in soils with good drainage. The leaves are simple, with pointed tips and smooth surfaces. Flowers are solitary, borne in the leaf axils, and are white to pale green in color. The fruits are slender and elongated with pointed tips, green at the immature stage and turning red when fully mature. A distinctive characteristic of large bird's eye chili is its strong pungency and its ability to be harvested continuously several times within a year. However, chili growth is highly sensitive to soil moisture and ambient temperature; therefore, an appropriate irrigation system can significantly improve both yield and fruit quality (Department of Agricultural Extension, 2020).

Water Requirements and Growth Factors of Chili

Water is a crucial factor directly affecting plant growth. Insufficient water supply can result in growth retardation, leaf yellowing, and leaf drop, whereas excessive water can cause root rot and soil-borne fungal diseases, severely reducing crop yield. Crop water requirement (ET_{crop}) refers to the amount of water needed to compensate for water loss through evapotranspiration. In other words, it is the quantity of water required by plants for optimal growth (Sumitr Khunchat, 2018). Different crops have different water requirements. For example, vegetable crops generally require about 3-5 mm/day, fruit trees about 3 mm/day, sweet corn approximately 5-8 mm/day, and rice about 10 mm/day. These values can be used to calculate daily irrigation needs or to estimate the total water resources required. For instance, vegetable cultivation on an area of 1 rai (1,600 m²) requires approximately 4.8-8.0 cubic meters, or 4,800-8,000 liters, of water per day (Office of Agricultural Product Promotion and Management, 2016). Irrigation is an agricultural engineering technology developed to facilitate farm management, improve water use efficiency, reduce labor requirements, and minimize crop damage caused by water stress. Nowadays, irrigation systems are widely adopted, especially in fruit orchards, vegetable farms, and field crops. Water plays an essential role in photosynthesis, nutrient dissolution and uptake, plant cooling through transpiration, and ultimately determines crop productivity. Water requirements vary according to crop type, variety, and growth stage; therefore, irrigation must be properly managed to meet crop needs. Chili generally requires about 600-900 mm of water per production cycle, with optimal soil moisture maintained at approximately 60–80% of field capacity. The most critical stages for water demand are flowering and fruit setting.

Smart Technology and Embedded IoT Systems Internet of Things

The Internet of Things (IoT) is a technology that connects various devices via the Internet, enabling automatic data transmission and remote control. The main components of an IoT system include sensors, microcontrollers, communication modules, and data storage platforms (Atzori, L., Iera, A., & Morabito, G., 2010). In agriculture, IoT has become a key part of Precision Agriculture, such as using sensors to measure soil moisture, temperature, or light intensity and sending the data to a control system to automatically irrigate crops. This improves irrigation efficiency, reduces labor, and minimizes unnecessary resource use (Digital Government Development Agency, 2021). A smart irrigation system for large chili peppers using IoT can report real-time soil moisture status, send alerts via applications, and

automatically adjust water supply based on collected data, effectively supporting digital-era farming. Gubbi et al. (2013) stated that the Internet of Things (IoT) consists of four main layers: the Sensing Layer, Network Layer, Data Processing Layer, and Application Layer, where devices are connected via the Internet to automatically collect and transmit data. Vermesan et al. (2014) explained that the IoT architecture links physical devices with digital systems. Data collected from devices is sent to the cloud for analysis and response, accessible through user-interactive applications. The integration of IoT, GIS, and remote sensing in precision agriculture enables the monitoring and decision-making based on real-time data from farmland. This integration focuses on three technologies:

1. IoT Uses field sensors to collect environmental data, such as moisture, temperature, and soil pH.
2. GIS (Geographic Information System) Visualizes farmland data on maps and performs spatial analysis.
3. Remote Sensing Utilizes satellite or drone imagery to monitor crop health and field trends. Combining IoT with GIS and remote sensing improves agricultural efficiency in planning, risk assessment, resource management, and yield optimization. These technologies support precise, site-specific decision-making.

Smart Farm

Smart Farm refers to the use of digital technologies and automated systems to manage agricultural operations. It relies on data from sensors, the Internet of Things (IoT), Artificial Intelligence (AI), Big Data analytics, and remote control systems to increase production efficiency, reduce costs, and promote sustainable agriculture. Wolfert et al. (2017) stated that Smart Farming is an agricultural approach that leverages information technology and IoT devices to enhance productivity and reduce costs by analyzing sensor data for decision-making in farm management. Zhang Q. (2019) explained that Precision Agriculture is a methodology that utilizes digital technologies, such as IoT, AI, and Cloud Computing, to manage farming at a site-specific level. This approach reduces the use of resources such as water, fertilizer, and labor while improving yield and quality sustainably, and According to Klerkx et al. (2019), a Smart Farm consists of the following main subsystems 1) Sensing System Uses sensors to measure various parameters, including soil moisture, temperature, sunlight, pH, and nutrient levels. 2) Connectivity System Transmits data from the farm via wireless networks, such as LoRa, NB-IoT, or Wi-Fi. 3) Analytics System Utilizes software or AI to analyze data for yield prediction, disease alerts, or crop planning.

Unstructured Databases (NoSQL)

An unstructured database, or NoSQL, is a database capable of storing information that does not need to follow a tabular format, such as JSON, XML, or Key-Value data. Unlike traditional SQL databases, which require a well-defined schema, NoSQL databases are suitable for smart irrigation systems that require real-time data processing, large volumes of information, and flexible data structures that can be adapted according to usage (MongoDB Inc., 2023). NoSQL databases commonly use formats similar to JSON and BSON for data exchange. In application development, NoSQL databases are often integrated with JSON and BSON data formats (Panupong Boonrom, 2023)

Related Research

Piyawat Maksri et al. (2020) developed a research project on an automated irrigation control system using soil moisture sensors. The study aimed to design an automated watering system for small-scale greenhouses by utilizing a microcontroller to regulate the system's operation based on real-time soil moisture levels. By installing sensors within the cultivation area and using the microcontroller for data processing, the findings indicated that this system significantly enhanced plant growth and improved water efficiency.

Al-Obaidi et al. (2020) developed research on designing an automated irrigation system to control water quantity using the Arduino Uno R3 microcontroller and soil moisture sensors. The system controls irrigation and schedules water delivery based on the type of plant, aiming to reduce costs such as water and labor expenses while increasing agricultural productivity. This proposed system is a sustainable solution for enhancing water use efficiency in agricultural areas according to plant needs. The system operates using a drip irrigation method, with the irrigation sensors connected to the Arduino Uno R3, allowing real-time monitoring via a computer. It also allows selection of plant types according to the system's program based on soil conditions and root zone moisture. The automatic irrigation system for farmers helps determine the required water quantity at scheduled times, reports the water status for each agricultural plot, and allows tracking of soil moisture levels and pump operation. It includes a database on plants and displays suitable water quantities for different plant types.

Rossy et al. (2020) developed research on the design and implementation of an automated tomato irrigation system using IoT with the ESP8266 microcontroller. The system considers factors such as the required soil moisture, air conditions, and temperature necessary for growing tomatoes, which should be between 60% and 80% humidity and temperatures between 24°C and 28°C. The research team utilized IoT technology to develop an innovative agricultural technology solution to address issues and enhance irrigation precision based on soil moisture levels and air temperature. The system, which includes ESP8266, soil moisture sensors, and DHT11, can be controlled remotely via an internet connection. The program is integrated with the Telegram Messenger application to receive data from the sensors and automate tomato watering. Experimental results showed that the soil moisture sensors functioned well, accurately reading soil moisture levels, and the temperature sensors provided suitable air temperature readings. Users receive all sensor data through the Telegram Bot, which sends notifications, allowing farmers to easily monitor and control tomato irrigation remotely. The system also manages and tracks the condition of tomato cultivation.

Garg et al. (2018) B conducted research titled IoT-Based Smart Agriculture Design for Optimal Management. The primary objective was to develop an agricultural system capable of maximizing the efficiency of resource management, including water, fertilizer, and energy. This was achieved by integrating Internet of Things (IoT) technology with data mining techniques and advanced communication protocols. The researchers designed a prototype consisting of sensor nodes for field data collection, a control unit for analysis and decision-making, and a cloud system for remote data storage and access. The system features real-time internet communication, along with security measures and data recovery protocols in case of system failure. The findings indicate that this developed system enhances farm management efficiency, reduces resource waste, and provides accurate agricultural forecasting while reducing labor demands and remaining adaptable for remote farming areas.

Boonrom et al. (2024) developed an "IoT-Based Adaptive Drip Irrigation System for Tomato Cultivation" following the five stages of the SDLC (Systems Development Life Cycle) model: 1) Problem Study and Planning, 2) Analysis, 3) System Design, 4) Development and Testing, and 5) Evaluation. The system enables moisture control within the cultivation plot based on settings configured via a web application. Command data for board control is stored in a NoSQL cloud database, ensuring rapid response times for electrical device control. Cultivation data is collected periodically in the cloud and migrated daily to a relational database. This stored data includes temperature, moisture, electricity consumption, and daily water usage throughout the harvest cycle. This information is intended for further analysis and processing into agricultural information to be shared with farmers.

Additionally, the system features an error-handling mechanism: if no water flow is detected, the web application notifies the user via the Line API and automatically shuts down the water pump.

Research Methodology

This research focuses on the development of a smart drip irrigation system for large bird's eye chili production. The research team proceeded according to the following steps:

1. Feasibility Study and Site Analysis

After conducting field research on the factors affecting the growth and irrigation of large bird's eye chilies in Ubon Ratchathani Province, it was found that most local farmers still rely on traditional, imprecise irrigation methods, such as manual hose watering or furrow irrigation. While some farmers utilize drip tapes, they still rely on manual observation to determine water needs. This lack of precision leads to over-watering or under-watering, which hinders plant growth and results in the waste of labor and water resources. Furthermore, during the dry season or dry spells, the absence of an efficient control system leads to a significant reduction in crop yield. Consequently, the analysis and planning phase consists of three key steps: 1) Designing a drip irrigation system tailored to the farmers' specific plots 2) Developing and installing an intelligent control system utilizing embedded systems technology and 3) Conducting field testing to evaluate water-use efficiency and overall productivity.

2. Study of Embedded IoT System Principles

The study focuses on the operating principles of the NodeMCU ESP8266, which is a small microchip or can be referred to as an embedded “microcontroller brain” with built-in Wi-Fi capability. It is low-cost, manufactured by Espressif Systems, and is widely used in IoT devices and smart home applications. A key feature of the ESP8266 is that it can be programmed directly, and it provides up to 4 MB of program memory. It operates at a voltage range of 3.3-3.6 V. When used with other sensors that operate at 5 V, a voltage divider circuit is required to prevent damage to the module. In addition, the operating principle of the YF-S201 Water Flow Sensor module is described. This module is used to measure the water flow rate. In general, its working principle involves detecting water flow based on changes in pressure or the movement of water inside a pipe. The sensor module contains an internal rotor (impeller) that rotates as water flows through it, allowing the measurement of water flow. The sensor must be installed on a water pipe to detect and measure the flow of water passing through the pipe.

3. Study of the Operating Principles of Firebase and Relational Database Systems

Firebase Realtime Database is a NoSQL cloud database that stores data in JSON format and enables real-time data synchronization across all connected devices automatically within milliseconds. It supports offline operation, where data is stored locally and automatically synchronized once the device reconnects to the internet. In addition, Firebase provides Security Rules that allow customized conditions for both read and write access to data. It supports multiple platforms, including Android, iOS, web applications, as well as ESP8266 devices. The study also examines the operating principles of relational databases. A relational database stores data in the form of tables, consisting of multiple tables that are related to each other. Each table is divided into rows, and each row is further divided into columns. In this research, a relational database is used to store daily statistical data, such as humidity and temperature values, and to generate statistical graphs for reporting results to users based on the collected data.

4. System Analysis Process

The research team collected data and analyzed existing problems in order to develop a web application for controlling a smart drip irrigation system for the production of large-fruited bird's eye chili. The objective is to enhance the potential of farming communities cultivating chili in large-scale plots. The analysis process consists of the following steps:

Analyze the smart drip irrigation system for the production of large-fruited bird's eye chili to enhance the potential of farming communities engaged in large-scale chili cultivation.

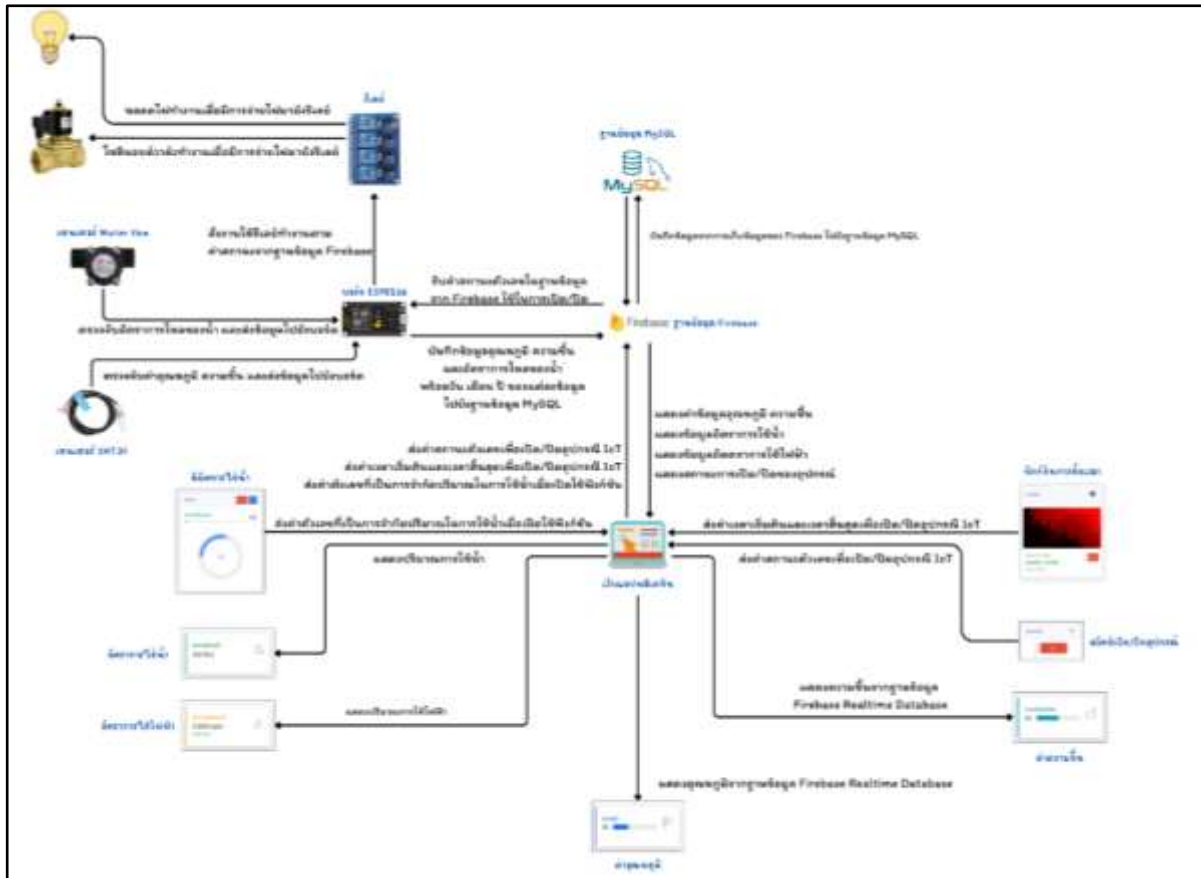


Figure 1: Smart Drip Irrigation System for The Production of Large-Fruited Bird's Eye Chili to Enhance The Potential of Farming Communities Engaged in Large-Scale Chili Cultivation

Based on Figure 1, the operation of the irrigation control system begins when the user accesses the web application developed by the research team. The system sends status values in the form of numeric commands (1, 0) to Firebase to control the water on/off operation. Subsequently, the ESP8266 board retrieves the numeric status data from the Firebase database and acts as a command transmitter to activate a 4-channel relay module. The relay supplies power to the operating devices, including light bulbs and electric solenoid valves.

The solenoid valves then control the opening and closing of water for the operation of mist sprayers and drip irrigation emitters, according to the commands issued through the developed web application. For the sensors that monitor temperature, humidity, and water flow rate, data are collected every 30 minutes and temporarily stored in Firebase Firestore.

At 11:00 PM each day, the data are transferred to a MySQL database for storage in a relational database system, after which the data stored in Firebase Firestore are deleted.

System Design Process

Based on the study of problems and system development planning, the research team designed a smart drip irrigation system for the production of large-fruited bird's eye chili to enhance the potential of farming communities engaged in large-scale chili cultivation. The system design was divided into the following parts:

1. Design of the overall system operation.
2. Design of the greenhouse for tomato cultivation to study the smart drip irrigation system for the production of large-fruited bird's eye chili to enhance the potential of farming communities engaged in large-scale chili cultivation.
3. Design of the operating principles of the smart drip irrigation system for the production of large-fruited bird's eye chili to enhance the potential of farming communities engaged in large-scale chili cultivation.
4. Design of the overall workflow of the smart drip irrigation system for the production of large-fruited bird's eye chili to enhance the potential of farming communities engaged in large-scale chili cultivation.
5. Design of the web application for the smart drip irrigation system for the production of large-fruited bird's eye chili to enhance the potential of farming communities engaged in large-scale chili cultivation.

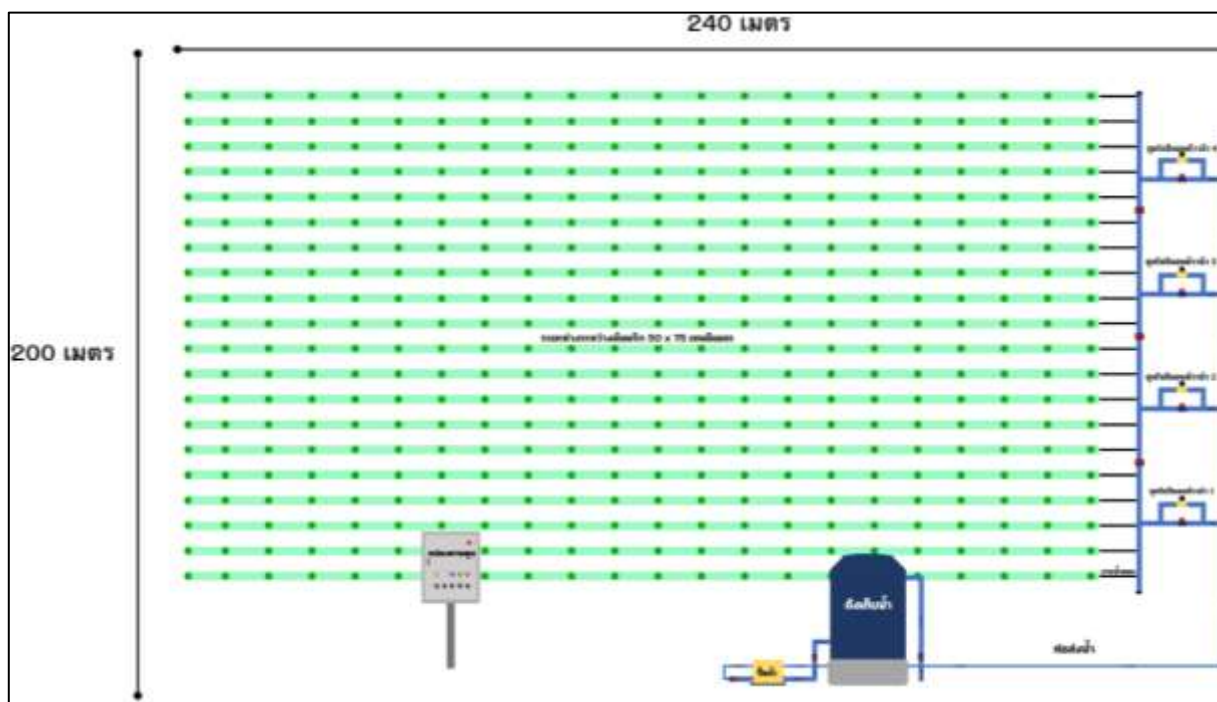


Figure 2: Design Illustrates a Large-Fruited Bird's Eye Chili Cultivation Plot with a Total Area

From Figure 2, the design illustrates a large-fruited bird's eye chili cultivation plot with a total area of 3 rai, covering dimensions of 200 × 240 meters. The layout includes the installation of control boxes and a water pump, as shown in the figure. The placement of solenoid valves was designed to ensure that the irrigation system can supply water in quantities appropriate to the needs of the chili plants. The planting spacing was specified at

50 × 75 centimeters, which is considered optimal. Based on this spacing, the cultivation area consists of 20 rows of chili plants. A total of four solenoid valve points are used, with each valve controlling four rows of plants.

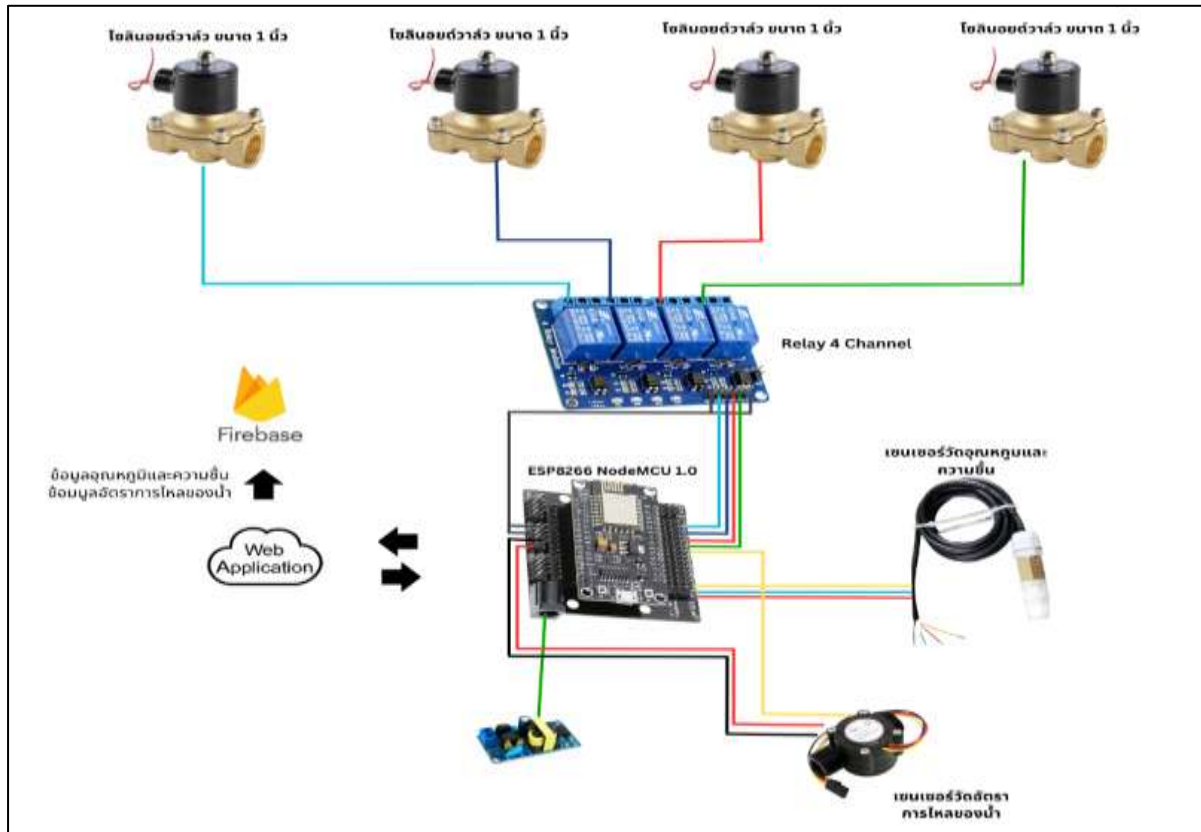


Figure 3: Connection Between The Database System and The System for Data Collection of The Smart Drip Irrigation System for Large-Fruited Bird's Eye Chili Production.

From Figure 3, the design illustrates the connection between the database system and the system control box in order to collect data on temperature and humidity from sensor devices, as well as operational status data such as water flow status, irrigation duration for each operation (solenoid time duration), and the amount of water used in each cycle through the web application. All of these data are stored in the Firebase database.

System Development and Testing Process

The development phase was carried out according to the system design. The development process was divided into four stages as follows:

Stage 1: Development of the chili cultivation plot according to the design, with a total cultivation area of 3 rai.



Figure 4: Mulching The Cultivation Beds with Plastic Film, Planting Chili Seedlings, and Arranging Rows for Irrigation.

From Figures 4, the images show a large-fruited bird's eye chili cultivation area covering 3 rai. The planting beds were prepared with rows for cultivation and covered with plastic mulch to prevent weed growth. The spacing between rows was set at 75 centimeters, and the spacing between chili plants was 50 centimeters, which is considered appropriate for optimal chili growth and development.



Figure 5: Installation of solenoid valves and connection of electrical wiring to the solenoid valves.

From Figures 5, the images show the routing of electrical wiring from the control box to the solenoid valve locations. Electrical wires with a diameter of 1.5 millimeters were used and threaded through 16-millimeter PE pipes to serve as insulation and to prevent electrical leakage hazards.

Stage 2: Programming and Development of the Database System for System Operation Control

The programming phase involved developing control programs using the Arduino IDE to manage the operation of solenoid valves via the NodeMCU 1.0 ESP8266 for drip irrigation control. The system controls irrigation, regulates soil moisture, monitors water flow, reports temperature and humidity data from sensors, and transmits water usage information to the web application. The MQTT protocol is used as an intermediary for data communication

between the control box and the cloud database. PHP and Python programming languages were employed for system control and application development. For database system development, a MySQL database was used to store daily data on temperature, humidity, and irrigation rates. This database operates as an online real-time database. The developed web application serves as an intermediary for connecting the NodeMCU ESP8266 device to receive data from the SHT30 sensor, which is used to measure temperature and humidity. The sensor transmits data to the web application, which is then used to control soil moisture and drip irrigation in the chili cultivation plot. The system's operational status at any given time is stored in the cloud database. The cloud database is also used as an intermediary to calculate daily irrigation rates. The microcontroller control board was programmed to receive data from the NodeMCU ESP8266, including temperature and humidity values from the SHT30 sensor, as well as irrigation duration for each cycle. These data are used to calculate water consumption in the drip irrigation system for the chili cultivation plot, based on the water flow rate per minute and the duration of each irrigation cycle.

System Evaluation

The system evaluation was conducted using a performance assessment questionnaire for the smart agricultural irrigation system based on the Internet of Things (IoT). Five experts were invited to evaluate the performance of the system. The evaluation results were analyzed using statistical methods to summarize the performance of the developed system.

The arithmetic mean ($\bar{x}$) and the standard deviation (S.D.) were calculated for each evaluation aspect in order to determine the level of system performance and quality.

Research Finding

The research team organized the presentation of the results of the development of the smart drip irrigation system for the production of large-fruited bird's eye chili to enhance the potential of farming communities engaged in large-scale chili cultivation in accordance with the research objectives, as follows:

Part 1: Results of the development of the smart drip irrigation system for the production of large-fruited bird's eye chili to enhance the potential of farming communities engaged in large-scale chili cultivation.

1. The web application interface for system control in the smart drip irrigation system for large-fruited bird's eye chili production.

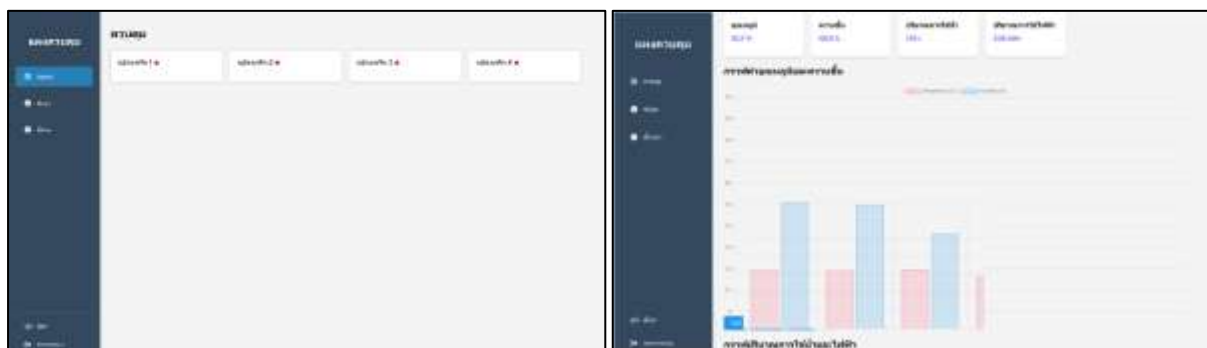


Figure 6: Interface Displaying Operational Data of The Smart Drip Irrigation System for Large-Fruited Bird's Eye Chili Production.

From Figures 6, the web application pages of the smart drip irrigation system for large-fruited bird's eye chili production display information about the chili cultivation plots in each area. This allows the web application to control water distribution, manage irrigation to the cultivation plots, enable automatic irrigation to maintain appropriate moisture levels, and schedule irrigation times for each day of the week.

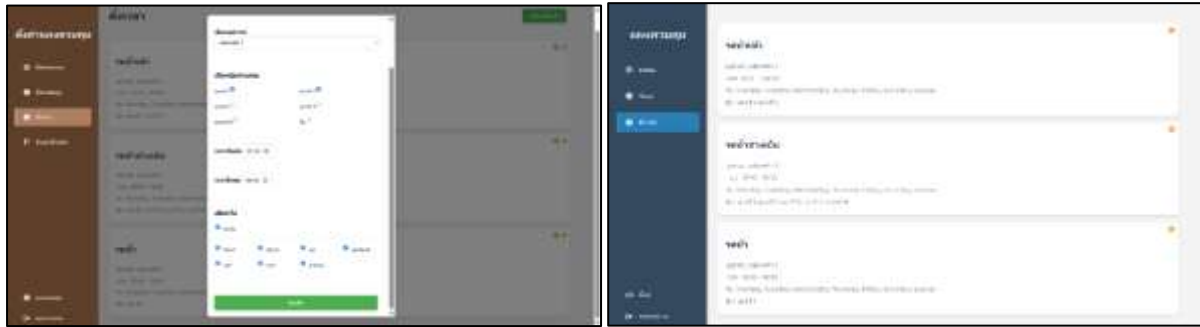


Figure 7: The Web Application Interface for Scheduling and Time-Based Control

Based on Figure 7, the page shows the system scheduling interface of the web application used to control the smart agricultural plot. The system allows multiple schedules to be created. For each schedule, users can specify a schedule name, set the start time and end time, and select the days for operation. The system enables users to choose both active days and excluded days as required. In addition, the system allows scheduling of various devices for on/off control and status settings. After the scheduling configuration is completed, the system can be edited. The available editing options include modifying the schedule name, start time, end time, selected days, device activation time, and enabling or disabling the operational status.

2. Results of the development of the device control box for the smart drip irrigation system for large-fruited bird's eye chili production.



Figure 8: device control box for the smartdrip irrigation system for large-fruited bird's eye chili production to enhance the potential of farming communities engaged in large-scale chili cultivation.

Based on Figure 8, the results of the development of the device control box for the smart drip irrigation system for large-fruited bird's eye chili production to enhance the potential of farming communities engaged in large-scale chili cultivation are presented. The control box consists of the following components: ESP8266 board, which controls

the operation of sensors for measuring temperature and relative humidity, as well as the solenoid valves by managing the opening and closing of water supply.

Part 2: Results of the Evaluation of the Smart Drip Irrigation System Performance for Large-Fruited Bird's Eye Chili Production to Enhance the Potential of Farming Communities Engaged in Large-Scale Chili Cultivation, as Evaluated by Five Experts

For system testing, a performance evaluation of the smart drip irrigation system for large-fruited bird's eye chili production was conducted after the system had been tested by five experts. The experts then evaluated the overall system performance in four aspects, as follows:

Table 1: Results of The Evaluation of System Functionality in Meeting User Requirements (Functional Requirement Test)

Evaluation Items	Performance and Quality		
	$\bar{X}$	S.D.	Interpretation
1. The system can effectively control the cultivation plot, including manual on/off control of the drip irrigation system and lighting	4.80	0.45	Very High
2. The system can effectively use the water usage limitation function	4.60	0.55	Very High
3. The system can provide alerts when irrigation is activated but water does not flow	4.60	0.55	Very High
4. The system can effectively report temperature, relative humidity, electricity consumption rate, and water usage rate	4.80	0.45	Very High
5. The system enables fast and efficient control	4.80	0.45	Very High
Overall Average	4.72	0.49	Very High

From Table 1, the results of the evaluation of the system in terms of meeting user requirements show an overall mean score of 4.72 and a standard deviation of 0.49. These results indicate that the developed system demonstrates very high performance in fulfilling user requirements.

Table 2: Results of The Evaluation of System Performance in Terms of Operation According to Specified Functions (Function Test)

Evaluation Items	Performance and Quality		
	$\bar{X}$	S.D.	Interpretation
1. Accuracy of data storage	4.80	0.45	Very High
2. Accuracy of data presentation	4.60	0.55	Very High
3. Accuracy of notifications	4.80	0.55	Very High
Overall Average	4.73	0.48	Very High

From Table 2, the results of the evaluation of the system in terms of operating according to the specified functions show an overall mean score of 4.73 and a standard

deviation of 0.48. These results indicate that the developed system demonstrates very high performance in performing its designated functions.

Table 3: Results of The Evaluation of Ease of Use (Usability Test)

Evaluation Items	Performance and Quality		
	$\bar{X}$	S.D.	Interpretation
1. Appropriate use of text colors	4.80	0.45	Very High
2. Appropriate use of background colors	4.80	0.45	Very High
3. The wording displayed on the screen is clear and easy to understand	4.80	0.45	Very High
4. Clarity of the text displayed on the screen	4.60	0.89	Very High
5. Overall layout and alignment of the system are appropriate	4.60	0.55	Very High
6. The developed system is easy to use	4.80	0.45	Very High
Overall Average	4.73	0.54	Very High

From Table 3, the results of the evaluation of the system in terms of ease of use show an overall mean score of 4.73 and a standard deviation of 0.54. These results indicate that the developed system demonstrates very high performance in terms of ease of use.

Table 4: Results of The Data Security Evaluation (Security Test)

Evaluation Items	Performance and Quality		
	$\bar{X}$	S.D.	Interpretation
1. System Access Security	4.60	0.55	Very High
2. Data Security in the System	4.80	0.45	Very High
Overall Average	4.70	0.50	Very High

From Table 4, the results of the evaluation of the system's data security show that the overall mean score is 4.70 with a standard deviation of 0.50. This indicates that the developed system demonstrates high effectiveness in terms of data security and is rated at a very good level.

Table 5: Results of The Overall System Performance Evaluation Across All Aspects

Evaluation Items	Performance and Quality		
	$\bar{X}$	S.D.	Interpretation
1. Accuracy of data storage	4.80	0.45	Very High
2. Accuracy of data presentation	4.60	0.55	Very High
3. Accuracy of notifications	4.80	0.55	Very High
Overall Average	4.73	0.48	Very High

According to the system evaluation results shown in Table 6, the overall system evaluation across all aspects has a mean score of 4.71 and a standard deviation of 0.50. This indicates that the developed system demonstrates very high overall performance.

Conclusion

The development of an intelligent drip irrigation system for the production of large-fruited bird's eye chili, aimed at enhancing the potential of large-scale chili farming communities, was conducted in accordance with the five stages of the System Development Life Cycle Model. These stages consisted of: (1) problem study and system development planning, (2) system analysis, (3) system design, (4) system development and testing, and (5) system evaluation. The intelligent drip irrigation system for large-fruited bird's eye chili production was evaluated for its efficiency by experts. The evaluation results indicated that the overall performance of the system was at the highest level. This was because the system was able to control soil moisture in the cultivation plots based on predefined settings through a web application. The system could record control commands sent to the control board via the web application and store them in a cloud database, which is a non-structured (NoSQL) database, enabling rapid control of electrical devices. In addition, cultivation data were continuously stored in the cloud database at different time intervals, and at specified times the data were transferred and stored daily in a relational database. The data stored in the relational database included temperature, humidity, electricity consumption, and daily water usage throughout the entire cultivation cycle until harvest. These data can later be analyzed and processed into information for use in agricultural academic studies and for dissemination as cultivation guidelines for farmers. Furthermore, the system was equipped with an error control mechanism for situations in which there was no water circulation in the system. This function operated through the developed web application by notifying users via the LINE application and automatically shutting down the water pump. The findings of this study are consistent with the research of Khemchat Cheychom (2019) and Parichat Rungruangnattakun (2019), who investigated approaches to the development of smart agriculture models and found that the adoption of smart farming practices can reduce labor burdens and long-term costs for farmers. The results are also in line with the studies of Weerasak Fongngoen et al. (2018) and Ornpan Saetang et al. (2017), who conducted research on the design and development of temperature and humidity control systems suitable for mushroom growth. Their studies revealed that uneven mushroom yields were caused by inappropriate temperature and humidity conditions, and that maintaining suitable environmental control in cultivation facilities resulted in more uniform mushroom production.

Suggestion

The smart drip irrigation system for the production of large-fruited bird's eye chili, aimed at enhancing the capacity of farming communities cultivating chili in large plots, cannot yet be used in cultivation areas where electricity is not available. If the system is further developed, an environmental control system can be designed to operate using solar energy in combination with grid electricity, in order to ensure suitability for cultivation areas according

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A Descriptive Study of Mental Toughness in Youth Woodball Players

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Abstract

This study aimed to describe the mental toughness profile of youth woodball players using a multidimensional approach. A total of 86 youth woodball athletes with 1-3 years of experience in the National Youth Games were selected through purposive sampling. Mental toughness was assessed using the Thai version of the Psychological Performance Inventory. Descriptive statistics, including mean and standard deviation, were employed for data analysis.

The findings indicated that overall mental toughness among youth woodball players was at a good level. Motivation demonstrated the highest mean score, followed by attitude control, negative energy control, self-confidence, positive energy, and attentional control, all of which were interpreted at good levels. Imagery showed the lowest mean score and was interpreted at a moderate level. These findings suggest that mental toughness in youth athletes may reflect a developing psychological profile shaped by competitive exposure and sport-specific demands rather than a fixed psychological attribute.

The results provide baseline descriptive evidence that may assist coaches and practitioners in understanding psychological characteristics of youth athletes in a precision-based, self-paced sport. Further research may explore developmental trajectories and intervention-based approaches to enhance specific psychological components.

Keywords: Mental Toughness, Youth Athletes, Woodball, Psychological Profile, Precision Sport

Introduction

Mental toughness has been widely recognized as a critical psychological construct in competitive sport. It has traditionally been conceptualized as a multidimensional set of psychological attributes that enable athletes to cope effectively with pressure, persist through challenges, and maintain performance consistency under demanding conditions (Loehr, 1986; Jones et al., 2007; Crust, 2008). More recent theoretical developments suggest that mental toughness should not be understood solely as a stable trait but rather as a dynamic psychological resource that may develop through interaction between individual characteristics and environmental demands (Pocius, 2025). This evolving perspective emphasizes the developmental and regulatory nature of mental toughness, particularly in youth sport contexts.

In precision-based and self-paced sports, psychological regulation may play an especially important role because athletes must independently initiate action, manage emotional responses, and sustain attentional focus without continuous external pacing cues. Within such contexts, mental toughness may function as a regulatory framework that integrates motivation, emotional control, confidence, attentional stability, and imagery processes (Loehr, 1986; Jones et al., 2007). Contemporary structural modeling research further indicates that mental toughness is positively associated with adaptive psychological mechanisms, while negatively related to performance-disruptive factors such as competitive anxiety (Demir et al., 2025). These findings reinforce the view that mental toughness operates within a broader system of cognitive and emotional regulation.

Although mental toughness has been extensively studied in elite and adult athletic populations, research focusing specifically on youth athletes remains comparatively limited. Youth sport participation represents a critical developmental stage in which psychological skills may emerge through experiential learning, coaching influence, and competitive exposure. Current theoretical discussions emphasize that mental toughness components may develop unevenly during youth sport participation, depending on the structure of training environments and the presence or absence of systematic psychological skills instruction (Pocius, 2025). Therefore, examining the profile of mental toughness in youth athletes may provide valuable baseline information for long-term athlete development planning.

Furthermore, recent empirical evidence integrating mental toughness with related constructs such as sport imagery and anxiety suggests that psychological components do not operate independently but rather interact within a dynamic system influencing performance readiness (Demir et al., 2025). This interaction underscores the importance of examining multiple components collectively rather than focusing on a single dominant dimension. Consequently, adopting a multidimensional profiling approach may offer a more comprehensive understanding of psychological readiness in youth athletes.

Despite the growing body of research on mental toughness, limited evidence exists regarding its profile among youth woodball players. Woodball, as a self-paced precision sport, requires sustained attentional engagement, emotional regulation, and repeated performance initiation under evaluative conditions. However, structured psychological skills training programs are not consistently integrated into youth training systems. Therefore, investigating the mental toughness profile of youth woodball players may help identify relative strengths and developmental needs within this population.

Accordingly, the purpose of this study was to describe the mental toughness profile of youth woodball players using a multidimensional framework. By situating the investigation within both classical conceptualizations and contemporary developmental perspectives of mental toughness, this study aims to contribute descriptive evidence that may inform psychological training strategies in youth sport contexts.

Literature Review

Mental toughness has been widely discussed in sport psychology as a psychological construct associated with effective functioning under pressure, persistence, and the ability to maintain performance quality across demanding competitive conditions (Loehr, 1986; Jones et al., 2007). Early applied work conceptualized mental toughness as a collection of psychological skills that enable athletes to cope with stress and sustain performance, emphasizing confidence, motivation, emotional regulation, attentional control, and energy management (Loehr, 1986).

Subsequent research emphasized its multidimensional nature, describing mental toughness as a constellation of interrelated cognitive, emotional, and behavioral characteristics rather than a single fixed trait (Jones et al., 2007; Crust, 2008). Qualitative investigations of elite performers further supported this perspective, highlighting self-belief, focus, resilience, and commitment as interacting components contributing to mentally tough performance (Middleton et al., 2004). Despite ongoing conceptual debates, there is general agreement that mental toughness reflects a dynamic configuration of psychological processes.

From a developmental perspective, psychological characteristics associated with mental toughness are thought to evolve through interactions with training demands, competitive exposure, and coaching environments (Gould et al., 2002). While experiential learning may reinforce certain components such as motivation and commitment, other skills may require deliberate psychological training to develop effectively (Crust & Clough, 2011). This uneven development may contribute to variability in mental toughness profiles among youth athletes.

Sport-specific demands further shape mental toughness profiles. In precision-based, self-paced sports, athletes must independently regulate attention, emotions, and activation levels across repeated performance attempts. Research suggests that psychological profiles may vary depending on task demands and sport context (Kuan & Roy, 2007), underscoring the importance of contextual interpretation in youth sport research.

Mental toughness has been assessed using various instruments, including the Psychological Performance Inventory (PPI), which measures confidence, motivation, emotional regulation, attentional control, imagery, and energy management (Loehr, 1986). Although concerns regarding construct validity and measurement overlap have been noted (Middleton et al., 2003), profile-based applications remain valuable for descriptive and developmental purposes in youth sport settings.

Recent empirical work has explored relationships between mental toughness and related psychological processes. Structural modeling evidence indicates that mental toughness is associated with lower competitive anxiety and stronger imagery ability (Demir et al., 2025). Moreover, a recent meta-analysis reported that structured psychological skills training can enhance mental toughness, although methodological variability warrants cautious interpretation (Lan, et al., 2025).

Overall, literature supports the view that mental toughness is multidimensional and developmentally influenced. However, research has largely focused on elite or adult athletes, with limited descriptive profiling in youth precision sports. This gap highlights the importance of examining mental toughness characteristics within specific developmental and sport contexts.

Research Methodology

Research Design

This study employed a descriptive cross-sectional design to examine the mental toughness profile of youth woodball players. The objective was to provide baseline psychological profiling within an authentic competitive context. The study did not involve any experimental manipulation, intervention, or psychological skills training program. Data were collected at a single time point prior to competition.

Participants

The participants consisted of 86 youth woodball athletes with 1–3 years of competitive experience in the National Youth Games. All participants were actively engaged in organized

youth-level training at the time of data collection. Purposive sampling was applied to ensure that the sample represented athletes with relevant competitive exposure.

Eligibility was limited to officially registered youth competitors who were able to complete the questionnaire independently. Responses that were incomplete were excluded from the final dataset. This procedure ensured that the resulting psychological profiles reflected active youth athletes within a defined national competitive context.

Instrumentation

Mental toughness was assessed using the Thai version of the Psychological Performance Inventory (PPI), originally developed by Loehr (1986) and subsequently adapted into Thai by Siripong (1997). The instrument measures seven psychological components relevant to sport performance: self-confidence, negative energy control, attentional control, imagery, motivation, positive energy, and attitude control.

Items were rated on a five-point Likert scale ranging from 1 (very low) to 5 (very high), with higher scores indicating stronger perceived psychological skills. The Thai adaptation has demonstrated high internal consistency reliability ($\alpha = .92$) (Siripong, 1997). In the present sample, the internal consistency reliability coefficients were within acceptable ranges for descriptive research purposes. In the present study, the instrument was used for descriptive profiling purposes rather than for diagnostic classification.

Data Collection Procedure

Data were collected by the researcher approximately one hour before competition. Participants received standardized instructions explaining the purpose of the study and the procedure for completing the questionnaire. The instrument was completed individually under supervision to reduce discussion and potential response bias.

The study did not involve interviews, experimental manipulation, or structured psychological training. The design remained purely descriptive and focused on assessing psychological characteristics at a single time point within a real competitive environment.

Data Analysis

Descriptive statistics were employed to analyze the data. Means and standard deviations were calculated for overall mental toughness and for each psychological component.

To facilitate interpretation, mean scores were classified according to the following criteria (Wattana, 2008):

4.21-5.00 = Very High

3.41-4.20 = High

2.61-3.40 = Moderate

1.81-2.60 = Low

1.00-1.80 = Very Low

Ethical Considerations

This study involved minimal-risk survey procedures conducted within a national competition setting. Participation was voluntary, and written informed consent was obtained from all participants prior to data collection. Participants were informed about the purpose of the study, their right to withdraw at any time without consequence, and the confidentiality of their responses.

No intervention, experimental manipulation, or invasive procedure was involved. Data were collected anonymously and were used solely for academic research purposes. The study was conducted in accordance with generally accepted ethical principles for non-interventional research involving human participants.

Research Finding

The findings of this study are presented using descriptive statistics to illustrate the mental toughness profile of youth woodball players. Data were obtained from 86 participants, and mean scores and standard deviations were calculated for each mental toughness component, as well as for overall mental toughness.

Table 1: Descriptive Statistics of Mental Toughness Components Among Youth Woodball Players (N = 86)

Mental toughness component	Mean ($\bar{X}$)	SD	Interpretation Level
Motivation	3.79	0.69	Good
Attitude control	3.78	0.66	Good
Negative energy control	3.76	0.64	Good
Self-confidence	3.68	0.59	Good
Positive energy	3.67	0.53	Good
Attentional control	3.64	0.72	Good
Imagery	3.40	0.81	Moderate
Overall mental toughness	3.67	0.66	Good

Note. Values are presented as mean ($\bar{X}$) and standard deviation (SD). Mental toughness was assessed using the Psychological Performance Inventory (PPI), with higher scores indicating higher levels of the respective components.

As shown in Table 1, the overall level of mental toughness among youth woodball players demonstrated a mean score of 3.67 (SD = 0.66), which was interpreted at a good level. Among the individual components, motivation exhibited the highest mean score ($\bar{X}$ = 3.79, SD = 0.69), followed by attitude control ($\bar{X}$ = 3.78, SD = 0.66) and negative energy control ($\bar{X}$ = 3.76, SD = 0.64), all of which were interpreted at good levels.

Self-confidence showed a mean score of 3.68 (SD = 0.59), while positive energy and attentional control demonstrated comparable mean values ($\bar{X}$ = 3.67, SD = 0.53 and $\bar{X}$ = 3.64, SD = 0.72, respectively), both within the good range. Imagery recorded the lowest mean score among the mental toughness components ($\bar{X}$ = 3.40, SD = 0.81) and was interpreted at a moderate level. These results indicate variation across components despite an overall good level of mental toughness.

Discussion

The purpose of this study was to describe the mental toughness profile of youth woodball players using a multidimensional framework. Interpreting the findings as a psychological profile rather than as indicators of fixed strengths or weaknesses is consistent with established perspectives that conceptualize mental toughness as a set of interrelated and trainable psychological skills (Loehr, 1986; Jones et al., 2007; Crust, 2008). More recent empirical work also supports the view that mental toughness operates as a dynamic psychological resource that can be developed and enhanced through structured programs (Demir et al., 2025; Pocius, 2025). The overall pattern of results suggests that certain components appear relatively more developed than others, which may reflect differences in how psychological characteristics are acquired during youth sport participation and competitive exposure.

Motivation emerged as the most prominent component in the present sample. A plausible explanation is that motivation may be reinforced early and continuously in youth

sport contexts because it is closely linked to observable behaviors such as training attendance, effort, and persistence. In mental toughness frameworks, commitment and persistence are frequently emphasized as core features that enable athletes to tolerate training demands and competitive challenges (Loehr, 1986; Jones et al., 2007). In a self-paced precision sport such as woodball, where athletes must repeatedly initiate and sustain task engagement without external pacing cues, motivation may function as a foundational psychological resource that supports ongoing participation and practice. This interpretation is consistent with recent findings suggesting that athletes with stronger mental toughness profiles demonstrate greater persistence and performance stability under competitive stress (Demir et al., 2025). However, while motivation may provide the energy to engage, it does not necessarily ensure effective performance execution if other regulatory skills are insufficiently developed.

Attitude control and negative energy control were also relatively high. These components reflect the ability to manage emotional reactions and maintain functional responses under pressure. Mental toughness literature consistently highlights emotional regulation and coping as central mechanisms for sustaining performance quality in competitive environments (Loehr, 1986; Jones et al., 2007; Crust, 2008). Contemporary evidence further indicates that higher levels of mental toughness are associated with lower levels of sport-related anxiety, suggesting a regulatory function of mental toughness under pressure conditions (Demir et al., 2025). It is possible that repeated exposure to competitive situations allows youth athletes to learn, through experience, which emotional reactions disrupt execution and how to restore task focus following mistakes. Such experiential learning may gradually reinforce adaptive emotional responses, even in the absence of formal psychological skills training. This interpretation aligns with the view that mental toughness-related coping skills can be shaped through interaction with performance demands rather than emerging solely as innate traits (Pocius, 2025).

Self-confidence demonstrated a good level among the participants. Confidence has long been regarded as a central element of mental toughness, supporting decisiveness, persistence, and willingness to engage with performance challenges (Loehr, 1986; Crust, 2008). In youth athletes, confidence may plausibly develop through mastery experiences, such as successful skill execution and gradual performance improvement in training and competition. In self-paced sports, confidence may be particularly relevant because athletes must independently initiate each action and commit fully to execution. Recent structural modeling evidence has shown that higher mental toughness is positively associated with psychological resources that support performance readiness, including imagery and emotional stability (Demir et al., 2025). Nevertheless, given the descriptive nature of the present study, confidence should be interpreted as part of a broader psychological profile rather than as a standalone determinant of performance effectiveness.

Positive energy and attentional control were observed at moderate levels. This pattern may indicate that while youth athletes are generally able to maintain functional activation, sustaining stable attention throughout competitive sequences remains challenging. Attentional regulation is widely recognized as a key feature of mentally tough performance, particularly in situations involving pressure and distraction (Loehr, 1986; Jones et al., 2007). In youth competition, attentional control may be especially sensitive to emotional carry-over from previous actions, evaluative concerns, and environmental variability. Furthermore, recent research integrating mental toughness, anxiety, and sport imagery has suggested that anxiety may negatively influence cognitive performance-related processes, including imagery and attentional engagement (Demir et al., 2025). In addition, measurement discussions within the mental toughness literature caution that profile scores reflect tendencies rather than absolute capacities, and moderate values may represent typical developmental levels rather than deficiencies (Middleton et al., 2003). From an applied perspective, attentional control represents a meaningful target for systematic psychological skill development.

Imagery was the lowest-rated component in the present profile. This finding is noteworthy because imagery is commonly conceptualized as a technique-based psychological skill that requires deliberate instruction and structured practice to develop effectively (Crust & Clough, 2011). Unlike motivation or emotional responses, imagery does not typically emerge automatically through participation alone. Therefore, lower imagery levels may plausibly reflect limited exposure to structured imagery training within youth sport environments rather than an inherent limitation of the athletes. Recent empirical findings have demonstrated that mental toughness is positively associated with sport imagery ability, while anxiety exerts a negative influence on imagery processes (Demir et al., 2025). This interaction suggests that imagery development may depend not only on technical instruction but also on broader emotional and regulatory capacities. Previous intervention-oriented research has suggested that psychological skills programs incorporating imagery can enhance dimensions related to mental toughness when implemented systematically (Bhambri et al., 2005; Pocius, 2025). As such, imagery may represent a modifiable component with potential spillover benefits for attentional focus and performance preparation in self-paced sports.

When considered collectively, the present findings suggest that mental toughness components reinforced through experience and competition (e.g., motivation and emotional regulation) may appear relatively stronger, whereas components that depend more heavily on deliberate psychological skill training (e.g., imagery and sustained attentional control) may be less developed. This pattern supports the view that mental toughness should be understood as a dynamic and developmental construct rather than a fixed trait (Crust, 2008; Jones et al., 2007; Demir et al., 2025; Pocius, 2025). At the same time, conceptual and measurement debates caution against overinterpreting descriptive profiles as definitive indicators of psychological quality (Middleton et al., 2003).

Conclusion

This study examined the mental toughness profile of youth woodball players using a multidimensional approach. The findings indicate that overall mental toughness among youth woodball players is at a moderate-to-good level, with variation observed across psychological components. The results suggest that mental toughness in youth athletes should be viewed as a developing psychological profile rather than a fixed attribute. This descriptive evidence provides a baseline understanding of mental toughness characteristics in youth athletes participating in a precision-based, self-paced sport. These findings may contribute to the understanding of psychological readiness patterns in youth precision sports.

Suggestion

Based on the findings of this study, several practical and research-oriented suggestions may be proposed. First, psychological development programs for youth athletes may consider incorporating structured psychological skills training alongside regular technical and physical preparation. Particular attention may be directed toward psychological skills that require deliberate and systematic practice, such as imagery and sustained attentional regulation, especially in precision-based, self-paced sports.

Second, future research may employ longitudinal designs to examine developmental changes in mental toughness components over time. Intervention-based studies may also be conducted to evaluate whether targeted psychological skills training leads to measurable changes in specific components of mental toughness in youth sport contexts.

Finally, future studies may expand the scope of investigation to include athletes from different sports or competitive levels in order to further explore how sport-specific performance demands may shape mental toughness profiles. In particular, comparative profiling across precision-based sports such as golf or archery may provide deeper insight into whether distinct task demands contribute to variations in psychological skill configurations.

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Startup Sustainability as A Governance Outcome: Funding Dynamics, ESG Legitimacy, and Institutional Amplification in Emerging Asia

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Abstract

This study examines startup sustainability in Emerging Asia from an ecosystem-level perspective, with particular attention to Southeast Asia. Rather than relying on firm-level explanations, it investigates how funding dynamics, survival constraints, ESG orientation, and institutional quality jointly shape startup outcomes. Using secondary ecosystem-level indicators and benchmark data across Southeast Asian economies and selected Emerging Asian comparators, the study applies a descriptive-comparative and benchmark-based analytical approach to identify systemic patterns in startup sustainability. The analysis reveals four main findings. First, startup funding has remained under prolonged contraction since the 2021 peak, accompanied by heightened volatility and a pronounced shift toward later-stage capital allocation. In the first half of 2025, total equity investment in Southeast Asia fell to USD 1.85 billion, intensifying early-stage financing constraints. Second, survival benchmarks indicate structural fragility: approximately 72% of startups survive beyond one year, but survival declines to around 55% by the third year and to roughly 20–30% by the fifth year, with the greatest failure risk concentrated at pre-seed and seed stages. Third, ESG-oriented startups account for about one-quarter of ecosystem activity on average, although with substantial cross-ecosystem variation. Their apparent survival advantage is best interpreted as a legitimacy-stabilization effect rather than direct performance enhancement. Fourth, this ESG-related advantage is conditional on institutional quality: stronger governance environments enhance the credibility and effectiveness of ESG signals, whereas weaker institutional contexts reduce their survival relevance. Overall, startup sustainability in Emerging Asia is best understood as a systemic governance outcome shaped by the interaction of capital allocation, legitimacy mechanisms, and institutional capacity.

Keywords: Startup Sustainability, Entrepreneurial Ecosystems, ESG Orientation, Institutional Quality, Emerging Asia

Introduction

Over the past decade, startups have been widely promoted as engines of innovation, employment generation, and economic upgrading across Emerging Asia. Governments, investors, and international organizations have invested heavily in entrepreneurial ecosystem development, often emphasizing startup formation, funding volumes, and highly visible success stories (Vandenberg et al., 2021; Leung & You, 2023). Yet the longer-term sustainability of startups remains highly uncertain. Across many Emerging Asian economies, high failure rates, volatile funding cycles, and uneven ecosystem development continue to

raise fundamental questions about how startup success and failure should be interpreted (Tran et al., 2021; Nguyen, 2022).

Most existing studies explain startup outcomes primarily through firm-level factors, including founder characteristics, innovation capability, strategy, and resource management. These explanations remain important, but they are less sufficient in settings where startups operate under strong systemic constraints. In Emerging Asia, entrepreneurs often confront prolonged funding contractions, pronounced late-stage capital bias, regulatory fragmentation, and uneven institutional quality (Zhao et al., 2021; Ungerer & Pietsch, 2025). Under such conditions, even capable and well-managed startups may fail not because of entrepreneurial weakness, but because the surrounding ecosystem narrows their chances of survival (Narayan et al., 2025).

Developments in Southeast Asia illustrate this problem clearly. After venture funding peaked in 2021, investment declined sharply and remained unstable through 2024-2025, while capital became more selective and increasingly concentrated in later-stage ventures (Ekawati et al., 2025; Roy & Vasa, 2025). Early-stage startups, by contrast, faced severe financing shortages and stronger selection pressure. At the same time, ecosystem-level survival benchmarks suggest that a substantial proportion of startups do not remain viable beyond the first three to five years, pointing to the structural vulnerability of entrepreneurial sustainability in the region (Khoury et al., 2021; Tran & Le, 2024).

Alongside these shifts, environmental, social, and governance (ESG) considerations have gained prominence in entrepreneurial finance and public policy discourse. Across Asia, ESG principles are increasingly framed as mechanisms for strengthening trust, encouraging long-term orientation, and supporting responsible value creation (Biswas & Dygas, 2025; Hermawan et al., 2025). ESG-oriented startups are often described as more resilient, credible, or future-ready. Even so, empirical evidence on whether ESG orientation improves startup survival, especially in emerging economies, remains limited and inconclusive (Saleem et al., 2023). A further limitation is that much of the existing literature treats ESG as a direct performance driver, giving less attention to its potential role as a legitimacy and risk-governance mechanism whose effects may depend on institutional conditions.

Against this backdrop, this study argues that startup sustainability in Emerging Asia is best understood as a systemic governance outcome produced by the interaction of four ecosystem-level forces: funding structure, survival constraints, ESG orientation, and institutional quality. Rather than asking whether ESG works in isolation, the study examines when and under what conditions ESG-related legitimacy contributes to survival stability. This shift moves the analytical focus away from individual startups and toward the ecosystems in which they are embedded (Vandenberg et al., 2021; Nguyen, 2022).

To address this problem, the study adopts an ecosystem-level analytical framework and poses four research questions:

1. How have funding dynamics in Southeast Asia evolved in recent years, and how do these changes shape early-stage survival constraints?
2. What do ecosystem-level survival and failure benchmarks reveal about the structural sustainability of startups in Emerging Asia?
3. How prevalent are ESG-oriented startups across ecosystems, and what role does ESG orientation play as a legitimacy signal under capital scarcity?
4. How does institutional quality amplify or weaken the effectiveness of ESG orientation in shaping startup survival outcomes?

This study makes three contributions. First, it extends entrepreneurial ecosystem research by reframing startup sustainability as an interaction-driven governance outcome rather than a purely firm-level achievement (Tran et al., 2021; Narayan et al., 2025). Second,

it provides ecosystem-level empirical benchmarks on funding conditions, survival patterns, and ESG orientation in Emerging Asia (Ekawati et al., 2025; Hermawan et al., 2025). Third, it develops and supports the concept of institutional amplification by showing that ESG-related survival advantages depend not simply on ESG adoption, but on the governance capacity of the surrounding institutional environment (Biswas & Dygaa, 2025; Saleem et al., 2023).

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature and develops the conceptual framework. Section 3 explains the data sources and research design. Section 4 presents the empirical findings. Section 5 discusses the theoretical and policy implications. Section 6 concludes with the main findings, limitations, and directions for future research.

Literature Review and Conceptual Framework

This section develops the conceptual foundation of the study by integrating four strands of literature: entrepreneurial ecosystems and startup survival, funding dynamics and capital selectivity, ESG orientation as a legitimacy and risk-governance signal, and institutional quality as an amplification mechanism. Taken together, these literatures support an integrated framework in which startup sustainability is understood not simply as a firm-level achievement, but as an outcome shaped by interacting system conditions (Tran et al., 2021; Narayan et al., 2025).

Startup Survival and the Limits of Firm-Level Explanations

Research on startup survival has traditionally emphasized firm-level determinants, such as founder characteristics, innovation capability, strategic orientation, and resource management. This body of work has yielded important insights into why some ventures outperform others. Even so, evidence from emerging and volatile markets increasingly suggests that firm-level explanations alone cannot fully account for observed survival and failure patterns (Zhao et al., 2021; Nguyen, 2022).

In many emerging economies, startups operate under conditions of capital scarcity, regulatory uncertainty, weak enforcement, and uneven market depth. In such settings, outcomes often reflect structural constraints as much as entrepreneurial capability. Early-stage failure, therefore, should not be interpreted solely as evidence of managerial weakness. It may also indicate broader limits embedded in the surrounding entrepreneurial environment, including financing access, legitimacy thresholds, and governance capacity (Vandenberg et al., 2021; Ungerer & Pietsch, 2025).

This perspective supports a shift from micro-level hazard explanations toward a broader view in which startup survival is shaped by systemic selection processes. From this standpoint, failure is not merely an individual firm outcome, but part of a wider pattern structured by the rules, incentives, and constraints of the ecosystem itself (Tran et al., 2021).

Funding Dynamics and Capital Selectivity in Entrepreneurial Ecosystems

Venture funding plays a central role in shaping startup trajectories. Beyond supplying financial resources, funding structures also function as selection mechanisms that determine which ventures obtain legitimacy, visibility, and access to growth opportunities. Prior research shows that funding cycles influence not only investment volume, but also the composition of ventures that survive and scale (Bessière et al., 2020; Mašek & Plaček, 2024).

During periods of capital expansion, early-stage ventures typically benefit from greater tolerance for experimentation and uncertainty. During downturns, by contrast, investors become more selective, place greater weight on proven models, and shift capital toward later-stage firms. This dynamic places disproportionate pressure on pre-seed and seed-stage startups, which face the highest uncertainty and possess the weakest legitimacy signals (Zhao et al., 2021; Ungerer & Pietsch, 2025).

In emerging ecosystems, prolonged funding contractions may therefore create pipeline bottlenecks, weaken ecosystem renewal, and intensify early-stage attrition. Funding dynamics should thus be conceptualized not only as a market condition, but also as a governance mechanism that shapes selection pressure and survival probabilities across the system (Narayan et al., 2025).

ESG Orientation as a Legitimacy and Risk-Governance Signal

Environmental, social, and governance (ESG) orientation has become increasingly prominent in entrepreneurial finance and policy debates. Although some studies present ESG adoption as a driver of superior organizational performance, a growing body of research emphasizes its signaling and governance functions instead (Chan, 2026; Schmelter & Strese, 2024).

From a legitimacy perspective, ESG orientation can reduce information asymmetry between startups and external stakeholders by signaling responsible conduct, long-term orientation, and greater sensitivity to risk. Under uncertain conditions, such signals may stabilize stakeholder expectations and lower perceived downside risk. For startups that lack long performance histories, ESG orientation may therefore operate less as a direct productivity enhancer and more as a mechanism of legitimacy formation and risk governance (Koenigsmarck et al., 2026; Deng et al., 2025).

At the same time, ESG signals are not inherently credible. Without verification, enforcement, or shared interpretive norms, such signals may remain symbolic rather than consequential. This raises a central analytical question: under what conditions does ESG orientation translate into meaningful survival advantages, especially in emerging ecosystems marked by heterogeneous institutional quality (Bai et al., 2025)?

Institutional Quality and the Amplification Logic

Institutional quality, including regulatory clarity, enforcement capacity, transparency, and stakeholder trust, plays a decisive role in shaping how signals and resources are interpreted within entrepreneurial ecosystems. Strong institutions enhance signal credibility, reduce transaction costs, and improve coordination among market participants. Weak institutions, by contrast, heighten uncertainty and reduce the effectiveness of market and governance signals (Kim et al., 2024; Shi & Mai, 2025).

The concept of institutional amplification captures this moderating logic. Rather than acting only as an independent predictor of startup outcomes, institutional quality may strengthen or weaken the effectiveness of other mechanisms, especially funding selectivity and ESG legitimacy. In higher-quality institutional environments, ESG signals are more likely to be verified, trusted, and translated into stakeholder support. In weaker institutional settings, the same signals may be discounted, ignored, or treated as symbolic claims with limited practical value (Li et al., 2026; Fodouop Kouam, 2025).

This perspective implies that ESG orientation cannot be evaluated meaningfully apart from the institutional context in which it is embedded. Its relevance to startup survival depends critically on the governance capacity of the wider ecosystem (Yang et al., 2025).

Integrated Conceptual Framework

Bringing these strands together as shown in Figure 1, this study proposes an integrated framework in which startup sustainability emerges from the interaction of four components:

1. Funding structure, which shapes resource allocation and selection pressure.
2. Survival constraints, reflected in early-stage attrition and longer-term failure benchmarks.
3. ESG orientation, which functions as a legitimacy and risk-governance signal.
4. Institutional quality, which amplifies or attenuates the effectiveness of ESG and funding-related mechanisms.

Within this framework, startup survival is not explained by ESG adoption alone, nor by funding access in isolation. Rather, sustainability is produced through interaction effects across the ecosystem. Funding scarcity raises legitimacy thresholds; ESG orientation helps stabilize stakeholder perceptions under uncertainty; and institutional quality determines whether such stabilization can be translated into meaningful survival advantages (Chan, 2026; Li et al., 2026).

The framework therefore positions startup sustainability as a systemic governance outcome emerging from the combined operation of capital allocation, legitimacy formation, and institutional capacity.

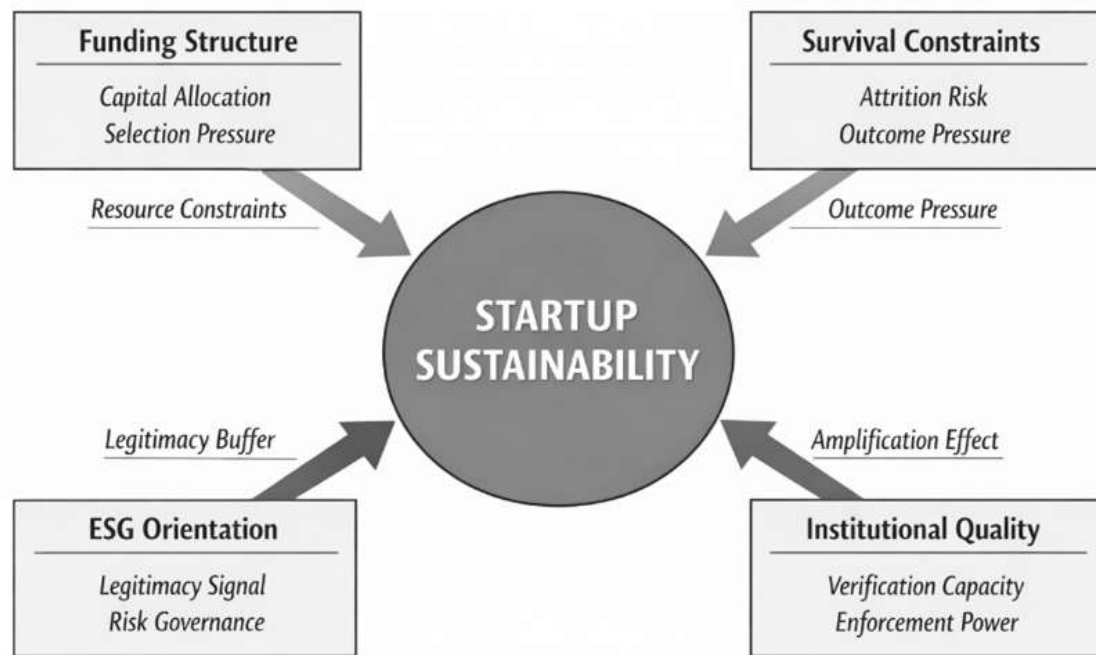


Figure 1: Integrated Conceptual Framework

Research Propositions (RP)

Guided by the integrated conceptual framework, the study advances the following ecosystem-level research propositions:

RP1: In Emerging Asian startup ecosystems, funding contraction and late-stage capital bias intensify resource constraints and increase outcome pressure on early-stage ventures, thereby weakening startup sustainability (Zhao et al., 2021; Narayan et al., 2025).

RP2: ESG orientation contributes to startup sustainability not primarily through direct performance enhancement, but through legitimacy stabilization and risk-governance buffering under conditions of funding selectivity and survival pressure (Koenigsmarck et al., 2026; Deng et al., 2025).

RP3: Institutional quality amplifies the sustainability relevance of ESG orientation, such that ESG-related legitimacy and buffering effects are stronger in ecosystems with higher verification capacity, enforcement strength, and stakeholder trust (Kim et al., 2024; Shi & Mai, 2025).

These propositions guide the empirical design and structure the analysis presented in Sections 3 and 4.

In summary, this section establishes the theoretical basis for interpreting startup sustainability as an ecosystem-level outcome shaped by the interaction of funding structure, survival constraints, ESG orientation, and institutional quality. The next section explains the data sources, variable construction, and research design used to operationalize this framework.

Data and Research Design

This section explains the data sources, unit of analysis, variable construction, and analytical strategy used to examine startup sustainability in Emerging Asia. The research design is intentionally ecosystem-level, descriptive-comparative, and benchmark-based. It is aligned with the study's objective of identifying systemic interaction patterns across entrepreneurial environments rather than estimating firm-level causal effects or hazard models (Bessière et al., 2020; Narayan et al., 2025).

Unit of Analysis and Analytical Scope

The primary unit of analysis in this study is the startup ecosystem, defined at the country or regional level. An ecosystem is understood as the configuration of startups, investors, support organizations, institutions, and governance arrangements operating within a national or sub-regional context (Vandenberg et al., 2021).

Accordingly, the study does not follow individual firms over time. Instead, it examines ecosystem-level structural indicators, including total funding volumes, deal activity, survival benchmarks, ESG-oriented startup shares, and institutional quality indices. This level of analysis is appropriate for the present research because the study is concerned with systemic constraints, governance capacity, and cross-ecosystem heterogeneity, all of which are difficult to capture adequately through firm-level designs in emerging markets (Tran et al., 2021; Zhao et al., 2021).

The geographical scope covers Emerging Asia, with particular emphasis on Southeast Asia, including Thailand, Singapore, Indonesia, Vietnam, Malaysia, and the Philippines, alongside selected broader Emerging Asian benchmarks used for comparative interpretation (Hermawan et al., 2025).

Data Sources and Selection Criteria

The study relies on secondary data compiled from multiple publicly available and policy-relevant sources. These include startup ecosystem databases and rankings for startup counts and comparative ecosystem benchmarks, venture funding reports for funding volumes and deal activity, national innovation and entrepreneurship agencies for country-specific ecosystem indicators, and governance-related composite indices for institutional quality (Bessière et al., 2020; Vandenberg et al., 2021; Nguyen, 2022).

To be included in the analysis, a source had to satisfy three conditions. First, it had to report indicators at an ecosystem-comparable level rather than only at the individual-firm level. Second, it had to provide information directly relevant to at least one of the four analytical components of the framework: funding structure, survival constraints, ESG orientation, or institutional quality. Third, it had to offer sufficient definitional clarity to permit cross-source comparison or harmonization. Additional context on regional investment trends was drawn from policy and industry reports that provide macro-level benchmarks for interpreting funding shifts across ecosystems (Narayan et al., 2025).

Startup survival benchmarks were compiled from ecosystem-level reports that provide indicative failure and survival patterns across different time horizons, while institutional quality indicators were drawn from widely used governance and regulatory-quality composites normalized for cross-country comparison (Zhao et al., 2021; Nguyen, 2022). ESG-oriented startup activity was identified using regional classifications that explicitly

recognize environmental, social, or governance-related value propositions within entrepreneurial ecosystems (Hermawan et al., 2025).

Because reporting conventions differ across sources, the study uses a harmonization procedure rather than simple aggregation. Where conceptually similar indicators were reported with different labels, values were aligned to the nearest ecosystem-level equivalent. When reporting periods differed, the most comparable period available was used for descriptive interpretation. The resulting dataset is therefore designed for cross-ecosystem comparison and benchmark-based analysis rather than pooled causal estimation.

Variable Construction and Definitions

The main variables are defined as follows. Startup count refers to the total number of active startups identified within an ecosystem for a given period. Total funding (USD billion) refers to aggregate annual venture equity investment deployed within an ecosystem, expressed in constant U.S. dollars where reported or converted for comparability. Deal count captures the number of equity financing rounds recorded within the ecosystem. Funding stage shares indicate the proportional distribution of funding across seed, early, and late stages (Bessière et al., 2020).

Survival benchmarks refer to ecosystem-level estimates or indicative ranges of startup survival at one-, three-, and five-year horizons, compiled from multiple regional and comparative reports (Zhao et al., 2021). ESG-oriented startup share measures the proportion of startups whose primary value proposition explicitly addresses environmental, social, or governance objectives, based on the classification logic used by the relevant source or regional reporting framework (Hermawan et al., 2025). Institutional quality is represented by a composite indicator reflecting regulatory quality, governance effectiveness, and enforcement capacity, normalized to a zero-to-one scale for cross-ecosystem comparison (Nguyen, 2022).

These variables are used descriptively and comparatively to identify central tendencies, dispersion, and directional interaction patterns across ecosystems. They are not used to estimate causal coefficients or firm-level treatment effects.

Analytical Strategy

The analytical strategy proceeds in four steps. First, descriptive comparison is used to document ecosystem heterogeneity in funding scale, survival patterns, ESG orientation, and institutional quality. Second, funding dynamics are examined across time and across financing stages in order to identify structural shifts in capital allocation, especially the degree of early-stage constraint and late-stage concentration (Bessière et al., 2020; Mašek & Plaček, 2024).

Third, survival and failure benchmarks are analyzed to establish baseline sustainability constraints and stage-dependent attrition patterns across ecosystems (Zhao et al., 2021). Fourth, stratified comparison is used to assess how ESG orientation and institutional quality jointly relate to survival stability. Rather than estimating regression coefficients, the analysis focuses on benchmark contrasts, proportional differences, and directional patterns that are consistent with the conceptual framework advanced in Section 2 (Narayan et al., 2025).

This analytical design is appropriate for two reasons. It matches the ecosystem-level unit of analysis, and it reflects the practical data constraints that characterize secondary research on entrepreneurial environments in emerging economies. The purpose of the analysis is therefore explanatory in a comparative and interpretive sense, not inferential in a firm-level statistical sense.

Methodological Considerations and Limitations

Several methodological considerations should be acknowledged. First, the use of ecosystem-level aggregates does not permit firm-level causal inference, hazard estimation, or direct testing of micro-level mechanisms. Second, the survival benchmarks reported in the

study represent indicative structural ranges compiled from multiple sources and should therefore be interpreted as comparative ecosystem patterns rather than precise actuarial probabilities (Zhao et al., 2021).

Third, startup counts, funding totals, and ESG classifications may vary somewhat across sources because of definitional differences, reporting thresholds, and update cycles (Hermawan et al., 2025). The harmonization process reduces, but does not eliminate, these differences. For this reason, the study emphasizes pattern consistency, benchmark contrast, and interaction logic rather than fine-grained numerical precision. These limitations are inherent to secondary ecosystem research, but they do not undermine the study's central objective, which is to identify comparative patterns and governance-relevant interactions rather than generate point prediction.

Alignment with Research Propositions

The data and research design are directly aligned with the propositions developed in Section 2. The funding indicators speak to Proposition 1 by showing whether contraction and late-stage capital bias intensify early-stage constraints. The ESG-oriented startup share and survival benchmarks inform Proposition 2 by allowing comparison of whether ESG orientation is associated with a proportional survival advantage. Institutional quality indicators, interpreted alongside ESG-related patterns, inform Proposition 3 by clarifying whether stronger governance environments amplify the survival relevance of ESG orientation.

By structuring the analysis around ecosystem-level indicators and interaction logic, the study maintains internal consistency between theory, evidence, and interpretation (Tran et al., 2021; Narayan et al., 2025).

In sum, this section establishes a transparent and appropriate research design for examining startup sustainability as a systemic, governance-driven phenomenon. The next section presents the empirical results.

Results

Descriptive Statistics for the Ecosystem-Level Sample

This study uses secondary ecosystem-level data to capture startup activity across Emerging Asia, with particular attention to Southeast Asia. The unit of analysis is the startup ecosystem at the country or regional level rather than the individual firm. All descriptive statistics therefore represent aggregated structural conditions, including ecosystem scale, funding intensity, stage-level capital composition, survival benchmarks, ESG orientation, and institutional context.

The dataset comprises country-year and region-period observations from major Southeast Asian economies, including Thailand, Singapore, Indonesia, Vietnam, and Malaysia, together with regional aggregates. This structure provides a balanced ecosystem-level sample suitable for comparative and institutional analysis.

Table 1 reports the descriptive statistics for the main variables used in the study. The results indicate substantial heterogeneity across ecosystems in both scale and maturity. Startup counts range from fewer than 500 to more than 5,000 active ventures, while annual venture funding also shows wide dispersion, pointing to strong concentration of capital across a relatively small number of ecosystems.

The stage composition of funding is similarly uneven. Seed-stage funding accounts for roughly one-fifth of total capital on average, whereas late-stage funding represents nearly half of all funding. This pattern suggests a structurally imbalanced investment profile in which later-stage ventures attract a disproportionate share of available capital, potentially constraining ecosystem renewal at earlier stages.

The survival indicators reinforce this interpretation. Mean three-year survival is approximately 55%, while the estimated five-year failure rate exceeds 78% (Table 1).

These values suggest that startup fragility is not limited to isolated firms but reflects broader structural pressures operating across ecosystems. ESG-oriented startups account for about one-quarter of ecosystem activity on average, although the large dispersion indicates uneven diffusion of sustainability-oriented entrepreneurship. Institutional quality also varies markedly across the sample, underscoring the relevance of governance conditions for interpreting ecosystem differences.

To anchor these ecosystem-level patterns in observed regional context, Table 2 presents descriptive indicators for Thailand and Southeast Asia. Thailand's estimated startup base and three-year survival benchmark are broadly consistent with the sample averages reported in Table 1, lending external plausibility to the descriptive baseline. At the same time, Thailand's funding level and regional ranking place it within an intermediate-maturity position in Southeast Asia, while regional investment trends show strong concentration in digitally intensive and AI-related sectors.

Taken together, Tables 1 and 2 establish the structural baseline for the analysis. They show that startup ecosystems in Emerging Asia differ not only in scale, but also in capital structure, sustainability orientation, and governance context. These differences provide the descriptive foundation for the funding, survival, ESG, and institutional analyses that follow.

Table 1: Descriptive Statistics of The Ecosystem-Level Startup Sample

Variable	Definition	Mean	Std. Dev.	Min	Max
Startup count	Number of active startups in the ecosystem	1,820	1,240	420	5,300
Total funding (USD billion)	Annual venture funding volume	1.92	1.15	0.38	5.10
Deal count	Number of equity financing rounds	238	96	72	510
Seed-stage funding share (%)	Share of total funding allocated to seed-stage ventures	21.4	9.6	8.2	44.5
Late-stage funding share (%)	Share of total funding allocated to late-stage ventures	46.8	13.2	22.4	71.3
3-year survival rate (%)	Estimated startup survival rate after three years	54.7	7.9	38.5	68.4
5-year failure rate (%)	Estimated startup failure rate after five years	78.3	6.5	65.0	90.0
ESG-oriented startup share (%)	Share of startups classified as ESG-oriented	24.6	10.3	9.1	48.7
Institutional quality index	Composite governance score, normalized from 0 to 1	0.61	0.18	0.32	0.89

Note: All values represent ecosystem-level aggregates across Emerging Asian economies. Funding figures are reported in constant U.S. dollars. The institutional quality index is normalized on a 0-1 scale.

Table 2: Contextual Descriptive Indicators for Thailand and Southeast Asia

Indicator	Description / Metric	Value	Source / Note
Thailand total startups (2024)	Active startups in the Thai ecosystem	Approx. 2,100 firms	National Innovation Agency (2024)
Startup growth (2021–2024)	Cumulative growth	+3.3%	NIA ecosystem data
Startup survival rate (Bangkok)	Startups operating after three years	Approx. 55%	Bangkok startup statistics
Thailand private funding (2024)	Estimated private funding volume	> USD 500 million	Abovea Thailand report
Global ecosystem rank (2025)	Global position	#54	StartupBlink Global Index
Southeast Asia ecosystem rank (2025)	Thailand's regional position	#4	StartupBlink SEA
Southeast Asia digital economy funding (2024–2025)	Private investment volume	Approx. USD 7.7 billion	Google–Temasek–Bain; Reuters
AI investment share	Share of digital VC allocated to AI	Approx. 32%	Reuters

Note: These indicators are presented to contextualize the ecosystem-level sample using externally reported descriptive benchmarks for Thailand and Southeast Asia.

Funding Dynamics in Southeast Asia

This subsection examines funding dynamics in the Southeast Asian startup ecosystem, focusing on aggregate funding volume, deal activity, and stage-level capital allocation. Using ecosystem-level secondary data, the analysis identifies a pronounced contraction in venture financing during 2024–2025, accompanied by heightened short-term volatility.

Table 3 summarizes the key funding indicators for 2025. In the first half of 2025, total equity investment across Southeast Asia fell to approximately USD 1.85 billion across 229 deals, representing a year-on-year decline of about 20.7% relative to the same period in 2024. This was the weakest first-half fundraising performance in more than six years.

Viewed over a longer horizon, Table 3a shows that this decline is not an isolated fluctuation but part of a broader post-2021 downturn. Total equity funding dropped sharply from the 2021 peak and remained weak through 2024, with H1 2025 indicating further deterioration. The evidence therefore points to a sustained structural adjustment rather than a short-lived cyclical correction.

The composition of funding also changed materially. As Tables 3 and 3c indicate, capital became increasingly concentrated in later-stage ventures, while seed and early-stage funding contracted sharply. The decline was especially severe at the seed stage, whereas later-stage totals were supported by a limited number of large transactions. This stage-level asymmetry is consistent with stronger investor risk aversion and a greater emphasis on capital efficiency, validation, and proven business models.

Short-term movements further reveal instability rather than recovery. Table 3b shows sharp month-to-month and quarter-to-quarter variation, including a severe downturn in August 2025 followed by a rebound in September that appears to have been driven by a small number of selective deals rather than a broad improvement in market conditions.

Three patterns are especially clear from Tables 3–3c. First, the magnitude and persistence of the decline point to a structural funding downturn. Second, capital reallocation toward later-stage ventures has intensified stage-level polarization, making early-stage entry and survival more difficult. Third, the volatility of recent funding flows suggests that aggregate investment levels are increasingly dependent on episodic deal concentration.

Taken together, the evidence indicates that funding scarcity, volatility, and stage polarization have become defining features of the Southeast Asian startup environment. These conditions form the empirical basis for the survival patterns examined in Section 4.3.

Table 3: Funding Dynamics in Southeast Asia (2025)

Metric (Period)	Value	Interpretation	Source / Note
Total funding (H1 2025)	USD 1.85 billion	Lowest first-half funding since 2019	DealStreetAsia
Deal count (H1 2025)	229 deals	Weak overall investment activity	DealStreetAsia
Year-on-year funding change (H1 2025)	-20.7%	Significant contraction relative to H1 2024	DealStreetAsia
Seed-and early-stage funding	Sharp decline	Severe weakening of early-stage capital availability	Funding trend synthesis
Late-stage funding	Relative increase	Capital allocation shifted toward more mature ventures	Funding trend synthesis
Funding (August 2025)	Approx. USD 84 million	Severe monthly contraction	Regional funding analysis
Funding (September 2025)	Approx. USD 547 million	Rebound driven by a small number of large deals	DealStreetAsia
Deal count (September 2025)	37 deals	Weak monthly deal activity despite funding rebound	DealStreetAsia

Note: This table summarizes selected 2025 funding indicators used to illustrate contraction, volatility, and stage-level capital polarization in Southeast Asia. Because the indicators are compiled from multiple secondary sources, the final column reports the most relevant source or interpretive note for each entry.

Table 4: Startup Funding Trends in Southeast Asia (2021-2025)

Year / Period	Total Equity Funding (USD)	Deal Count	Key Trend
2021	Approx. 23.4 billion	n/a	Funding peak prior to the regional downturn
2023	Approx. 7.86 billion (est.)	n/a	Sharp contraction from the 2021 peak
2024	4.56 billion	633	Weakest annual performance in recent years
H1 2025	1.85 billion	229	Lowest first-half funding level in more than six years
2025 (digital economy, rolling 12-month context)	7.7 billion	n/a	Indicates capital specialization beyond conventional startup equity flows

Note: The digital economy investment figure is not strictly comparable to startup equity funding. It is included only as contextual evidence of broader capital reallocation in the regional innovation economy.

Table 5: Quarterly and Monthly Funding Volatility in Southeast Asia (2024-2025)

Period	Funding (USD)	Deal Count	Interpretation
Q4 2024	Approx. 1.2 billion	116	Temporary rebound driven by a limited number of large deals
Q1 2025	Approx. 555 million	113	Year-on-year funding declined sharply
Q3 2025	n/a	112	Weak quarterly deal volume relative to prior years
August 2025	Approx. 84 million	n/a	Severe monthly funding contraction
September 2025	Approx. 547 million	37	Funding rebound without broad deal recovery

Note: Monthly and quarterly figures are presented descriptively to illustrate short-term volatility rather than to imply a continuous recovery pattern.

Table 6: Stage-Level Funding Comparison in Southeast Asia Tech (9M 2024 vs. 9M 2025)

Stage	Rounds (9M 2024)	Funding 2024 (USD)	Rounds (9M 2025)	Funding 2025 (USD)	Interpretation
Seed	168	340 million	64	92 million	Severe contraction in early-stage activity
Early stage	89	1.10 billion	48	547 million	Selective decline in mid-pipeline financing
Late stage	9	471 million	7	670 million	Capital concentration in a small number of mature ventures
Total	n/a	Approx. 1.4 billion	n/a	Approx. 1.4 billion	Aggregate funding sustained by large late-stage rounds

Note: “9M” refers to the first nine months of each year. The stable aggregate total masks a substantial reallocation of capital away from seed and early-stage ventures toward late-stage deals.

Startup Survival and Failure Benchmarks

This subsection reports ecosystem-level benchmark evidence on startup survival and failure in Emerging Asia. The purpose is not to estimate firm-level hazard rates, but to establish baseline survival conditions that contextualize the ESG and institutional interpretations developed in subsequent subsections. In ecosystem analysis, survival rates are best treated as structural properties of the environment, reflecting capital availability, market depth, policy clarity, and legitimacy infrastructure rather than managerial capability alone.

Across Southeast Asian ecosystems, benchmark evidence converges around a three-year survival rate in the mid-50% range. As summarized in Table 4, approximately 72% of startups remain active after one year, but survival declines substantially by year three. Longer-horizon evidence indicates that failure rates commonly reach 70-90% by year five, pointing to persistent fragility in medium- and long-term startup sustainability.

This pattern is consistent with comparative evidence showing that, even in relatively advanced ecosystems, exit risk is concentrated in the early years of operation and moderates only after ventures pass the initial validation and scaling phases. Against this broader benchmark, a three-year survival rate of roughly 55% signals a demanding survival environment characterized by strong early-stage selection pressure.

Failure risk is also clearly stage-dependent. Table 4 indicates that vulnerability is greatest at the pre-seed and seed stages, where ventures face limited cash buffers, incomplete

product-market fit, and weaker legitimacy. Late-stage ventures face lower failure risk because they benefit from stronger validation, more stable funding access, and greater institutional recognition. This stage gradient aligns closely with the funding patterns documented in Section 4.2, where early-stage capital contracted more severely than later-stage funding.

Three findings follow. First, early attrition is the dominant selection mechanism, with the steepest decline occurring between founding and year three. Second, long-run sustainability remains weak across many ecosystems, even where short-term continuity appears relatively high. Third, stage dependency is systematic rather than incidental: survivability improves as ventures accumulate legitimacy, funding stability, and institutional embeddedness.

Figure 1 summarizes this benchmark trajectory visually. Survival falls from approximately 72% at year one to around 55% by year three and to roughly 20-30% by year five, with the steepest attrition occurring in the early years of operation.

Table 7 and Figure 1 therefore underscore the structural fragility of startup sustainability in Emerging Asia. While short-term continuity is not negligible, medium- and long-term survival remains constrained by ecosystem-level conditions, especially funding structure, legitimacy infrastructure, and institutional quality.

Table 7: Startup Survival and Failure Benchmarks in Emerging Asia (Ecosystem-Level)

Indicator	Benchmark Value	Interpretation
1-year survival rate	Approx. 72%	High experimentation with moderate short-term continuity
3-year survival rate	Approx. 55%	Substantial early attrition during validation and early scaling
5-year failure rate	Approx. 70-90%	Long-run startup sustainability remains structurally weak
Highest failure stage	Pre-seed and seed	Failure risk is concentrated where capital shortage and legitimacy deficits are greatest
Lowest failure stage	Late stage	Stronger validation, funding stability, and institutional recognition reduce failure risk
Dominant exit mode	Business closure	Closures exceed acquisitions across many ecosystems

Note: Values represent ecosystem-level benchmarks compiled from multiple regional and comparative sources. They are reported as descriptive structural patterns and should not be interpreted as firm-level survival probabilities, hazard estimates, or causal effects.

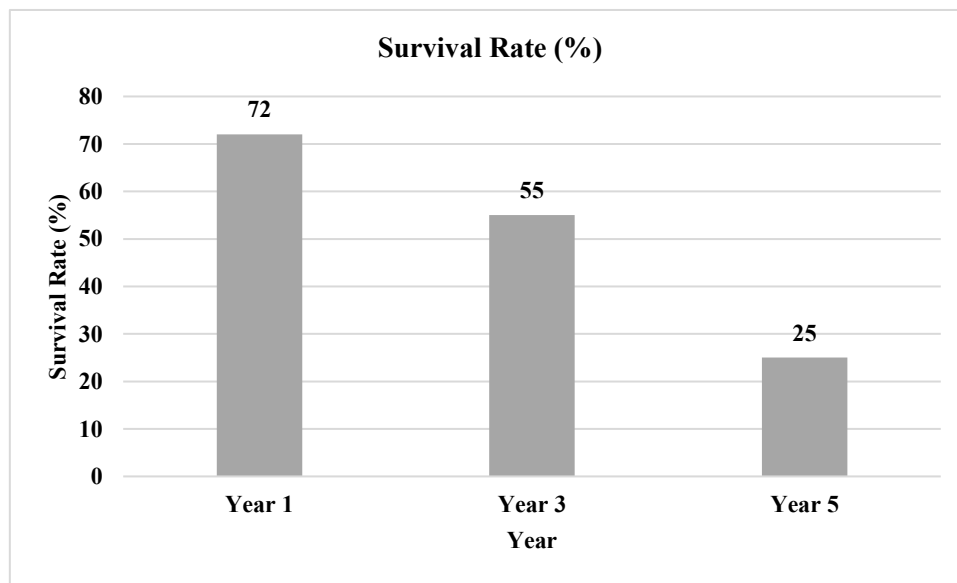


Figure 1: Benchmark Startup Survival Trajectory in Emerging Asia

ESG Orientation and Legitimacy Benchmarks

This subsection documents ecosystem-level benchmarks for ESG-oriented startup presence and interprets ESG orientation as a legitimacy and risk-governance signal rather than a direct productivity driver. The objective is descriptive: to establish how widely ESG-oriented ventures are represented across Emerging Asian ecosystems and why this representation matters under conditions of funding scarcity and elevated failure risk.

At the ecosystem level, ESG orientation functions as a credibility-bearing signal that can reduce information asymmetry for investors, partners, and regulators, especially when financing becomes selective. Evidence from emerging-market finance suggests that ESG-related disclosure and external validation may improve legitimacy under institutional complexity. In this context, ESG is better understood as a mechanism for stabilizing stakeholder expectations than as a guarantee of superior productivity.

Table 5 reports the descriptive benchmark for ESG-oriented startup presence across the ecosystem sample. On average, about 24.6% of startups are classified as ESG-oriented, although dispersion across ecosystems is substantial. This variation indicates that sustainability-oriented entrepreneurship is present at meaningful scale, but remains unevenly distributed across entrepreneurial environments.

Three implications follow from Table 5. First, ESG diffusion is material but heterogeneous, suggesting that sustainability-oriented entrepreneurship depends heavily on ecosystem-specific institutional readiness, stakeholder demand, and market depth. Second, ESG orientation can be read as a proxy for legitimacy infrastructure at the ecosystem level, reflecting the presence of ventures aligned with recognizable sustainability norms and reporting expectations. Third, ESG salience is likely to increase under funding contraction. When capital becomes scarce and selection tightens, credible signals become more valuable, making ESG orientation relevant not as virtue alone but as a risk-governance attribute.

Table 5a summarizes this interpretive logic. Under capital scarcity, ESG can function as a screening and credibility signal. Under high early-stage attrition, it may help stabilize stakeholder support. Under stronger institutional conditions, its credibility is more easily verified; under weaker conditions, symbolic adoption becomes more likely.

Taken together, Tables 5 and 5a show that ESG-oriented entrepreneurship in Emerging Asia is neither marginal nor uniform. It is an ecosystem-level compositional feature whose relevance becomes more pronounced under funding stress and survival pressure. This descriptive baseline prepares the ground for the institutional comparison in Section 4.5.

Table 8: ESG Orientation in The Ecosystem Sample (Descriptive Benchmark)

Indicator	Definition	Mean	Std. Dev.	Min	Max
ESG-oriented startup share (%)	Share of startups classified as ESG-oriented within the ecosystem	24.6	10.3	9.1	48.7

Note: Values represent ecosystem-level aggregates across Emerging Asian economies. ESG orientation is treated as a compositional characteristic of the entrepreneurial base rather than as a direct performance metric.

Table 9: Interpretive Logic Map for ESG Orientation (Descriptive, Ecosystem-Level)

Ecosystem Condition	Why ESG Orientation Matters	Expected Descriptive Manifestation
Capital scarcity / funding contraction	ESG functions as a screening and credibility signal under tighter financing conditions	Capital is more likely to concentrate around ventures with externally recognizable and credible narratives
High early-stage attrition	ESG functions as a legitimacy-stabilizing and risk-governance mechanism	ESG-oriented ventures are more likely to retain relatively stable stakeholder support under uncertainty
Stronger institutional environments	ESG signals are more verifiable, enforceable, and credible	A larger observable legitimacy-related premium is expected
Weaker institutional environments	ESG orientation is more vulnerable to symbolic adoption	Descriptive differences are smaller, weaker, or less consistent

Note: This table provides an interpretive scaffold for the analysis in Section 4.5. It summarizes the expected directional logic of ESG relevance at the ecosystem level and does not imply causal inference.

ESG Orientation and Institutional Amplification Effects

This subsection examines whether the descriptive ESG-related survival advantage observed at the ecosystem level is conditional on institutional quality. Rather than treating ESG orientation as a universal performance lever, the analysis interprets ESG as a legitimacy and risk-governance signal whose effectiveness depends on the ecosystem's capacity to verify claims, enforce rules, and sustain stakeholder trust.

Two strands of evidence motivate this interaction logic. One emphasizes that ESG-related actions and disclosure can reduce information asymmetry and strengthen legitimacy in institutionally complex environments. The other suggests that sustainability-oriented signals are more valuable when ventures face elevated uncertainty and when external stakeholders seek cues of lower downside risk. These strands together support the view that ESG may operate as a stabilizing mechanism, but only where the surrounding governance environment makes such signals credible.

Benchmark Pattern: ESG as a Stabilizing Rather than Transformative Mechanism

At the ecosystem level, ESG-oriented ventures account for a larger proportional share of estimated survival than non-ESG ventures. As shown in Table 6, ESG-oriented startups

represent approximately 55% of the estimated survival share, compared with about 45% for non-ESG startups.

This difference should be interpreted cautiously. It indicates a descriptive survival advantage consistent with legitimacy stabilization, not a transformative productivity effect. Table 10 does not report firm-level hazard estimates or causal effects. Rather, it captures a proportional ecosystem-level pattern suggesting that ESG-oriented ventures may experience less legitimacy volatility under conditions of ecosystem stress.

Institutional Amplification: Why ESG Has Greater Survival Relevance in Stronger Governance Contexts

The ESG-related survival advantage appears stronger in higher-quality institutional environments, where ESG claims are more likely to be verified through clearer rules, enforcement capacity, reporting norms, and stakeholder trust. In such settings, ESG orientation functions as a credible signal that can stabilize expectations and reduce perceived risk.

In weaker institutional contexts, the same signal may carry much less weight. Limited verification capacity and weaker enforcement reduce credibility, increasing the likelihood that ESG claims are treated as symbolic rather than consequential. Table 7 summarizes this directional pattern through a stratified ecosystem-level comparison: stronger institutional quality is associated with a stronger ESG-related survival advantage, whereas lower-quality environments exhibit weaker or more marginal differences.

Taken together, Tables 6 and 7 suggest that ESG orientation is associated with a proportional survival advantage at the ecosystem level, but that this advantage is context-dependent. Its descriptive relevance is greatest where institutional quality enhances verification and trust, and weakest where governance capacity is limited.

This pattern supports an institutional amplification interpretation. Institutional quality does not simply coexist with ESG orientation; it strengthens or attenuates the survival relevance of ESG-related legitimacy. The next subsection integrates funding structure, survival constraints, ESG orientation, and institutional quality to explain how these dimensions jointly shape ecosystem-level outcomes.

Table 10: ESG Vs. Non-ESG Survival Proportion (Ecosystem-Level Descriptive Benchmark)

Category	Proportional Share of Estimated Survival	Interpretation
ESG-oriented startups	Approx. 55%	Descriptive survival advantage consistent with legitimacy-stabilization and risk-governance effects
Non-ESG startups	Approx. 45%	Baseline survival shares under broader ecosystem pressures

Note: This table reports an ecosystem-level descriptive benchmark. The figures should be interpreted as proportional descriptive patterns rather than as firm-level survival probabilities, hazard estimates, or causal effects.

Table 11: Institutional Amplification Pattern (Stratified Descriptive Interpretation)

Institutional Quality Tier	ESG-Related Survival Advantage	Interpretation
High institutional quality	Stronger	ESG claims are more credible and verifiable, producing a larger legitimacy-related survival advantage
Medium institutional quality	Moderate	Partial verification capacity allows ESG orientation to stabilize risk, but less consistently
Low institutional quality	Weak or marginal	Limited enforcement and lower stakeholder trust reduce signal credibility, making ESG orientation more vulnerable to symbolic interpretation

Note: This table summarizes the expected and observed directional pattern of institutional amplification at the ecosystem level. It is intended as a stratified descriptive interpretation and does not imply causal estimation. If tier-specific quantitative benchmarks become available, the qualitative entries may be replaced with numeric proportions and dispersion measures.

Integrated Heterogeneity and Systemic Interaction Effects

This subsection synthesizes the empirical patterns reported in Sections 4.2-4.5 and examines how funding structure, survival constraints, ESG orientation, and institutional quality jointly shape startup outcomes in Emerging Asia. Rather than treating these dimensions as independent drivers, the analysis interprets startup sustainability as the product of interaction effects operating across the ecosystem.

Four stylized findings emerge from the preceding results. First, startup funding in Southeast Asia has entered a prolonged contraction marked by capital scarcity, heightened selectivity, and a pronounced late-stage bias. Second, survival remains structurally fragile, with severe early-stage attrition and weak medium- to long-term continuity. Third, ESG orientation is present at meaningful but uneven scale and operates primarily as a legitimacy and risk-governance signal rather than as a direct performance enhancer. Fourth, the effectiveness of ESG orientation is conditional on institutional quality, with stronger governance environments amplifying its survival relevance.

Taken together, these findings indicate that startup outcomes in Emerging Asia cannot be explained by any single factor. Observed ecosystem heterogeneity reflects the interaction of resource constraints, legitimacy mechanisms, and governance capacity rather than isolated entrepreneurial differences.

Interaction between Funding Structure and Survival Constraints

The contraction and reallocation of capital toward later-stage ventures intensify survival pressure at the pre-seed and seed stages. Sections 4.2 and 4.3 show that early-stage startups face both reduced funding availability and the highest failure risk. This combination creates a selection bottleneck in which survival increasingly depends on whether ventures can cross legitimacy and credibility thresholds under constrained capital conditions. Funding structure therefore acts as a system-level filtering mechanism.

ESG Orientation as a Conditional Buffer under Capital Scarcity

Within this constrained environment, ESG orientation does not offset capital scarcity directly. Its role is more limited but still meaningful: it can moderate legitimacy volatility by stabilizing stakeholder expectations when investors become more selective. As shown in Section 4.5, ESG-oriented startups exhibit a descriptive survival advantage consistent with such a buffering mechanism. Yet this effect remains conditional. Without credible verification and enforcement, ESG signals are more likely to become symbolic and lose stabilizing force.

4.6.3 Institutional Quality as a Systemic Multiplier

Institutional quality emerges as the broader multiplier that determines whether funding selectivity and ESG legitimacy can be translated into survival stability. In higher-quality governance environments, regulatory clarity, enforcement capacity, and stakeholder trust increase the credibility of ESG signals and improve the efficiency of capital allocation. In weaker institutional contexts, funding scarcity and high failure risk dominate more fully, leaving ESG orientation with only limited descriptive survival relevance. This amplification logic helps explain why similar levels of entrepreneurial effort or ESG adoption can produce different outcomes across ecosystems.

Table 12 consolidates this integrated interaction logic by summarizing the role of each dimension and its system-level effect.

The combined evidence from Sections 4.2-4.5 shows that startup sustainability in Emerging Asia is shaped by systemic interaction effects rather than isolated drivers. Funding contraction raises early-stage selection pressure; survival remains structurally fragile; ESG orientation provides legitimacy-based risk stabilization; and institutional quality amplifies or attenuates the effectiveness of that signal. Startup heterogeneity therefore reflects differences in ecosystem governance capacity as much as, and often more than, differences in entrepreneurial capability alone.

Taken together, Tables 1-8 and Figure 1 directly address the four research questions posed in Section 1. The evidence shows that recent funding contraction and late-stage capital concentration intensify early-stage survival constraints (RQ1); ecosystem-level survival benchmarks confirm the structural fragility of startup sustainability in Emerging Asia (RQ2); ESG-oriented startups are present at meaningful but uneven scale and appear to exhibit a descriptive legitimacy-related survival advantage under capital scarcity (RQ3); and this advantage is stronger in higher-quality institutional environments, consistent with an institutional amplification logic (RQ4).

Section 5 builds on these integrated results to discuss the theoretical and policy implications for entrepreneurial ecosystem research, as well as the practical implications for policymakers, investors, and ecosystem builders seeking to improve startup sustainability under conditions of capital scarcity and institutional heterogeneity.

Table 12: Integrated Interaction Logic of Startup Sustainability (Ecosystem-Level)

Dimension	Role in the System	Interaction Effect
Funding structure	Shapes resource allocation and selection pressure	Capital scarcity raises legitimacy thresholds and intensifies early-stage exclusion
Survival constraints	Reflects structural outcome pressure within the ecosystem	Early-stage attrition magnifies selection effects and narrows the pathway to scale
ESG orientation	Functions as a legitimacy and risk-governance signal	Stabilizes stakeholder expectations under funding selectivity and uncertainty
Institutional quality	Enables verification, enforcement, and stakeholder trust	Amplifies or attenuates the survival relevance of ESG orientation

Note: This table synthesizes the ecosystem-level interaction logic developed across Sections 4.2-4.5. It is intended as an interpretive summary of the study's descriptive findings and does not imply causal estimation.

Discussion

This study examined startup sustainability in Emerging Asia by moving beyond firm-level explanations and focusing instead on ecosystem-level interactions among funding dynamics, survival constraints, ESG orientation, and institutional quality. The results suggest that startup outcomes in the region are shaped less by entrepreneurial capability in isolation than by the conditions under which ventures seek financing, build legitimacy, and operate within uneven governance environments (Tran et al., 2021; Narayan et al., 2025).

Reframing Startup Sustainability as a Systemic Outcome

A central implication of the findings is that startup sustainability in Emerging Asia should be understood as structurally conditioned rather than purely venture-specific. The combined evidence on prolonged funding contraction, late-stage capital concentration, and high early-stage attrition indicates that survival is heavily influenced by how entrepreneurial ecosystems allocate resources, recognize legitimacy, and sustain institutional support (Vandenberg et al., 2021; Zhao et al., 2021).

This interpretation challenges strands of the entrepreneurship literature that implicitly treat failure primarily as the result of managerial weakness, poor strategy, or inadequate innovation. In many Emerging Asian contexts, even capable startups confront structural constraints, including capital scarcity, demanding legitimacy thresholds, and fragmented institutional support. Under such conditions, failure may reflect ecosystem configuration as much as firm-level deficiency (Nguyen, 2022).

Funding Structure as a Selection Mechanism

The findings also highlight the importance of funding structure as a selection mechanism. The shift of capital toward later-stage ventures during the regional downturn does more than reflect changing investor preferences. It reshapes the entrepreneurial pipeline by narrowing access to finance for startups at the stages where uncertainty is highest and legitimacy is least established (Bessière et al., 2020; Mašek & Plaček, 2024).

This has a broader theoretical implication: funding cycles should not be viewed only as financial trends, but as system-level mechanisms that shape which ventures are able to remain visible, credible, and fundable. In that sense, capital allocation becomes part of the

governance architecture of the ecosystem, filtering entry, progression, and survival across stages (Shuwaikh et al., 2025).

ESG Orientation as Legitimacy-Based Risk Governance

A further insight concerns the role of ESG orientation. The results suggest that ESG-oriented startups display a descriptive survival advantage, but that this advantage is better understood as stabilizing rather than transformative. ESG orientation does not remove structural financing constraints or ensure superior growth performance. Its contribution appears to lie in reducing uncertainty for external stakeholders under conditions of heightened selectivity and risk (Chan, 2026; Schmelter & Strese, 2024).

This interpretation supports a growing literature that treats ESG less as a direct performance enhancer and more as a signaling and governance device, especially in environments marked by information asymmetry and institutional complexity (Koenigsmarck et al., 2026; Deng et al., 2025). In the present study, ESG is therefore best interpreted as a legitimacy-bearing mechanism whose value becomes more visible when survival is difficult and capital is selective.

Institutional Quality as an Amplification Mechanism

Among the most important implications of the study is the role of institutional quality as an amplification mechanism. The relevance of ESG orientation is not constant across ecosystems. It is stronger in environments where regulatory clarity, enforcement capacity, and stakeholder trust make ESG claims more credible and more easily verified. Where such conditions are absent, ESG signals are more likely to remain symbolic and less likely to translate into survival stability (Kim et al., 2024; Shi & Mai, 2025).

This suggests that institutions should not be treated as passive background conditions. They actively shape how market signals are interpreted and whether governance-related attributes acquire practical value. Startup sustainability therefore depends not only on what ventures signal, but also on whether the surrounding ecosystem can recognize, verify, and reward those signals (Li et al., 2026).

Theoretical Implications

The study contributes to entrepreneurial ecosystem theory in three respects. First, it strengthens the case for an ecosystem-level perspective that emphasizes interaction effects rather than isolated determinants. Second, it repositions ESG orientation from a narrowly performance-centered construct to a legitimacy-based governance mechanism whose relevance depends on institutional context. Third, it brings funding dynamics more directly into discussions of entrepreneurial sustainability by showing that capital allocation patterns help shape long-run ecosystem resilience (Hermawan et al., 2025; Roy & Vasa, 2025).

Taken together, these contributions suggest that future scholarship should pay greater attention to how entrepreneurial outcomes are structured by the interaction of capital availability, legitimacy formation, and institutional capacity rather than by venture attributes alone.

Practical and Policy Implications

The findings also carry practical implications. From a policy perspective, the results caution against startup development strategies that rely too heavily on firm-level promotion while neglecting the wider system conditions that shape survival. Improving startup sustainability requires stronger early-stage financing channels, more coherent regulatory environments, and institutional arrangements that make sustainability-related signals credible and usable (Narayan et al., 2025; Ungerer & Pietsch, 2025).

For investors, the results suggest that ESG orientation may serve as a useful risk-screening device, but only when it is embedded in an environment where disclosure, verification, and stakeholder trust are sufficiently developed. For ecosystem builders, the findings point to the importance of governance infrastructure, including certification

mechanisms, data transparency, and regulatory consistency, as part of the foundation for more sustainable entrepreneurial development (Ekawati et al., 2025).

Limitations and Directions for Future Research

This study relies on secondary ecosystem-level data and descriptive benchmark indicators. That design is appropriate for the study's purpose, but it does not support firm-level causal inference, hazard estimation, or direct testing of micro-level mechanisms. The findings should therefore be interpreted as comparative ecosystem patterns rather than precise estimates of venture-level effects.

Future research could extend this framework by linking ecosystem-level indicators with longitudinal firm-level data in order to test these interaction mechanisms more formally. Comparative work beyond Emerging Asia would also be valuable for assessing the wider applicability of the institutional amplification logic identified here (Hermawan et al., 2025).

Concluding Reflection

Overall, the discussion reinforces the central claim of the study: startup sustainability in Emerging Asia is shaped by the interplay of funding structure, legitimacy mechanisms, and institutional capacity. Recognizing this broader configuration is essential both for advancing entrepreneurial ecosystem theory and for designing more effective interventions to support startup survival under conditions of capital scarcity and institutional heterogeneity.

Conclusion

This study examined startup sustainability in Emerging Asia from an ecosystem-level perspective, with particular attention to the interaction among funding dynamics, survival constraints, ESG orientation, and institutional quality. Rather than treating startup success or failure as a purely firm-level phenomenon, the analysis showed that sustainability is shaped by the broader conditions under which ventures seek capital, establish legitimacy, and operate within uneven institutional environments.

Summary of Key Findings

Four main findings emerge from the analysis. First, startup funding in Southeast Asia has remained under prolonged contraction, characterized by declining aggregate investment, heightened volatility, and stronger concentration in later-stage deals. This pattern has intensified early-stage selection pressure and narrowed the pathway to scale.

Second, startup survival remains structurally fragile across Emerging Asian ecosystems. The benchmark evidence indicates substantial early attrition, with survival dropping sharply after the first years of operation and long-run continuity remaining weak. Failure risk is concentrated especially at the pre-seed and seed stages.

Third, ESG orientation is present at meaningful but uneven scale across ecosystems. The findings suggest that ESG-oriented startups exhibit a descriptive survival advantage, but that this advantage is better interpreted as stabilizing rather than transformative. ESG appears to matter primarily as a legitimacy and risk-governance signal under conditions of uncertainty and selective funding.

Fourth, institutional quality amplifies the relevance of ESG orientation. In stronger governance environments, ESG signals are more credible, verifiable, and therefore more likely to be associated with survival stability. In weaker institutional settings, the same signals are more easily reduced to symbolic claims with limited practical effect.

Contributions

This study contributes in three respects. Conceptually, it advances entrepreneurial ecosystem research by showing that startup sustainability is better understood as the product

of interaction effects than as the result of isolated venture-level attributes. Empirically, it provides ecosystem-level benchmarks on funding conditions, survival patterns, ESG orientation, and institutional quality in Emerging Asia. Theoretically, it reframes ESG orientation from a narrowly performance-centered construct to a legitimacy-based governance mechanism whose relevance depends on institutional context.

Implications

The findings carry several implications. For policymakers, efforts to increase startup formation or promote ESG adoption alone are unlikely to improve survival unless they are matched by stronger early-stage financing channels and more credible institutional support. For investors, ESG orientation may serve as a useful risk-screening signal, but its value depends heavily on the surrounding governance environment. For ecosystem builders, the results highlight the importance of transparency, verification, certification, and regulatory coherence as part of the infrastructure required for more sustainable entrepreneurial development.

Limitations and Future Research

This study relies on secondary, ecosystem-level benchmark data and does not estimate firm-level causal effects. The findings should therefore be interpreted as comparative structural patterns rather than precise venture-level estimates. Future research could extend this framework by combining ecosystem indicators with longitudinal firm-level data to test these interaction mechanisms more formally. Comparative studies beyond Emerging Asia would also help assess the broader applicability of the institutional amplification logic identified here.

Concluding Remarks

Startup sustainability in Emerging Asia is shaped not only by entrepreneurial effort, but by the interaction of capital allocation, legitimacy formation, and institutional capacity. ESG orientation contributes to survival not as a universal remedy, but as a context-dependent stabilizing mechanism whose relevance depends on whether ecosystems can verify and reward credible signals. Understanding sustainability in this broader systemic sense is essential for both theory development and the design of more resilient entrepreneurial ecosystems.

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The Development of English Presentation Skills Through The Integration of Digital Technology and Team-Based Learning for Higher Vocational Certificate Students

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Abstract

This quasi-experimental study examined the development of English presentation competence through the integration of digital technology, particularly Canva as a tool for collaborative presentation development, and team-based learning for Higher Vocational Certificate students. Such competence is essential for vocational learners in digitally driven professional contexts. The objectives of this study were to: 1) compare students' digital technology skills for presentation before and after instruction; 2) compare students' English presentation skills before and after instruction; and 3) examine students' satisfaction with the learning activities.

The sample consisted of 28 first-year Higher Vocational Certificate students majoring in Digital Business Technology. The research instruments included: 1) a learning management plan integrating digital technology with Team-Based Learning implemented over six weeks; 2) an assessment form for digital technology skills for presentation; 3) an English presentation skills assessment; and 4) a student satisfaction questionnaire. Quantitative data were analyzed using descriptive statistics, including means and standard deviations.

The findings revealed that students' digital technology skills for presentation and English presentation skills after the intervention were significantly higher than before the intervention at the .01 level. In addition, students reported a high level of satisfaction with the learning activities. The results indicate that integrating digital technology with team-based learning is an effective approach for enhancing English presentation skills in vocational education contexts.

Keywords: Digital Technology, Team-Based Learning, English Presentation Skills, Digital Competence, Vocational Education

Introduction

Advancements in digital technology have rapidly transformed communication practices, work processes, and educational management, particularly within digital economic and social contexts that emphasize effective communication and technological competence (Schwab, 2016; OECD, 2019). Educational institutions therefore play a crucial role in developing learners' competencies aligned with 21st-century labor market demands.

This responsibility is especially pronounced in vocational education, which aims to prepare professionally skilled graduates for direct entry into industrial and service sectors.

English presentation skills constitute a critical component of professional communication in global working environments, as English functions as a lingua franca for professional interaction, information delivery, and the presentation of ideas and outcomes across disciplines (Crystal, 2003; Graddol, 2006). For vocational learners, English presentation skills extend beyond linguistic accuracy to include content organization, professional vocabulary use, confident delivery, and appropriate use of digital media in authentic workplace contexts.

However, evidence from English instruction in vocational education indicates that many learners continue to face difficulties in developing English presentation skills, particularly in terms of communication confidence, coherent content organization, and contextual language use. These challenges are partly attributable to teacher-centered instructional approaches that emphasize linguistic knowledge and grammar over practice-based learning and classroom interaction (Voogt & Roblin, 2012; Richards, 2015).

As a result, learner-centered and collaborative instructional approaches have gained increasing attention in educational research. Team-Based Learning (TBL) is a structured collaborative learning model that emphasizes teamwork, individual accountability, peer interaction, and knowledge application in problem-solving contexts (Michaelsen et al., 2004; Michaelsen & Sweet, 2008). This approach aligns closely with professional workplace practices that require effective communication, shared decision-making, and teamwork.

In parallel, the integration of digital technology in English language instruction has been shown to enhance learner engagement, motivation, and opportunities for authentic communication practice (Siemens, 2005; Thomas et al., 2014). English presentation tasks, in particular, benefit from digital tools and multimedia resources that support clarity, structure, and professional delivery.

Despite existing studies on TBL or digital technology in English instruction, research examining the integration of both approaches to enhance English presentation skills in vocational education—especially at the Higher Vocational Certificate level in digital business-related fields, remains limited. Addressing this gap, the present study investigated the effects of integrating digital technology with team-based learning on students' digital presentation skills, English presentation skills, and learning satisfaction. The findings provide empirical evidence to inform instructional design, curriculum development, and vocational English education in digitally driven learning environments.

Literature Review

The development of English presentation skills among Higher Vocational Certificate students is directly aligned with contemporary vocational education policy. The Higher Vocational Certificate Curriculum B.E. 2567 (2024) emphasizes language and communication competencies that support professional practice, particularly in fields related to digital business technology, where communication, presentation, and teamwork in technology-driven environments are essential (Office of the Vocational Education Commission, 2024). This policy orientation underscores that English presentation skill development represents not merely linguistic improvement, but the cultivation of professional competence responsive to labor market demands.

Within English language education, presentation skills are considered a core component of professional communication. Effective presentations require linguistic accuracy, coherent structure, appropriate vocabulary selection, and audience-oriented

communication. Research in English language teaching consistently emphasizes that speaking and presentation skills are best developed through authentic, practice-oriented learning rather than purely theoretical instruction (Richards, 2015). This perspective aligns with English for Specific Purposes (ESP), which focuses on language use in professional contexts and supports learners in developing communication skills tailored to occupational needs (Dudley-Evans & St John, 2018). Thai studies similarly report that profession-oriented English presentation activities significantly enhance vocational learners' confidence and communicative competence (Sriprasert, 2021).

Digital technology further plays a vital role in enhancing English presentation skills by enabling multimodal communication. Multimedia learning theory suggests that the effective integration of text, visuals, audio, and digital media enhances comprehension and communicative clarity (Mayer, 2021). Studies on presentation design indicate that digital tools facilitate content organization and structured message delivery (Gallo, 2014; Reynolds, 2019). Thai research likewise demonstrates that digital presentation media support both digital skill development and authentic vocational learning experiences (Wongkamdee, 2023). Nevertheless, scholars caution that technology alone is insufficient without pedagogical frameworks that actively engage learners (Wongsuwan, 2024). Recent research emphasizes that digital literacy and technological adoption, when integrated with collaborative learning frameworks, significantly enhance student engagement. Specifically, collaborative learning has been identified as a primary driver in optimizing learning experiences and fostering active participation in technology-enhanced educational settings (Arjang et al., 2024).

Team-Based Learning (TBL) provides a structured pedagogical framework that promotes collaboration, peer discussion, and group presentation. According to Michaelsen and Sweet (2008), TBL enhances individual accountability, engagement, and deep learning, while Parmelee and Michaelsen (2010) highlight its effectiveness in developing communication, critical thinking, and teamwork skills essential for professional contexts. Research in English language education further indicates that TBL reduces language anxiety, increases confidence, and promotes authentic language use (Stepanova, 2017; Slavin, 2019). Moreover, studies have shown that its implementation in English departments encourages active participation and meaningful peer interaction (Ariani & Aviani, 2023). In the context of Thai vocational education, TBL has been adapted to include an additional assessment phase (Hansopa, 2018), which supports systematic monitoring, evaluation, and reflective learning, thereby strengthening competency-based learning outcomes.

When digital technology is integrated with team-based learning, learners are afforded systematic opportunities to develop English presentation skills through collaborative design, discussion, and performance. Digital tools function as cognitive and communicative supports, while TBL structures sustained interaction and learner engagement. However, literature indicates that empirical research on this integrated approach in vocational education—particularly at the Higher Vocational Certificate level, remains scarce, thereby justifying the present study. The integration of digital technology through the Canva platform within the Team-Based Learning (TBL) framework serves as a critical mediator in developing English presentation skills. By providing a structured, collaborative environment, this approach significantly mitigates language anxiety—a common barrier for vocational students. The visual clarity and professional design capabilities of Canva empower students to focus more on their communicative delivery and content organization, thereby fostering greater confidence and competence in their oral presentations.

Research Methodology

This study aimed to compare students' digital technology skills for presentation and English presentation skills before and after instruction, and to examine their satisfaction with learning activities designed to enhance English presentation skills through the integration of digital technology and team-based learning.

The conceptual framework of this study defined the independent variable as the integration of digital technology with team-based learning, while the dependent variables comprised digital presentation skills, English presentation skills, and student satisfaction. The framework was developed based on the principles of Team-Based Learning and relevant studies (Michaelsen et al., 2008; Hansopa, 2018), as illustrated in Figure 1.

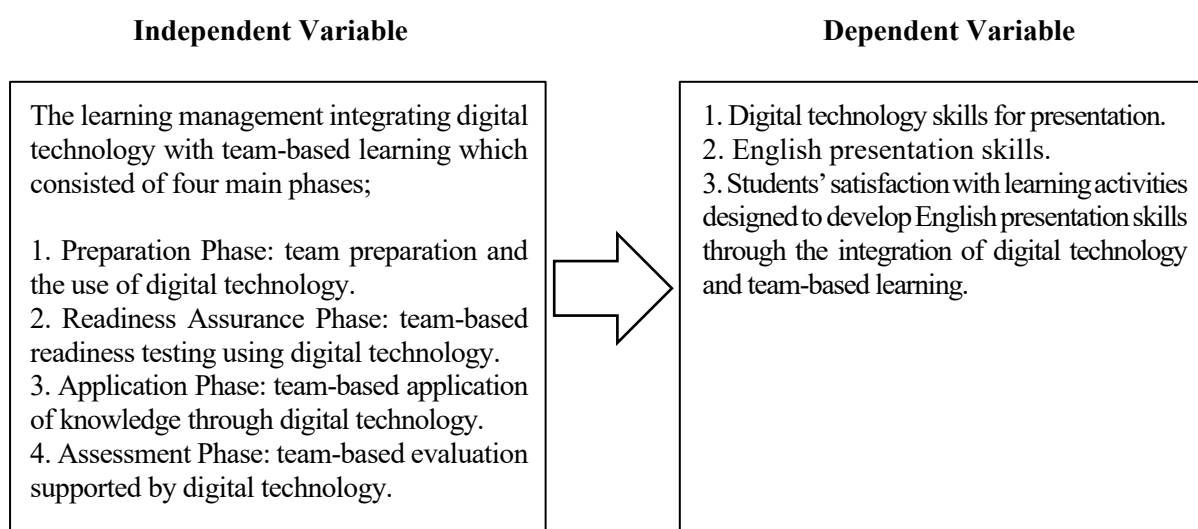


Figure 1: Conceptual Framework of the Study

Figure 1 illustrates the four phases of Team-Based Learning (TBL) integrated with digital technology. 1) Preparation Phase: Students study fundamental concepts of English product presentations and relevant vocabulary through selected digital resources prior to class. 2) Readiness Assurance Phase: Students complete individual (iRAT) and team (tRAT) assessments, followed by targeted instruction to address misconceptions through just-in-time teaching, supported by digital tools. 3) Application Phase: Students collaboratively develop English presentation scripts and design digital presentation materials using Canva, with teacher guidance. 4) Assessment Phase: Students present their work using Canva, followed by rubric-based evaluation and reflective feedback.

The population consisted of 94 first-year Higher Vocational Certificate students majoring in Digital Business Technology at Interpattanasat Technological College, enrolled in the course English for Digital Business Technology during the second semester of the 2025 academic year. The sample comprised 28 students selected through cluster random sampling, with the classroom as the sampling unit. Research instruments included: 1) a learning management plan integrating digital technology with Team-Based Learning (TBL); 2) a digital presentation skills assessment; 3) an English presentation skills and 4) a student satisfaction questionnaire. All instruments were validated for content validity by three experts. The content validity of the research instruments was evaluated using the Index of Item-

Objective Congruence (IOC) by three experts. The results indicated that most items in the learning management plan and assessment instruments achieved an IOC value of 1.00, exceeding the acceptable criterion of 0.50, thus confirming satisfactory content validity. The reliability of the satisfaction questionnaire was examined using Cronbach's alpha coefficient. The overall reliability coefficient was $\alpha = 0.88$, indicating a high level of internal consistency.

The instructional intervention was conducted over six weeks, two hours per week, following four TBL stages: preparation, readiness assurance, application of knowledge, and evaluation. Students completed English product presentation tasks using digital technology as instructional support.

Data collection involved pre-tests and post-tests of digital presentation skills and English presentation skills, as well as post-intervention satisfaction surveys. Quantitative data were analyzed using means, standard deviations, and paired-sample t-tests, while qualitative data from open-ended responses were analyzed using content analysis.

Research Finding

The results of this study on the development of English presentation skills through the integration of digital technology and team-based learning for Higher Vocational Certificate students are presented according to the research objectives.

Table 1: Comparison of Digital Technology Skills for Presentation Before and After Instruction of Higher Vocational Certificate Students (N = 28)

Learning Outcomes	The number of students (n)	Full marks	Mean ($\bar{X}$)	S.D.	t	P
Pre-test	28	100	63.36	6.14		
Post-test	28	100	73.79	4.84	13.02	< .001

As shown in Table 1, the mean score of students' digital technology skills for presentation after the instructional intervention ($\bar{X} = 73.79$, $SD = 4.84$) was significantly higher than that before the intervention ($\bar{X} = 63.36$, $SD = 6.14$) at the .01 level ($t = 13.02$, $p < .001$). This result indicates that team-based learning integrated with digital technology had a significant effect on the development of students' digital presentation skills. In particular, the use of the Canva platform was effective in enhancing students' ability to apply digital technology for presentation purposes.

Table 2: Comparison of English Presentation Skills Before and After Instruction of Higher Vocational Certificate Students (N = 28)

Learning Outcomes	The number of students (n)	Full marks	Mean ($\bar{X}$)	S.D.	t	P
Pre-test	28	100	58.14	6.08		
Post-test	28	100	78.29	6.20	82.17	< .001

As presented in Table 2, the mean score of students' English presentation skills after the instructional intervention ($\bar{X} = 78.29$, $SD = 6.20$) was significantly higher than that before the intervention ($\bar{X} = 58.14$, $SD = 6.08$) at the .01 level ($t = 82.17$, $p < .001$). This finding

indicates that the learning management integrating digital technology with team-based learning was associated with significant improvement in students' English presentation skills. The notably high t-value may be attributed to the nature of the English presentation assessment, which was conducted as a group-based performance evaluation. This assessment approach resulted in relatively similar scores among students and a low variance in the difference scores, thereby yielding a high t-value in the paired-sample t-test. However, the exceptionally high t-value observed in this study ($t = 82.17$) should be interpreted with caution. This result may be influenced by the group-based performance assessment, which produced relatively homogeneous scores among students and reduced variability in the difference scores.

Such conditions can inflate the t-statistic in paired-sample analyses. Therefore, future studies are recommended to employ individual-level assessment or include additional statistical indicators such as effect sizes to provide a more balanced interpretation of learning outcomes.

Table 3: Students' Satisfaction with Learning Activities Integrating Digital Technology and Team-Based Learning (N = 28)

Satisfaction Aspect	Mean ($\bar{X}$)	S.D.	Level
1. Learning content and activities	4.32	0.58	High
2. Teaching and learning methods	4.59	0.47	Very high
3. Learning environment and instructional tools	4.48	0.52	High
4. Learning outcomes and perceived benefits	4.71	0.40	Very high
Overall	4.49	0.51	High

The results indicate that students' overall satisfaction with the learning activities was at a high level ($\bar{X} = 4.49$, $SD = 0.51$). The highest level of satisfaction was reported for learning outcomes and perceived benefits ($\bar{X} = 4.71$), followed by teaching and learning methods ($\bar{X} = 4.59$), both at a very high level. Satisfaction with learning environment and instructional tools ($\bar{X} = 4.48$) and learning content and activities ($\bar{X} = 4.32$) was also rated at a high level.

Discussion/Conclusion

The findings of this study confirm that integrating digital technology with team-based learning significantly enhances both digital presentation skills and English presentation skills among Higher Vocational Certificate students.

First, the significant improvement in digital technology skills for presentation supports the view that digital tools facilitate active learning, learner engagement, and the development of essential digital competencies required in the 21st century. The consistent use of digital presentation platforms, particularly Canva, enabled students to develop skills in content organization, multimedia design, and effective information delivery. This finding is consistent with prior research indicating that digital technology promotes authentic learning experiences and improves learners' confidence in using technological tools in professional contexts.

Second, the improvement in English presentation skills highlights the effectiveness of team-based learning in language instruction. The structured teamwork process encouraged peer interaction, collaborative problem-solving, and repeated practice in authentic

communication situations. These elements reduced language anxiety and increased learners' confidence in using English for professional presentation. The results align with research suggesting that presentation skills are best developed through experiential learning, collaborative activities, and meaningful language use rather than through grammar-focused instruction alone.

Third, the high level of student satisfaction reflects the alignment between the instructional approach and learners' expectations and learning needs. The integration of digital technology with team-based learning created an engaging, supportive, and practice-oriented learning environment. This outcome is consistent with outcome-based education principles, which emphasize the development of competencies applicable to real-world professional contexts, particularly in vocational education. The high level of student satisfaction observed in this study is consistent with the findings of Srisuwan (2022), who reported that collaborative learning activities significantly enhance the learning experiences of vocational students in Thailand.

This study demonstrates that the integration of digital technology and team-based learning is an effective instructional approach for developing English presentation skills among Higher Vocational Certificate students. The findings indicate significant improvements in students' digital technology skills for presentation and English presentation skills, as well as a high level of learner satisfaction.

The results suggest that combining collaborative learning structures with digital tools provides meaningful learning experiences that enhance both linguistic and professional competencies. This instructional approach is particularly suitable for vocational education contexts, where learners are required to develop communication skills, digital literacy, and teamwork abilities aligned with workplace demands.

Suggestion

1. Instructional Recommendations

English language instruction in vocational education should incorporate digital technology alongside team-based learning to provide learners with authentic opportunities to practice English presentation skills in professional contexts. Learning activities that emphasize teamwork and digital media use can effectively enhance students' communication confidence and digital competencies.

2. Curriculum and Institutional Recommendations

Vocational education institutions should use the findings of this study to inform curriculum development and instructional planning. English courses should be designed to integrate language skills, digital literacy, and collaborative learning. Additionally, professional development opportunities should be provided to enhance teachers' competencies in applying digital tools and collaborative learning strategies effectively.

3. Recommendations for Future Research

Future studies should involve larger and more diverse samples across different vocational fields and educational levels. Longitudinal research is also recommended to examine the sustainability of English presentation skills over time. Furthermore, future research may explore the integration of emerging digital technologies, such as online platforms, artificial intelligence, or blended learning models, to further enhance English communication skills in vocational education.

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The Role of Self-Congruence in Active Social Media Engagement Among Lurkers

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Abstract

This research investigates the role of self-congruence in active social media engagement among users who typically exhibit lurking behavior. Drawing on Self-Congruence Theory and the COBRAs framework, the study proposes an integrated model to examine how dimensions of self-congruence are associated with active engagement among passive users. A quantitative research design was employed, using survey data collected from 200 social media users, and multiple regression analysis was used to test the hypothesized relationships.

The results indicate that the proposed model explains 37.8% of the variance in active engagement. Influencer-product congruence emerged as the strongest predictor of active engagement ($\beta = 0.455$, $p < 0.001$), followed by consumer-influencer congruence ($\beta = 0.179$, $p = 0.021$). Consumer-product congruence, however, showed no significant effect. These findings suggest that lurkers may be more likely to report active participation when they perceive a strong alignment between the influencer and the endorsed product, as well as a sense of identity similarity with the influencer.

The research contributes to the literature by integrating three dimensions of self-congruence within the context of influencer marketing and by demonstrating their differential effects on active engagement among lurking users. Practical implications are provided for influencer selection and content strategy, highlighting the importance of identity alignment in fostering meaningful consumer engagement in contemporary social media environments.

Keywords: Self-Congruence, Congruence Between Consumer and Influencer, Congruence Between Influencer and Product, Congruence Between Consumer and Product, Social Media Engagement, Lurkers

Introduction

In an era where social media plays a vital role in marketing communication, consumer engagement on social media has become a key indicator of the effectiveness of digital strategies. It reflects consumers' interest levels, responses, and the degree of attachment they have toward brands and content creators (Brodie et al., 2011; Dolan et al., 2019). One of the main factor associated with engagement is the role of influencers, who act as credible communicators with high social influence in the eyes of followers. This is especially true in contexts where consumers value content that is authentic and reflects their true selves (Kim & Yoon, 2024; Koay et al., 2023). Although influencer marketing has grown remarkably, many social media users still exhibit lurking behavior-consuming content without actively

interacting (Nonnecke et al., 2021). Such behavior presents challenges for brands and content creators because visible engagement is often used to evaluate campaign success. Therefore, understanding the factors that motivate these users to shift from passive to active engagement is a crucial area for further research.

The Self-Congruence theory (Sirgy, 1982) provides a psychological framework explaining consumers' tendency to respond to brands or individuals that align with their self-image. Recent studies have found that the congruence among consumers, influencers, and products can enhance trust, identification, and the intention to engage on social media (Belanche et al., 2021; Koay & Lim, 2025). However, previous research has mainly focused on certain dimensions of congruence, such as consumer-brand or consumer-influencer, and has primarily measured attitudes rather than actual behaviors. Additionally, there is a lack of integrated studies examining all three dimensions of congruence to explain the associations behind the transition of lurkers to openly interactive participants. Moreover, in the context of Thai social media users, who have unique usage patterns, empirical research remains limited.

Therefore, this study proposes an integrated model to examine how all three dimensions of self-congruence are associated with active social media engagement. Drawing on Self-Congruence Theory and the COBRAs framework, the study seeks to better understand the factors related to more proactive responses among lurking users. The model combines the Self-Congruence framework with a consumer engagement perspective based on the COBRAs dimensions of consumption, participation, and creation to explore patterns of engagement across different levels of social media activity. This research addresses a theoretical gap by offering an integrated perspective on psychological factors linked to engagement behaviours while also providing practical recommendations for marketers seeking to develop influencer-brand matching strategies that support stronger consumer engagement among typically anonymous users. These insights are relevant to improving the effectiveness of marketing communication in contemporary digital contexts.

Objective

To examine how alignment among consumers among consumers, influencers, and products in influencing proactive engagement behaviors among social media users aged 18-45 who exhibit passive (lurking) behavior

Literature Review

Self-Congruence and Identity-Based Responses in Digital Media

Self-Concept Theory (Sirgy, 1982) suggests that consumers tend to respond to individuals, brands, or symbols that align with their self-image, whether it is their actual self or the ideal self they wish to project to society. Such alignment leads to positive perceptions, trust, and motivation to express oneself through various behaviors (Escalas & Bettman, 2005; Malär et al., 2011). In the era of social media, many researchers confirm that self-congruence is a key variable affecting engagement because digital platforms provide space for users to select content or creators that reflect their self-image (Lee et al., 2020; Kim & Yoon, 2024). When communication shifts from brands to influencers, consumers often perceive influencers as role models with clear identities, personalities, and lifestyles. The similarity in identity between consumers and influencers is a crucial factor that fosters identification and proactive interactions with content, such as liking, commenting, or sharing (Shan et al., 2020; Belanche

et al., 2021). Therefore, self-congruence is not merely an attitude structure but a psychological association that directly influences consumer behavior on social media platforms.

Dimensions of Congruence in Influencer Marketing

Recent studies have expanded the concept of self-congruence to encompass multiple dimensions within the influencer marketing ecosystem, including:

1. Consumer-Influencer Congruence

This occurs when consumers perceive that influencers share similar personalities, values, or lifestyles with themselves. Such congruence promotes trust, parasocial bonds, and a desire to engage with content (Xiao et al., 2021; Venciūtė et al., 2023), especially among users seeking content that reflects their identity (identity signaling).

2. Influencer-Product Congruence

Matching influencers with products (match-up fit) is a critical factor consumers use to evaluate credibility (Koay et al., 2023). If the influencer's image or role aligns with the product's attributes, consumers perceive the content as more authentic and are more motivated to interact. Many studies confirm that influencer-product congruence is the strongest predictor of engagement in influencer marketing contexts.

3. Consumer-Product Congruence

The alignment between consumers and products affects brand image perception and long-term attachment (Lee et al., 2020). However, its impact on proactive engagement remains unclear, especially when products are presented through influencers, which may be a more influential driver (Malär et al., 2011). Nonetheless, examining all three dimensions together is important as they reflect the effects of identity congruence at individual, social, and content levels, which may influence engagement differently.

Social Media Engagement and the Role of Identity

The Consumers' Online Brand-Related Activities (COBRAs) framework (Muntinga et al., 2011; Schivinski et al., 2016) is widely used to understand social media engagement by conceptualizing engagement as a behavioral hierarchy with three intensities: consumption, contribution, and creation. Consumption refers to passive exposure to brand-related content (i.e., lurking), which involves viewing or reading without overt interaction and is therefore largely non-interactive (Nonnecke et al., 2021). In contrast, contribution reflects low-effort interactive behaviors (e.g., likes, reactions, comments, shares), while creation represents higher-effort behaviors in which users generate or co-create brand-related content. Although many users begin at the consumption level, media psychology research suggests that lurkers may progress toward more active engagement when the content reflects or supports their identity (identity-driven motivation), aligning with Self-Congruence Theory, which proposes that perceived harmony between the self and media increases intentions to express oneself on digital platforms (Dolan et al., 2019; Khan, 2024). When a substantial proportion of a brand's audience remains in the consumption (lurking) stage, marketing performance may be affected because exposure does not readily translate into measurable interaction metrics, potentially weakening engagement-based distribution and slowing conversion outcomes. Engagement is thus shaped not only by content appeal but also by an identity-related relationship formed through both content and content creators.

Although influencer marketing and social media engagement research continue to grow, significant gaps remain, including the lack of an integrated model that considers all three dimensions of self-congruence to comprehensively explain engagement behaviors. There is also a lack of associations explaining the role of self-congruence among lurking users, who constitute the majority of social media users. Much existing research focuses on attitude measurement rather than actual proactive engagement behaviors. Additionally, there is a lack

of empirical studies in the Thai context systematically examining both lurking groups and the congruence between influencers and products. Therefore, this study proposes an integrated model to examine the effects of all three dimensions of self-congruence on active social media engagement, using the Self-Congruence Theory and COBRAs framework to explain the associations that drive lurking users toward significant proactive responses.

Research Methodology

This study employs a quantitative cross-sectional survey design to examine the effects of three dimensions of self-congruence, consumer-influencer congruence, influencer-product congruence, and consumer-product congruence on active engagement behavior on social media among users exhibiting lurking behavior. The use of questionnaires is appropriate for measuring psychological and behavioral variables in large samples, as it supports hypothesis testing through the use of inferential statistics.

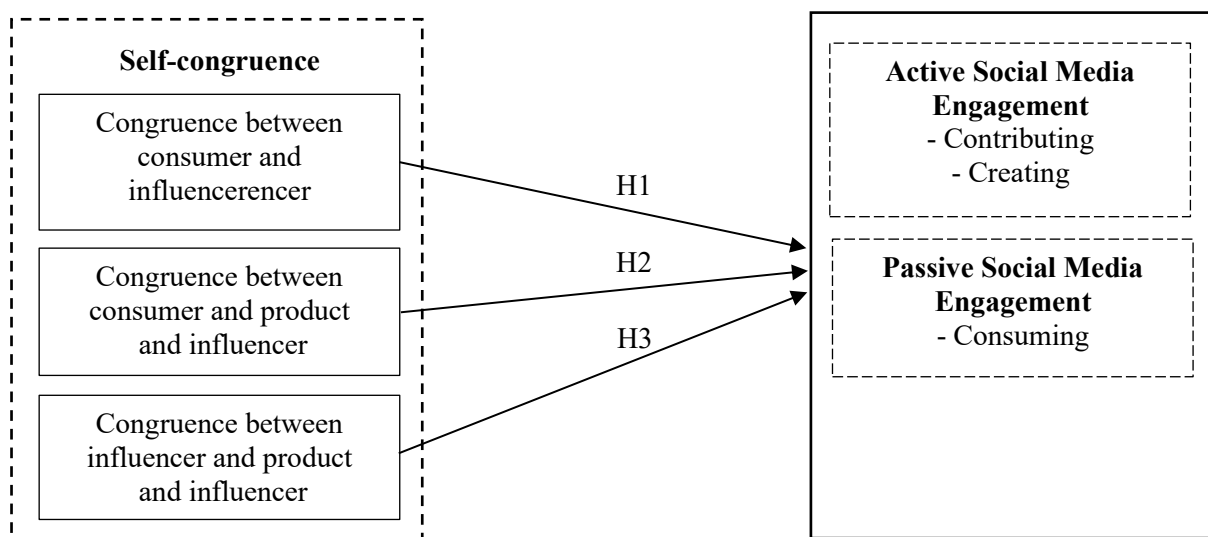


Figure 1: Research Framework

Target Population and Sampling Method

The target population consists of social media users aged 18-45 years who exhibit lurking behavior, defined as regular social media use with minimal overt interaction (e.g., liking, commenting, or sharing posts). The sample was selected using purposive sampling with screening questions to confirm that:

1. Respondents use social media daily
2. Their primary behavior is content consumption rather than active engagement
3. Respondents self-identify as passive users/lurkers

Since the total population size cannot be precisely determined, the sample size was calculated using Cochran's (1977) formula for infinite populations, with a 95% confidence level and 5% margin of error, yielding a minimum required sample of 196 respondents. However, this study successfully collected 200 complete questionnaires, providing adequate statistical power for data analysis, particularly for Multiple Regression Analysis, ensuring reliable results.

Research Instrument and Variable Measurement

The questionnaire consists of six sections designed based on validated measurement instruments from previous research, adapted to the social media context

1. Demographic information
2. Screening questions for lurking behavior
3. Consumer-influencer congruence (6 items) adapted from Belanche et al. (2021)
4. Influencer-product congruence (6 items) adapted from Koay et al. (2023)
5. Consumer-product congruence (6 items) adapted from Lee et al. (2020)
6. Active engagement behavior on social media (18 items) from the COBRAs model (Schivinski et al., 2016)

All items use a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Prior to actual data collection, a pilot test was conducted with 30 respondents to assess question clarity and internal consistency. The pilot test results showed Cronbach's Alpha coefficients ranging from 0.78-0.89, exceeding the 0.70 threshold recommended by Nunnally (1978), indicating reliable instrumentation. Content validity was verified by three experts in digital marketing and consumer behavior.

Data Collection Procedure

Data were collected through an online questionnaire on a secure platform. Respondents were recruited through social media channels and university networks. Participants received information about the research objectives, privacy protection, and withdrawal rights before providing informed consent. To ensure data quality, responses with irregular patterns were screened out, such as straight-lining (selecting the same response throughout), unusually short completion times, or missing data exceeding 10%. After screening, 200 complete datasets were obtained.

Data Analysis Methods

Data analysis was conducted using SPSS software through the following steps:

1. Descriptive Analysis: Summarized sample characteristics, social media usage behavior, and interaction tendency levels.
2. Reliability and Validity Testing: Calculated Cronbach's Alpha coefficients and item-total correlations. Tested regression assumptions, including linearity, normality, homoscedasticity, and multicollinearity using Tolerance and Variance Inflation Factor (VIF) statistics.
3. Hypothesis Testing Using Multiple Regression: Multiple regression analysis was used to test the influence of the three dimensions of self-congruence on active engagement behavior, reporting statistical significance values including standardized coefficients (β), p-values, R^2 , Adjusted R^2 , and F-test to assess model fit.

Research Finding

The data analysis results are presented in three sections: 1) descriptive data, 2) reliability and validity assessment of variables, and 3) hypothesis testing using multiple regression.

Descriptive Data

The sample of 200 respondents was predominantly aged 18-24 years (46%) and 25-34 years (42%). Most respondents reported social media usage characterized primarily by content consumption (lurking behavior), such as scrolling through posts (75%) and watching short videos (71%), rather than active engagement behaviors such as liking or commenting. The means and standard deviations of key variables are presented in Table 1.

Table 1: Means and Standard Deviations of Key Variables (N = 200)

Variables	Mean ($\bar{X}$)	SD
Consumer-Influencer Congruence	3.37	0.75
Influencer-Product Congruence	3.45	0.69
Consumer-Product Congruence	3.40	0.69

The results indicate that most users perceived influencer-product congruence at a higher level than other factors and exhibited moderate to relatively low levels of active engagement, reflecting the usage patterns of non-interactive observers (lurkers).

Reliability and Validity Assessment

The reliability assessment of the measurement instruments revealed that Cronbach's Alpha coefficients for all variables ranged from 0.78-0.89, exceeding the minimum reliability threshold of 0.70, indicating good internal consistency. Regression assumptions were examined, and no multicollinearity issues were detected, with VIF indices for all variables below 3. Homoscedasticity of error variance was confirmed, and the distribution of residuals was within acceptable levels.

Hypothesis Testing Using Multiple Regression

The hypothesis testing results using multiple regression indicated that the model explained $R^2 = 0.378$ of the variance in active engagement behavior, demonstrating that the three dimensions of self-congruence account for 37.8% of the outcome.

Table 2: Multiple Regression Analysis Results

Predictor Variables	B	Std. Error	Beta (β)	t	Sig.
Constant	1.222	0.201	-	6.067	0.000
Consumer-Influencer Congruence	0.164	0.070	0.179	2.336	0.021*
Consumer-Product Congruence	0.039	0.072	0.043	0.545	0.586
Influencer-Product Congruence	0.382	0.068	0.455	5.616	0.000**
R = 0.615, $R^2 = 0.378$, Adjusted $R^2 = 0.369$, F = 39.723, $p < 0.001$					

*Statistically significant at the .05 level, **Statistically significant at the .01 level

Interpretation of Study Results

1. Consumer-Influencer Congruence (H1: Hypothesis Supported)

The analysis revealed that consumer-influencer congruence has a positive and significant effect on active engagement ($\beta = 0.179$, $p = 0.021$), indicating that users who perceive themselves as sharing identity or values like the influencer are more likely to exhibit increased interaction with content.

2. Consumer-Product Congruence (H2: Hypothesis Rejected)

The analysis found that consumer-product congruence was not statistically significant ($\beta = 0.043$, $p = 0.586$), reflecting that consumers' perception of product alignment with their self-concept alone is insufficient to drive engagement, particularly among lurkers.

3. Influencer-Product Congruence (H3: Hypothesis Supported)

The analysis revealed that influencer-product congruence is the strongest predictor in the model ($\beta = 0.455$, $p < 0.001$), demonstrating that when the influencer's image and product

are well-matched, users perceive greater authenticity and credibility of the content, leading to the highest levels of active engagement.

Summary of Study Results

The findings suggest that self-congruence is an important factor associated with active engagement behavior on social media among users exhibiting lurking behavior. The model accounted for 37.8% of the variance in active engagement behavior, indicating meaningful explanatory potential. Among the three dimensions examined, influencer-product congruence demonstrated the strongest positive and significant association with active engagement, followed by consumer-influencer congruence, which aligns with concepts of identification and social media attachment. By contrast, consumer-product congruence did not show a significant association with engagement behavior.

The results further suggest that variation in active engagement among users who typically remain silent may be related not only to the product or content itself, but also to the perceived alignment among the influencer, the consumer, and the product. Identity alignment and perceived authenticity may be especially relevant in understanding engagement among users who do not usually express themselves publicly. Taken together, these findings underscore the relevance of self-congruence to engagement behavior and reflect the complexity of consumer behavior in current social media contexts.

Conclusion

This study investigates the role of self-congruence in the context of influencer marketing and examine how the three dimensions of congruence influence active social media engagement behavior among users exhibiting lurking behavior. The findings show that consumer-influencer congruence and influencer-product congruence were significantly associated with consumer engagement levels. In contrast, consumer-product congruence was not significantly associated with engagement, suggesting that for users exhibiting lurking behavior, the perception of self-product fit may be sufficient to generate positive evaluations but may not be enough to relate to visible engagement behaviors on social media. Given that engagement in digital environments often involves self-disclosure and potential social risk, the findings suggest that influencers may be particularly relevant in shaping how lurkers respond to content. Specifically, stronger alignment with influencers and influencer-product pairings appears to be associated with greater active engagement than self-product congruence alone. These interpretations are offered as theory-informed explanations rather than directly observed psychological associations. Overall, this research extends the self-congruence literature by integrating all three dimensions into a single model and showing their differing associations with active engagement on social media. It also contributes to a better understanding of lurkers as a distinct user group with different patterns of online response. From a practical perspective, the findings suggest that marketers should pay close attention to the alignment among influencers, products, and target audience identity when developing communication strategies intended to support stronger engagement in digital contexts.

Discussion

The findings of this study contribute to expanding understanding of the role of self-congruence in social media engagement behavior, particularly among users exhibiting lurking behavior, who are generally characterized by limited self-disclosure and low levels of visible content engagement (Nonnecke et al., 2021). The empirical analysis also supports the relevance

of the theoretical perspectives adopted in this study and offers further insight into consumer behavior in contemporary digital media contexts.

Consumer-Influencer Congruence and the Identification Process

The study found that consumer-influencer congruence was significantly associated with active engagement. This finding is consistent with identification-based perspectives, which suggest that consumers tend to respond more positively to individuals who reflect their identity, beliefs, or values (Shan et al., 2020). It is also broadly in line with the concept of parasocial interaction, which proposes that followers may develop a sense of psychological connection even without direct interaction. In influencer marketing contexts, perceived identity congruence may therefore be related to greater trust, liking, and stronger perceived relevance of the influencer in consumption-related decisions (Belanche et al., 2021). Previous studies have likewise suggested that self-congruence may be associated with self-expressive forms of engagement through content interaction, particularly among users who do not typically express their opinions publicly (Dolan et al., 2019; Khan, 2024). These findings suggest that consumer-influencer congruence is an important factor associated with engagement among lurkers. However, interpretations relating to identification, psychological connection, or self-expression should be treated as theory-informed explanations rather than direct empirical findings, as these theoretical constructs were not directly measured in the present study

Influencer-Product Congruence and the Match-Up Hypothesis

The findings indicate that influencer-product congruence had the strongest association with engagement in the model, which is consistent with the Match-Up Hypothesis. This perspective suggests that marketing communication may be more effective when the communicator's image is perceived as compatible with the presented product (Koay et al., 2023). Research on influencer credibility has also suggested that when consumers perceive a strong fit between the influencer and the product, they may view the content as more authentic, and this perception may be relevant to engagement (Belanche et al., 2021). In the context of users exhibiting lurking behavior, this pattern may suggest that perceived appropriateness between influencer and product is particularly relevant to visible engagement. However, interpretations involving authenticity, reduced psychological friction, or other theoretical constructs should be considered possible explanations rather than direct findings of this study.

Consumer-Product Congruence and Expression Level According to Social Identity Theory

The finding that consumer-product congruence was not significantly associated with engagement may be interpreted through Social Identity Theory (Escalas & Bettman, 2005; Malär et al., 2011), which suggests that brand congruence is often more closely related to attitudes and longer-term attachment than to immediate interactive behavior, particularly in contexts involving social visibility or perceived social risk, such as expressing opinions in public online spaces. For users exhibiting lurking behavior, the product alone may therefore be less strongly related to visible engagement. This may suggest that product-level self-congruence is less salient in prompting active engagement unless accompanied by other socially relevant cues. Nevertheless, such interpretations should remain cautious, as mediating factors were not directly examined in the present study.

Integration of Self-Congruence into the COBRAs Framework

When considered alongside the behavioral hierarchy of the COBRAs Framework (Schivinski et al., 2016), the findings suggest that identity-related congruence may be relevant to differences in engagement across levels of social media activity, particularly beyond passive consumption. This interpretation is consistent with Dolan et al. (2019), who suggest that social media engagement is shaped not only by content itself, but also by the interaction of social and identity-related motives. Accordingly, this research supports the relevance of self-congruence

in understanding engagement among lurkers. At the same time, the findings should not be interpreted as demonstrating a direct psychological driver or transition association, as other potentially relevant factors, such as platform design or entertainment value, were not examined in this model and may be explored in future research.

Implications

Theoretical Implications

This research makes significant contributions to developing theoretical knowledge in several areas.

This research contributes to theoretical knowledge in several areas. First, the findings extend the self-congruence framework by suggesting that identity congruence is relevant not only to the relationship between consumers and brands, but also across three distinct dimensions: consumer-influencer, influencer-product, and consumer-product. These dimensions showed different patterns of association with behavioral engagement, thereby contributing to the influencer marketing literature, where comparative examination across multiple dimensions of self-congruence remains limited.

Second, the research adds to understanding of lurker behavior, a large user group that has received relatively limited theoretical attention. The finding that identity-related factors, particularly consumer-influencer congruence and influencer-product congruence, were significantly associated with engagement suggests that social alignment and identity-related perceptions may be especially relevant in understanding this group, beyond what has typically been emphasized in the traditional literature.

Third, the results are broadly consistent with the conceptual foundation of the COBRAs framework, which conceptualizes consumer engagement with brand-related social media content across the dimensions of consumption, contribution, and creation. In this study, the findings suggest that differences in active engagement among users exhibiting lurking behavior may be related not only to content exposure itself, but also to perceived congruence among consumers, influencers, and products. In this way, the research offers additional insight into factors associated with engagement within the COBRAs framework, without implying a direct causal association.

Managerial Implications

The findings of this study provide several practical implications for brands, marketers, and influencer campaign managers. First, because influencer-product congruence demonstrated the strongest association with engagement, brands may benefit from selecting influencers whose image and personality appear well matched with the product, rather than focusing primarily on follower count or reach metrics.

Second, the results suggest that perceived congruence between consumers and influencers may be relevant to engagement behavior. Brands may therefore consider content strategies that reflect the target audience's identity and lifestyle, including storytelling, authentic experience-sharing, and other forms of communication that may enhance perceived identity alignment.

Third, as lurkers tend to avoid overt self-disclosure, communication designed for this group may be more effective when it emphasizes ease of participation, authenticity, and reduced social exposure. Practical examples include polls, emoji reactions, and other low-effort interaction formats that allow users to respond without extensive public expression.

Fourth, these findings may also inform psychographic segmentation by helping brands identify audience groups that perceive stronger congruence with certain influencers or products. Such

insight may support the development of more tailored and meaningful communication strategies across different consumer segments.

Limitation of the Research

Although this study offers theoretical and empirical insight into the associations between self-congruence and active engagement behavior on social media, several limitations should be acknowledged. First, the cross-sectional nature of the study restricts interpretation to associations observed at one point in time. Consequently, the findings cannot establish causal direction or account for possible changes in self-congruence and engagement over time. Future research could address this limitation through longitudinal or panel-based designs.

Second, engagement behavior was assessed using self-reported measures, which may be subject to social desirability bias, recall error, and subjective evaluation. Moreover, self-reported engagement may not fully reflect actual platform behavior, as participants may overreport or underreport the extent of their visible interactions. Future studies should therefore consider incorporating behavioral trace data, platform analytics, or multiple data sources to strengthen measurement validity.

Third, the findings may have limited generalizability across different cultural, demographic, and platform contexts. Further research is needed to determine whether these patterns hold across other populations and settings.

Fourth, the present model included only the three dimensions of self-congruence. Additional variables, such as fear of missing out, social anxiety, online identity motives, and platform affordances, may also be relevant to engagement behavior and warrant further investigation.

Finally, future research should employ designs better suited to examining temporal ordering and potential indirect relationships in order to evaluate the theoretical interpretations proposed in this study more rigorously.

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The Influence of In-Store Experience and Product Assortment on Consumer Purchase Intention: A Case Study of 7-Eleven and CJ More

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Abstract

This study aims to analyze and compare the influence of In-Store Experience factors namely Location, Personal Interaction, Color/Lighting, Layout/Display, and Product Assortment on consumers' Purchase Intention in 7-Eleven and CJ More stores. The research methodology employed a quantitative approach using an online questionnaire survey administered to 385 respondents. The sample size was determined using Cochran's formula at a 95% confidence level with a margin of error of $\pm 5\%$. A purposive sampling technique was applied, targeting individuals who had visited both stores at least once in the past month. Data were analyzed using descriptive statistics and multiple regression analyses.

The findings reveal that Layout/Display, Color/Lighting, and Product Assortment have a statistically significant positive effect on Purchase Intention for both brands. In contrast, Location does not significantly influence Purchase Intention in either case. Personal Interaction was found to have a significant effect only in the case of 7-Eleven. Notably, Product Assortment emerged as the strongest predictor in both models.

The theoretical contribution of this study lies in extending the understanding of the Stimulus-Organism-Response (S-O-R) model within the context of modern small-format retail businesses. From a managerial perspective, the results suggest that retailers should prioritize Product Assortment as a key strategic focus, alongside the design of the store atmosphere, to achieve a sustainable competitive advantage.

Keywords: In-Store Experience, Product Assortment, Purchase Intention, Consumer Behavior, Convenience Store, S-O-R Model, Servicescape, Atmospherics

Introduction

The retail industry is a structurally significant sector in driving economic systems, as it functions as an intermediary between producers and consumers while generating added value throughout the product supply chain. According to Nation Thailand (2024), the Thai retail market was valued at approximately THB 4.51 trillion in 2024, and is projected to grow at an average annual rate of 4.5% between 2024 and 2029, reflecting the dynamic nature of the industry alongside changing consumer behaviors that prioritize convenience, speed, and efficient shopping experiences (Krungsri Research, 2024).

Within this context, urbanization and lifestyle changes have significantly increased the role of modern trade relative to traditional trade, particularly convenience stores, which effectively cater to instant consumption needs (Grewal et al., 2009; Grewal et al., 2017). Consequently, competition in the retail sector is no longer confined solely to pricing and location; it has extended to experience-based competition, emphasizing the design of the In-Store Experience as a crucial mechanism for creating differentiation and perceived consumer value (Pine & Gilmore, 1999; Verhoef et al., 2009). Key components of the In-Store Experience include Location, Personal Interaction, Color/Lighting, Layout/Display, and Product Assortment, all of which are controllable factors that influence consumer perception, satisfaction, and Purchase Intention (Bitner, 1992; Baker et al., 2002; Venter et al., 2017).

In terms of competitive dynamics, the convenience store market in Thailand is characterized by intense and saturated competition, particularly between 7-Eleven and CJ More, the two major players competing for the same customer base and location. Nevertheless, both brands have clearly differentiated strategic positions. 7-Eleven emphasizes the "One Stop Convenience" concept, prioritizing comprehensive product and service offerings, while CJ More adopts the "More Than Supermarket" concept, highlighting Product Assortment, value for money, and creating an enhanced In-Store Experience beyond conventional retail stores (CP ALL, 2024; Longtunman, 2024; Thairath, 2024). This differentiation demonstrates that In-Store Experience has emerged as a strategic variable crucial for establishing competitive advantage in a highly saturated market.

However, although previous research has broadly emphasized the customer experience concept within retail contexts, most studies have focused on large-scale department stores or digital (omnichannel) retail channels. In contrast, smaller-scale retail contexts, particularly convenience stores, which are constrained by physical space and characterized by rapid purchase decision-making, have received limited attention (Bascur & Boshoff, 2004; Bascur & Rusu, 2020). Furthermore, studies conducted in Thailand indicate that research on consumer behavior in convenience stores predominantly addresses repeat purchase behavior or service-related factors, whereas the physical aspects of stores in terms of psychological influence, such as Layout/Display, Color/Lighting, and In-Store Experience design, remain underexplored (Saengchai & Phongphitak, 2025).

To address this gap, the present study integrates the Stimulus-Organism-Response (S-O-R) framework with the concepts of Atmospherics and Servicescape to examine the role of In-Store Experience factors as stimuli that affect internal consumer states (organism), including perceived value, emotions, and satisfaction, ultimately leading to the behavioral outcome, namely Purchase Intention (Kotler, 1973; Bitner, 1992; Mehrabian & Russell, 1974). This study focuses on comparatively analyzing the influence of these factors between 7-Eleven and CJ More, representing competition in Thailand's modern retail market.

Accordingly, this study contributes to both theoretical and practical knowledge. Theoretically, this study expands the framework for explaining consumer behavior within small-scale retail contexts characterized by high competition, which remains limited in the current literature. Practically, the findings can guide the design of in-store experience strategies to enhance customer attraction and establish sustainable competitive advantages in the modern retail industry.

Objective

This study aims to analyze the influence of In-Store Experience, comprising Location, Personal Interaction, Color/Lighting, and Layout/Display, as well as the role of Product Assortment, on consumers' Purchase Intention within the context of modern retail environments, using convenience stores 7-Eleven and CJ More as case studies.

Furthermore, the study seeks to compare the relative importance of each determinant in order to identify the factors that play a dominant role or exert secondary influence in the consumer decision-making process. This approach contributes to a systematic and structural understanding of purchasing behavior in real-world settings. From an applied perspective, the study aims to translate the empirical findings into managerial guidelines for retail management, encompassing store space management, atmospheric design, product planning, and the enhancement of customer experience, with the objective of strengthening the long-term competitive capabilities of retail businesses.

Literature Review

1. In-Store Experience

The concept of In-Store Experience refers to the combined influence of physical, social, and service-related environmental elements that consumers encounter from the moment they enter the store until they leave. It encompasses not only product selection but also the emotions, feelings, and behaviors triggered by the store environment (Terblanche & Boshoff, 2004). The importance of In-Store Experience lies in the retailer's ability to design experiences that create satisfaction, enhance perceived convenience, and encourage customer engagement. A well-designed in-store environment increases the likelihood that consumers will spend more time in the store, explore more products, make purchases, and return to the store in the future.

Several theories support this idea. Kotler's (1973) Atmospheric Theory posits that the deliberate design of a store's environment can evoke specific emotional responses in consumers, thereby increasing the probability of purchase. Similarly, the Stimulus-Organism-Response (S-O-R) model explains how environmental stimuli, such as store atmosphere, affect consumers' internal states, including emotions and feelings, which then influence their purchasing behavior (Mehrabian & Russell, 1974).

2. Location

Location is a critical component of the marketing mix, enabling products to reach target customers effectively. Philip Kotler & Gary Armstrong (2008) identify Location as a mechanism for product distribution, while Kevin Lane Keller (2009) conceptualizes it as part of the marketing intermediaries that connect products to end consumers.

Building on these perspectives, Location extends beyond a mere distribution channel to become a strategic factor that significantly influences consumer behavior and business performance, particularly in highly competitive environments. Empirical evidence suggests that Location is closely associated with accessibility and spatial factors such as population density, income levels, and traffic flow, all of which affect customer attraction and sales performance (Wang et al., 2022). In theoretical terms, consumer behavior frameworks such as Convenience Theory and Utility Theory explain that consumers tend to choose options that minimize time and effort costs, while the concept of Store Atmospherics highlights Location as an external factor influencing store image and perceived value. However, prior research has largely overlooked the analysis of Location within a competitive brand context, as well as

the role of mediating variables such as store image. Therefore, this study aims to examine the influence of Location on consumer behavior through both direct and indirect effects. This approach is consistent with the findings of Pairat Thanyanan & Anurak (2021), who reported that Location significantly influences repurchase intention and willingness to pay, with key factors including travel convenience, proximity to residential areas, availability of parking, crowd density, and store visibility.

3. Personal Interaction

Personal Interaction is considered a critical factor in shaping the In-Store Experience and Purchase Intention in modern retail businesses. This relationship can be explained through the Stimulus–Organism–Response (S-O-R) model, which views employees as stimuli that influence consumers' perceptions, satisfaction, and emotions, ultimately leading to behavioral responses in the form of Purchase Intention. This perspective aligns with the principles of the Service Marketing Mix (7Ps) and SERVQUAL, both of which emphasize the role of personnel in creating service value (Booms & Bitner, 1982; Parasuraman et al., 1988).

Furthermore, when considered alongside the concepts of Servicescape and Atmospherics, social interactions are found to work synergistically with the physical environment to shape the overall In-Store Experience (Terblanche & Boshoff, 2003). Contemporary Thai consumers exhibit hybrid behavior patterns that increasingly prioritize convenience and experiential value (PwC, 2025; Intellify, 2025), reflecting broader growth trends in the retail sector, particularly in convenience stores that cater to instant consumption needs (Krungsri Research, 2024).

However, previous research has predominantly focused on large-scale retail contexts, leaving a gap in understanding smaller-scale convenience stores that operate under highly competitive conditions. Therefore, the present study aims to examine the direct influence of Personal Interaction on Purchase Intention, addressing this academic gap and providing strategic insights for modern retail management. Based on prior research, it is hypothesized that Personal Interaction positively affects consumers' Purchase Intention (Álvarez-Guale, 2011).

4. Color/Lighting

Color/Lighting is a key component of store atmospherics that significantly influences consumers' experiences and Purchase Intention. This relationship can be explained through the Stimulus–Organism–Response (S-O-R) model, which conceptualizes Color/Lighting as stimuli that affect consumers' emotions, perceptions, and satisfaction, ultimately leading to purchasing behavior (Kotler, 1973). This perspective is consistent with the concepts of Atmospherics and Servicescape, which suggest that the design of the physical environment can create experiential value (Farias, Aguiar & Melo, 2014).

However, recent studies have indicated that the effects of lighting are not unidirectional. Bright lighting has been found to stimulate exploration and increase openness to new products (Hemalatha et al., 2022), whereas warm lighting enhances positive emotions and consumption desire (Spence, 2020). Additionally, some studies suggest that the impact of lighting operates more strongly through emotional responses rather than directly influencing behavior (Pizzi et al., 2020). These findings imply that the outcomes of Color/Lighting depend on contextual factors such as product type and store format. In particular, within the highly competitive Thai retail market, where convenience stores are densely distributed, color and lighting design has become a strategic factor in differentiating customer experience (Krungsri Research, 2024). Nevertheless, empirical research on small-format retail stores remains limited. This gap highlights the need for further research. Thus, this study aims to examine the direct effect of Color/Lighting on Purchase Intention, leading to the hypothesis that Color/Lighting has a positive influence on consumers' Purchase Intention.

5. Layout/Display

Layout and display are critical factors in shaping the spatial In-Store Experience and consumers' purchasing behavior, as they influence movement patterns, product visibility, and ease of search, thereby affecting value assessment and selection decisions (Kotler, 1973). The concepts of Atmospherics and Servicescape further explain that retail space design can exert psychological influence and stimulate product engagement, particularly by enhancing product visibility and prominence (Pieters & Warlop 1999). Store layouts, such as Grid and Free-flow configurations, affect both shopping efficiency and exploratory behavior (Levy & Weitz, 2001).

However, prior research indicates that the effects of Layout / Display are not uniform. Structured layouts can reduce cognitive load, whereas flexible layouts may stimulate unplanned purchases, especially for hedonic products (Boka et al., 2019). This suggests that outcomes depend more on context and consumer experience than on direct causal effects. In the context of Thai retail, previous studies have primarily focused on repeat purchase behavior rather than physical store factors, creating a research gap regarding Layout / Display in small-scale retail settings (Saengchai & Phongphitak, 2025).

Therefore, the present study aims to examine the influence of Layout / Display on Purchase Intention, with the hypothesis that effective store layout and product placement positively affect consumers' Purchase Intention.

6. Product Assortment

Product Assortment is a critical component of retail strategy, encompassing both the breadth (number of product categories) and depth (number of options within each category) of offerings, which directly influences consumers' purchasing decisions. Consumer choice theory posits that increasing the number of options enhances the likelihood of matching consumer needs with available products, thereby increasing the probability of purchase. However, the concept of choice overload suggests that excessive variety may increase cognitive load and decision complexity, potentially reducing consumers' purchase intentions (Chernev, Böckenholt & Goodman, 2020).

Empirically, research has demonstrated that an optimal level of Product Assortment can enhance the likelihood of purchase decisions. Gao & Simonson (2016) found that increasing product options positively affects the probability of selection, while Mogilner, Rudnick & Iyengar (2008) reported that assortment variety influences consumer choice behavior. Recent studies have indicated a positive relationship between Product Assortment and Purchase Intention in modern retail contexts (Hanaysha et al., 2025; Alshurideh et al., 2022). However, the literature emphasizes that this relationship is not strictly linear but depends on the appropriateness of the number of product options.

Although prior studies have investigated Product Assortment in general and online retail contexts, research in convenience store settings characterized by spatial constraints and limited shelf space remains scarce. These limitations may affect the optimal level of product variety necessary to influence consumers' Purchase Intention, particularly in highly competitive contexts such as Thailand, where 7-Eleven and CJ MORE dominate the market. Accordingly, the present study aims to examine the influence of Product Assortment on Purchase Intention, thereby filling a knowledge gap and providing strategic insights for retail management in real-world competitive environments.

Research Instrument

The conceptual framework was developed based on a review of relevant concepts, theories, and prior studies. The independent variable is In-Store Experience, which consists of Location, Personal Interaction, Color/Lighting, and Layout/Display, as well as Product Assortment. The dependent variable was Purchase Intention.

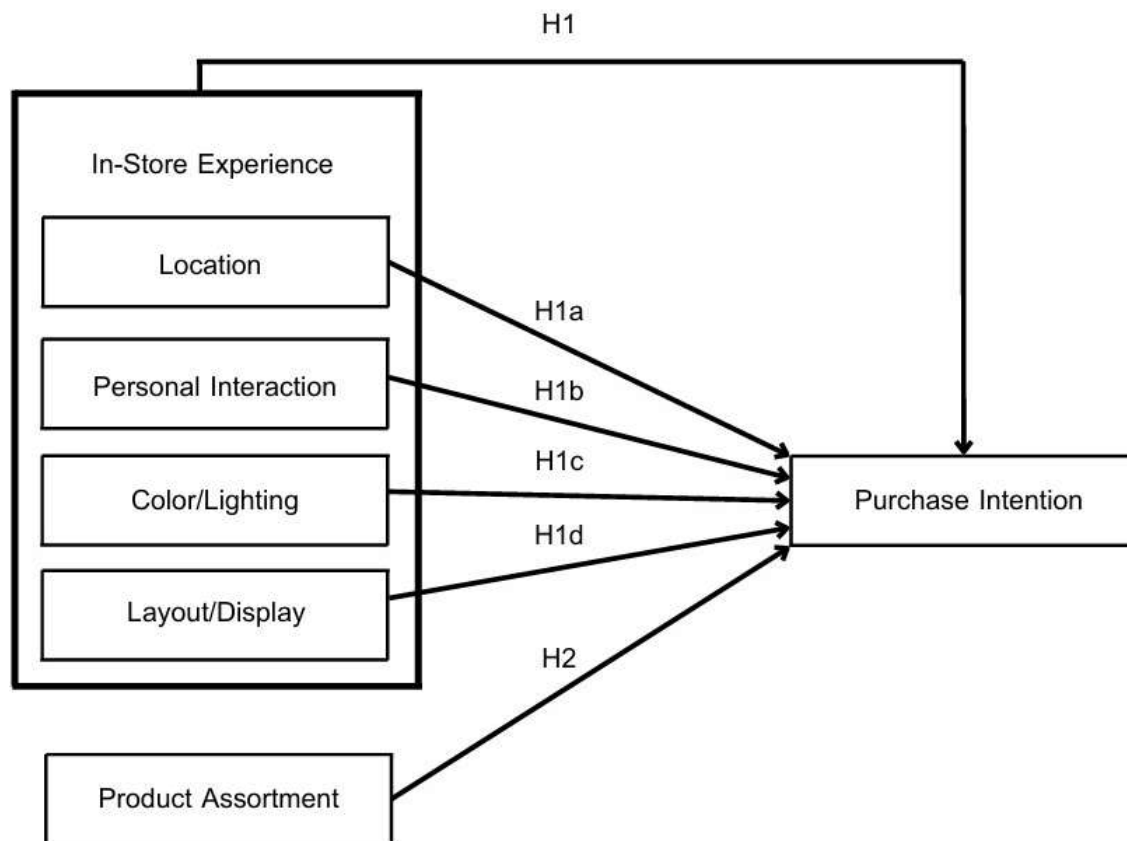


Figure 1: Illustrates The Study of The Influence of In-Store Experience and Product Assortment on Consumer Purchase Intention, Using 7-Eleven and CJ More as Case Studies.

Research Methodology

1. Population and Sample

The population in this study consisted of consumers who have experience making purchasing decisions in convenience stores, specifically 7-Eleven and CJ More in Thailand. These consumers were selected because they frequently purchase products from convenience stores and tend to base their purchasing behavior on Product Assortment and the In-Store Experience they encounter.

The researchers employed Non-Probability Sampling, using Purposive Sampling, to select respondents based on predetermined characteristics aligned with the research objectives. The criteria for sample selection were as follows.

1. Consumers who have previously used the services of both 7-Eleven and CJ More in Thailand.

2. Consumers who have purchased products inside convenience stores at least once within the past month, ensuring that the data accurately reflect their purchasing behavior and In-Store Experience. Because the exact population size was unknown, the researchers determined the sample size using Cochran's (1977) formula. A confidence level of 95% and a margin of error of $\pm 5\%$ were specified, resulting in a total of 385 questionnaires being used for data collection.

2. Data Collection

This study examines the effects of product assortment and in-store experience at CJ More and 7-Eleven on consumers' purchase decision behavior in Thailand. A survey research design was employed, and data were collected using an online questionnaire distributed via Google Forms. The data collection period was 15 days, from December 1 to December 15, 2025. In total, 385 valid responses were obtained. The questionnaires were distributed through social media. A screening question was included at the beginning of the questionnaire to ensure that only respondents who had experience using both 7-Eleven and CJ More were included in the analysis. Responses from participants who did not meet this criterion were excluded before the data analysis. The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) The data collection and analysis procedures were as follows

1.The researchers first gathered items that had been tested for reliability and then constructed an online questionnaire using Google Forms, as it provided a convenient platform for reaching the target respondents.

2.The researchers distributed the Google Forms questionnaire link to the target sample, consumers who had prior experience shopping at both 7-Eleven and CJ More and asked group members to further disseminate the questionnaire across online platforms, resulting in 400 completed responses.

3.Once all the data were collected, the researchers processed and analyzed the responses using the Statistical Package for the Social Sciences (SPSS).

3. Reliability Testing

The researchers assessed the reliability of the questionnaire using Cronbach's Alpha Coefficient to evaluate the internal consistency of the items within each construct.

Table 1: Reliability of The Questionnaire.

Independent Variable	Cronbach's Alpha Coefficient for the Sample (n = 385): 7-Eleven Store	Cronbach's Alpha Coefficient for the Sample (n = 385): CJ More Store
In-Store Experience	0.844	0.838
Location	0.704	0.817
Personal Interaction	0.788	0.828
Color/Lighting	0.769	0.803
Layout/Display	0.759	0.758
Product Assortment	0.866	0.807
Purchase Intention	0.852	0.798

Table 1. shows that the reliability coefficients of all variables exceeded 0.70, which is considered acceptable. This indicates that the questionnaire is reliable and suitable for data collection.

4. Statistical Analysis

1. Descriptive Statistics

Section 1: Screening Questions

1.1) Respondents who had previously used the services of both 7-Eleven and CJ More.

Section 2: Demographic Information and Retail Service Usage Behavior This section collected information on respondents' demographic characteristics and their retail store usage behavior, including gender, age, occupation, income, and weekly frequency of retail store visits. Descriptive statistics, including frequency distribution, mean, standard deviation (S. D.) were employed to summarize and interpret the data obtained from the questionnaire.

Section 3: consisted of items measuring the influence of In-Store Experience factors, including Location, Personal Interaction, Color/Lighting, Layout/Display, and Product Assortment, as well as the influence on Purchase Intention in the case of the 7-Eleven retail store.

Section 4: consisted of items measuring the influence of In-Store Experience factors, including Location, Personal Interaction, Color/Lighting, Layout/Display, and Product Assortment, as well as the influence on Purchase Intention in the case of the CJ More retail store.

2. Inferential Statistics

Inferential statistics were employed to analyze the data from the sample and make generalizations about the larger population through estimation and hypothesis testing. These techniques enabled the researchers to address the research questions and test the proposed hypothesis.

2.1) Pearson's Correlation Coefficient was used to examine the relationships among the variables.

2.2) Multiple Regression Analysis was conducted to analyze the relationships between more than one independent variable and the dependent variable. Simple Regression Analysis was also applied to test statistical significance (Sig), standard error (S.E.), unstandardized regression coefficients (B), standardized regression coefficients (Beta), and standard error of estimate (STD. Error), and the t-statistic was used for hypothesis testing.

This study examined the issue of multicollinearity among the independent variables using Tolerance and Variance Inflation Factor (VIF) values. The analysis revealed that, for 7-Eleven in-store factors, Tolerance values ranged from 0.341 to 0.683, and VIF values ranged from 1.463 to 2.929. For CJ More in-store factors, Tolerance values ranged from 0.300 to 0.703, and VIF values ranged from 1.423 to 3.330.

Since all Tolerance values exceeded 0.1 and all VIF values were below the recommended threshold of 10, as suggested by Hair et al. (2010), it can be concluded that the independent variables do not exhibit multicollinearity and are suitable for use in multiple regression analysis.

Research Findings

Based on the general information of the 385 respondents, the majority were female ($n = 209$, 54.3%). Most were aged between 18 and 24 years ($n = 332$, 86.2%). Regarding the usage of 7-Eleven stores, 199 respondents (51.7%) reported visiting the store 10 times or more per month, and 215 respondents (55.8%) spent approximately 101–200 baht per visit. In contrast, for CJ More stores, 209 respondents (54.3%) reported visiting 1–3 times per month, and 168 respondents (43.6%) spent approximately 101–200 baht per visit. The analysis of the respondents' opinions was conducted regarding the following factors: In-Store Experience, Location, Personal Interaction, Color/Lighting, Layout/Display, Product Assortment, and Purchase Intention.

Table 2: Mean, Standard Deviation, and Interpretation of Overall Respondents' Opinions on 7-Eleven Stores

Independent Variable	$\bar{X}$	S.D.	Interpretation
In-Store Experience	4.237	0.588	Highest
Location	4.438	0.574	Highest
Personal Interaction	4.143	0.663	High
Color/Lighting	4.193	0.610	High
Layout/Display	4.288	0.607	Highest
Product Assortment	4.254	0.593	Highest
Purchase Intention	4.188	0.638	High
Total	4.249	0.502	Highest

From Table 2. The mean and standard deviation indicated that the overall level of respondents' opinions was the highest, with a mean score of 4.249. When examining each factor individually, in descending order of mean scores, the factors of Location, Layout/Display, Product Assortment, and In-Store Experience were rated at the highest level of opinion, while the factors of Color/Lighting, Purchase Intention, and Personal Interaction were rated at a high level of opinion.

Table 3: Mean, Standard Deviation, and Interpretation of Overall Respondents' Opinions on CJ More Stores

Independent Variable	$\bar{X}$	S.D.	Interpretation
In-Store Experience	4.169	0.592	High
Location	4.151	0.710	High
Personal Interaction	4.143	0.663	High
Color/Lighting	4.194	0.612	High
Layout/Display	4.232	0.641	High
Product Assortment	4.225	0.554	Highest
Purchase Intention	4.249	0.572	Highest
Total	4.195	0.510	High

From Table 3. The mean and standard deviation indicated that the overall level of respondents' opinions was high, with a mean score of 4.195. When examining each factor individually, in descending order of mean scores, the factors of Purchase Intention, Layout/Display, and Product Assortment were rated at the highest level of opinion, while the factors of Color/Lighting, In-Store Experience, Location, and Personal Interaction were rated at a high level of opinion.

The analysis of the influence of In-Store Experience, Location, Personal Interaction, Color/Lighting, and Layout/Display on Purchase Intention, as well as the influence of Product Assortment on Purchase Intention, was analyzed using Multiple Regression Analysis.

Table 4: The influence of In-Store Experience, Location, Personal Interaction, Color/Lighting, and Layout/Display, as well as the influence of Product Assortment, on Purchase Intention of 7-Eleven retail stores was analyzed.

	Unstandardized Coefficients		Standardized Coefficients	t	p-value	Collinearity Statistics	
	B	Std. Error	Beta (β)			Tolerance	VIF
Constant	-0.230	0.151		-1.517	0.130		
In-Store Experience	0.264	0.041	0.243	6.402	0.000	0.473	2.115
Location	-0.028	0.035	-0.025	-0.788	0.431	0.683	1.463
Personal Interaction	0.137	0.036	0.142	3.748	0.000	0.475	2.107
Color/Lighting	0.109	0.045	0.104	2.428	0.016	0.369	2.711
Layout/Display	0.153	0.046	0.146	3.303	0.001	0.351	2.852
Product Assortment	0.410	0.048	0.380	8.518	0.000	0.341	2.929
R = 0.862, $R^2 = 0.743$, Adjust $R^2 = 0.739$, F = 181.845, P = 0.000							

***statistically significant at the 0.05 level**

From Table 4. Analysis of the Influence of In-Store Experience, Location, Personal Interaction, Color/Lighting, Layout/Display, and Product Assortment on Purchase Intention

The analysis of the influence of In-Store Experience, Location, Personal Interaction, Color/Lighting, and Layout/Display on Purchase Intention, as well as the influence of Product Assortment on Purchase Intention, revealed that Product Assortment had the strongest positive effect ($\beta = 0.380$, $p = 0.000$), indicating that consumers place high importance on the variety of products offered in retail stores, which positively affects their purchase decisions.

Next, In-Store Experience had a significant positive effect ($\beta = 0.243$, $p = 0.000$), suggesting that providing a good in-store experience, such as allowing consumers to move around and select products comfortably, enhances their satisfaction and encourages them to spend more time in the store, thereby increasing their likelihood of making a purchase.

Layout/Display also had a significant positive effect ($\beta = 0.146$, $p = 0.001$), indicating that systematic product arrangement within the store facilitates product selection and serves as a stimulus for purchase intention.

Similarly, Personal Interaction had a significant positive effect ($\beta = 0.142$, $p = 0.000$), reflecting the importance consumers place on the behavior and service of store employees.

Color/Lighting showed a significant positive effect as well ($\beta = 0.104$, $p = 0.016$), suggesting that proper lighting that clearly displays products can further enhance consumers' purchase intention.

In contrast, Location had no statistically significant effect on purchase intention ($\beta = -0.025$, $p = 0.431$). Since the p-value did not meet the significance criterion, it cannot be concluded that store location affects consumers' purchase intention. This may be because consumers prioritize in-store experience over store location, rendering this factor non-influential on their purchase decisions.

Table 5: The Influence of In-Store Experience, Location, Personal Interaction, Color/Lighting, And Layout/Display, As Well As the Influence of Product Assortment, on Purchase Intention of CJ More Retail Stores Was Analyzed.

	Unstandardized Coefficients		Standardized Coefficients	t	p-value	Collinearity Statistics	
	B	Std. Error	Beta (β)			Tolerance	VIF
Constant	0.173	0.127		1.361	0.174		
In-Store Experience	0.161	0.040	0.167	4.034	0.000	0.376	2.661
Location	0.031	0.033	0.039	0.949	0.343	0.380	2.631
Personal Interaction	0.021	0.026	0.024	0.790	0.430	0.703	1.423
Color/Lighting	0.121	0.043	0.130	2.805	0.005	0.300	3.330
Layout/Display	0.220	0.036	0.246	6.143	0.000	0.401	2.496
Product Assortment	0.414	0.040	0.401	10.370	0.000	0.432	2.314
R = .870, R^2 = .756, Adjust R^2 = .752, F = 195.532, P = .000							

***statistically significant at the 0.05 level**

From Table 3.2 Analysis of the Influence of In-Store Experience, Location, Personal Interaction, Color/Lighting, Layout/Display, and Product Assortment on Purchase Intention of CJ More Retail Stores

The analysis of the influence of In-Store Experience, Location, Personal Interaction, Color/Lighting, and Layout/Display on Purchase Intention, as well as the influence of Product Assortment on Purchase Intention, revealed that Product Assortment had the strongest positive effect ($\beta = 0.401$, $p = 0.000$), indicating that consumers place high importance on having a wide variety of products, similar to a one-stop shopping experience, which positively affects their purchase decisions within the retail store.

Next, Layout/Display was found to have a significant positive effect ($\beta = 0.246$, $p = 0.000$), suggesting that systematic product arrangement facilitates consumers in selecting products easily, thereby enhancing their purchase intention.

In-Store Experience also showed a significant positive effect ($\beta = 0.167$, $p = 0.000$), indicating that providing a good in-store experience, such as having desired products available and allowing convenient access within the store, creates a positive feeling among consumers and increases the likelihood of purchase.

Color/Lighting also had a significant positive effect ($\beta = 0.130$, $p = 0.005$), reflecting that appropriate store colors and lighting create a pleasant atmosphere and make products clearly visible, which further encourages purchase intention.

In contrast, two factors were found to have no significant effect on purchase intention, as their p-values did not meet the significance criterion. Location showed no statistically significant effect on purchase intention ($\beta = -0.039$, $p = 0.343$), and Personal Interaction also showed no significant effect ($\beta = 0.024$, $p = 0.430$). This may be because consumers can conveniently select products without the need for direct interaction with store employees, rendering personal interaction non-influential on their purchase intention.

Conclusion

1. The general information and Purchase Intention behavior of consumers who used convenience stores, both 7-Eleven and CJ More, were obtained from a total of 385 respondents. Overall, the majority of respondents were female (209 individuals) and were between 18-24 years of age (332 individuals). Regarding occupation, most respondents were students (342 individuals).

2. For 7-Eleven, the In-Store Experience factors influencing consumers' Purchase Intention showed that respondents placed importance on Location ($\bar{x} = 4.438$; S.D. = 0.5745), Layout/Display ($\bar{x} = 4.288$; S.D. = 0.6073), Color/Lighting ($\bar{x} = 4.193$; S.D. = 0.6109), and Personal Interaction ($\bar{x} = 4.143$; S.D. = 0.663). Similarly, consumers of CJ More placed importance on Layout/Display ($\bar{x} = 4.232$; S.D. = 0.641), Color/Lighting ($\bar{x} = 4.194$; S.D. = 0.612), Location ($\bar{x} = 4.151$; S.D. = 0.710), and Personal Interaction ($\bar{x} = 4.143$; S.D. = 0.663).

3. For 7-Eleven, the In-Store Experience factor most emphasized by respondents was Location ($\bar{x} = 4.438$; S.D. = 0.574). The dependent variable, Purchase Intention, was also rated at the highest level ($\bar{x} = 4.188$; S.D. = 0.638). Meanwhile, consumers of CJ More placed the greatest importance on Layout/Display ($\bar{x} = 4.232$; S.D. = 0.641), which correspondingly influenced the dependent variable, Purchase Intention, also rated at the highest level ($\bar{x} = 4.249$; S.D. = 0.572).

4. The hypothesis testing results revealed that In-Store Experience exerted a significant positive influence on consumers' Purchase Intention at 7-Eleven ($\beta = 0.253$, P-Value = 0.000), particularly Personal Interaction ($\beta = 0.142$, P-Value = 0.000), Color/Lighting ($\beta = 0.104$, P-Value = 0.016), and Location ($\beta = 0.146$, P-Value = 0.001). However, another dimension of Location did not show a positive influence at the 0.05 significance level ($\beta = -0.25$, P-Value = 0.431). Additionally, Product Assortment demonstrated a significant positive influence on Purchase Intention at 7-Eleven ($\beta = 0.380$, P-Value = 0.000). For CJ More, In-Store Experience also had a positive influence on Purchase Intention ($\beta = 0.167$, P-Value = 0.000), with significant effects from Color/Lighting ($\beta = 0.130$, P-Value = 0.005) and Location ($\beta = 0.246$, P-Value = 0.000). However, another dimension of Location ($\beta = 0.039$, P-Value = 0.343) and Personal Interaction ($\beta = 0.024$, P-Value = 0.430) did not exhibit positive influences at the 0.05 significance level. In contrast, Product Assortment at CJ More showed a significant positive influence on Purchase Intention ($\beta = 0.401$, P-Value = 0.000).

Discussion

The findings indicate that In-Store Experience has a statistically significant positive influence on Consumers' Purchase Intention in both 7-Eleven and CJ More contexts. This supports the research hypothesis and highlights the critical role of the In-Store Environment in shaping consumer behavior in modern retail settings. These results are consistent with Philip Kotler's (1973) concept of Atmospherics and the Stimulus-Organism-Response (S-O-R) model proposed by Albert Mehrabian & James A. Russell (1974), which suggest that physical and social stimuli within the store environment can evoke consumers' emotional states and subsequently lead to behavioral responses in the form of Purchase Intention. This reflects the psychological mechanism through which the In-Store Experience influences decision-making processes.

Mechanistically, In-Store Experience enhances experiential value, such as convenience, enjoyment, and confidence in product selection. These factors contribute to observable consumer behaviors, including increased time spent in-store and greater product

exploration, ultimately leading to higher Purchase Intention. Furthermore, differences in usage patterns suggest that 7-Eleven consumers prioritize speed and convenience, whereas those at CJ More emphasize browsing and extended in-store engagement. From a managerial perspective, retail operators should prioritize designing the In-Store Experience in alignment with consumer behavior for instance, optimizing product accessibility through effective Layout/Display, utilizing Color/Lighting to create an appropriate atmosphere and enhancing service delivery to build long-term competitive advantage through superior customer experience.

In contrast, the findings reveal that Location does not have a statistically significant effect on Purchase Intention in the either 7-Eleven or CJ More contexts. This result contradicts the findings of Pairat Thanyanan & Anurak (2021), who reported that location significantly influences repurchase intention and willingness to pay. Theoretically, although Philip Kotler & Gary Armstrong (2008), as well as Kevin Lane Keller (2009), emphasize Location as a crucial factor in customer accessibility, the extensive distribution of convenience stores in Thailand has diminished its role as a differentiating factor. Instead, Location has become a baseline expectation among consumers.

From the perspective of consumer behavior frameworks, such as Convenience Theory and Utility Theory, consumers have minimized time and effort costs associated with store access, rendering accessibility less influential in purchase decisions. Instead, consumers place greater importance on the experiential value derived from the In-Store Experience. Additionally, within the Store Atmospherics framework, location is considered an external factor that primarily influences store entry decisions. However, because the sample consisted of consumers with prior usage experience, purchase decisions were more strongly driven by internal evaluations of the in-store environment. Managerially, these findings suggest that retailers should shift their strategic focus from leveraging location advantages to differentiating through in-store experience and effective management of product assortment, which are more influential in driving Purchase Intention in the current competitive landscape.

Regarding Personal Interaction, the results indicate that it has a statistically significant positive effect on Purchase Intention in the case of 7-Eleven, but no significant effect in the case of CJ More. This suggests that the hypothesis is only partially supported and reflects the differences in the role of personnel across retail formats. The findings for 7-Eleven are consistent with the S-O-R framework, Service Marketing Mix (7Ps) and SERVQUAL, which identify employees as critical stimuli influencing consumer perceptions and emotions. Efficient, accurate, and courteous service enhances satisfaction and trust, thereby increasing Purchase Intention. This also aligns with the Servicescape concept, which posits that social interactions work in conjunction with the physical environment to shape the overall store experience.

Conversely, the absence of a significant effect in the CJ More context can be explained from the perspectives of consumer behavior and competitive strategy. Consumers in this setting may prioritize functional value, such as Product Assortment and value for money over service-related attributes. Moreover, hybrid behavioral patterns emphasizing convenience and self-directed decision-making reduce employees' roles in the purchase process. From a managerial perspective, retailers should align employee roles with consumer behavior and brand positioning. For example, convenience-oriented stores such as 7-Eleven should emphasize service efficiency and consistency, whereas stores focusing on Product Assortment, such as CJ More prioritize facilitating self-service while providing assistance at critical touchpoints to enhance the overall customer experience.

The analysis further reveals that Color/Lighting has a statistically significant positive influence on Purchase Intention in both 7-Eleven and CJ More contexts. This supports the research hypothesis and underscores the importance of atmospheric elements in influencing consumer behavior in modern retail environments. These findings are consistent with the S-O-R framework, which explains that environmental stimuli such as Color/Lighting affect consumers' internal states particularly emotions and perceptions before leading to behavioral responses. This aligns with the Servicescape concept, which highlights the role of physical environment design in shaping experiential value and consumer perception.

From a psychological perspective, Color/Lighting plays a crucial role in shaping emotional responses and reducing uncertainty in product evaluation. Bright lighting enhances product visibility and encourages exploration, whereas warm lighting fosters positive emotions and desire to consume. However, these effects are typically indirect, operating through emotional and perceptual processes rather than directly influencing behavior. In terms of context, although Color/Lighting influences both brands, their distinct design approaches reflect different competitive strategies. 7-Eleven emphasizes brightness and clarity to facilitate quick decision-making, whereas CJ More uses tonal and lighting variations to create an environment conducive to prolonged browsing and product exploration. Managerially, retailers should design Color/Lighting in alignment with product categories and customer usage behavior to optimize purchasing decisions and enhance the overall experience.

The findings also indicate that Layout / Display have a statistically significant positive effect on Purchase Intention in both 7-Eleven and CJ More contexts. This supports the research hypothesis and highlights the importance of physical store elements in influencing consumer decision-making. These results are consistent with Atmospherics theory (Kotler, 1973) and the Servicescape framework, which suggest that spatial design can shape psychological responses and consumer perceptions, particularly in terms of product visibility and engagement (Pieters & Warlop, 1999). Furthermore, store layout formats, such as grids and free-flow, influence movement patterns and purchasing behavior in terms of both efficiency and exploration (Levy & Weitz, 2001).

From a psychological mechanism perspective, a structured Layout/Display reduces cognitive load, enabling consumers to locate products easily and make quicker decisions. In contrast, flexible layouts encourage product exploration and impulse purchasing, particularly for experiential goods (Boka, Saerang & Arie, 2019). This suggests that the effect of Layout/Display operates indirectly through perception, convenience, and exploratory behavior. From a managerial perspective, retailers should design store layouts in alignment with usage behavior for example, employing grid layouts to enhance speed in convenience-oriented stores and flexible layouts to stimulate exploration in experience-oriented stores- thereby improving accessibility, engagement and Purchase Intention in highly competitive retail environments.

Finally, the findings demonstrate that Product Assortment has a statistically significant positive influence on Purchase Intention in both 7-Eleven and CJ More contexts and represents the most influential factor among all variables. This supports the research hypothesis and highlights Product Assortment as a primary driver of purchase decisions in modern retail. These findings are consistent with consumer choice theory, which suggests that increasing the number of options enhances the likelihood of matching consumer preferences, thereby increasing the purchase probability. Prior studies have also found a positive relationship between Product Assortment and Purchase Intention (Gao & Simonson, 2016; Hanaysha et al., 2025; Alshurideh et al., 2022).

However, the concept of choice overload suggests that excessive variety may increase decision difficulty (Chernev et al., 2020), indicating that the relationship depends on the optimal level of assortment. From a psychological perspective, Product Assortment enhances perceived value and decision confidence by increasing the likelihood of finding suitable products while reducing perceived risk. Conversely, excessive options may increase cognitive burden and decision-making hesitation. Therefore, the findings suggest that retailers have effectively managed an optimal level of Product Assortment within the spatial constraints of convenience stores. From a managerial standpoint, retailers should design their assortment structure by balancing breadth and depth, ensuring coverage of core consumer needs while avoiding excessive variety that may complicate decision-making. This approach can enhance shopping efficiency, customer satisfaction, and competitive advantage in increasingly dense retail market.

Suggestions

Managerial Implications

The findings of this study suggest that In-Store Experience and Product Assortment function as key “stimuli” that influence consumers’ perceived value and convenience, which in turn leads to Purchase Intention through psychological mechanisms as explained by the Stimulus-Organism–Response (S-O-R) framework. Therefore, retail management should be designed as an “experience-driven system,” wherein multiple elements are systematically integrated to enhance consumer responses.

Within this framework, Layout / Display should be elevated from a purely physical element to a behavioral regulation mechanism. The strategic design of store navigation paths and structured product categorization can reduce consumers’ cognitive load and improve decision-making efficiency in stores. Simultaneously, exploratory layout designs can stimulate impulse purchases and increase transaction value. Regarding Personal Interaction, the findings reflect a context-dependent effect, with significance observed only in specific situations. This indicates that employees continue to play an important role, particularly in contexts that require informational support or trust-building. Therefore, employee development should encompass both functional service skills and emotional engagement. Similarly, Color/Lighting acts as an “affective stimulus” that influences consumers’ emotional processing and perception. A well-designed store atmosphere can enhance trust and ease of product selection, thereby indirectly influencing Purchase Intention. Importantly, Product Assortment emerges as the primary predictor in both models, reflecting a shift in competitive dynamics from “availability” to “relevance.” In other words, merely offering a sufficient quantity of products is no longer adequate; retailers must curate assortments that align with context-specific consumer requirements. Consequently, data-driven assortment planning and localization strategies are critical for enhancing competitiveness in the retail industry.

Finally, the differences in the findings between 7-Eleven and CJ More highlight their distinct strategic positioning. 7-Eleven emphasizes operational efficiency and service standardization, whereas CJ More focuses on variety and value-added services. Therefore, the application of these research insights should be aligned with each brand’s positioning to achieve a sustainable competitive advantage in the long term.

Suggestions for Future Research

Future research should advance both theoretical and methodological rigor by extending the Stimulus-Organism-Response (S-O-R) framework beyond direct effect analysis to better explain underlying mechanisms through mediating variables such as perceived convenience,

shopping enjoyment, and customer satisfaction. In parallel, moderating variables, such as product type, time pressure, and store familiarity, should be incorporated to better capture context-dependent consumer behavior. Additionally, future studies should adopt a mixed-methods approach by integrating qualitative techniques, such as in-depth interviews or observational methods, to gain deeper insights into consumer motivations and emotional experiences that may not be fully captured through questionnaires. Furthermore, incorporating perspectives from behavioral economics could provide a more comprehensive understanding of the interaction between price and Product Assortment. From a methodological standpoint, advanced analytical techniques such as Structural Equation Modeling (SEM) or Mediation and Moderation Analyses should be employed to enhance causal inference. Sampling methods should also be improved by transitioning from purposive sampling to probability sampling and by combining online and offline data collection methods to reduce bias and improve generalizability. Finally, expanding the scope of the study across different geographic areas and comparing various retail formats would contribute to a more comprehensive body of knowledge within the Thai retail context.

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Enhancing Creative Writing Ability Through AI-Integrated Learning Activities Among 10th-Grade Students

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Abstract

The main three objectives of this research were to develop AI-supported creative writing lessons for Grade 10 students that met the 80/80 effectiveness standard, examine how students' writing skills improved after learning with AI, and assess students' satisfaction with this teaching approach. Within the Thai educational context, creative writing instruction often faces significant challenges. Traditional teaching methods frequently focus on the final product rather than the process, leaving students struggling with a lack of inspiration, the "blank page syndrome," and limited vocabulary. These issues contribute to writing anxiety and low engagement. This study aimed to demonstrate how AI-integrated learning serves as a critical intervention to bridge these pedagogical gaps by providing personalized support, immediate feedback, and cognitive scaffolding throughout the writing process.

We used a quasi-experimental design with 10th-grade students from Weerawatyothin School in Thailand. The experimental group consisted of 32 students, while the Control group had 30. Students in the experimental group completed 15 hours of instruction using a six-stage teaching model that incorporated AI tools.

The results were positive. The AI activities achieved an effectiveness rate of 84.53/83.59 (E1/E2) effectiveness, exceeding the 80/80 benchmark. Students' creative writing improved significantly after the intervention ($p < .05$). They also reported very high satisfaction with the approach. These findings suggest that using AI in creative writing classes can meaningfully help secondary school students write better, stay more engaged, and overcome common writing challenges by providing essential scaffolding within their zone of proximal development.

Keywords: Creativity, Creative Writing, Artificial Intelligence in Education, AI, Thai Language

Introduction

Why This Study Matters

Creative writing is an essential part of language education around the world because it allows students to express their ideas, emotions, and experiences through imaginative use of language. At the secondary school level, creative writing helps build not only language skills but also creativity, critical thinking, and a stronger sense of personal identity. However, many secondary students still struggle with creative writing, especially when it comes to generating ideas, organizing their thoughts clearly, and staying motivated (Amornsriwatanakul et al., 2021; Ennis, 2017).

Traditional creative writing instruction often focuses too heavily on the final product rather than the writing process. As a result, students receive little formative feedback and have limited opportunities to explore ideas, revise their drafts, or reflect on their work. These teaching practices can hold back students' creative growth and reduce their engagement in writing activities.

Recent educational research has shown that artificial intelligence (AI) can enhance teaching and learning by offering personalized support, immediate feedback, and adaptive learning pathways (Li & Zhang, 2023; Al Naimiy et al., 2025). Theoretically, integrating AI into writing instruction fits well with constructivist and sociocultural learning theories. AI can act as a cognitive tool that helps learners build knowledge through interaction, reflection, and ongoing refinement. In addition, AI-based support can serve as scaffolding aligned with Vygotsky's zone of proximal development, allowing students to complete writing tasks that they might not be able to accomplish on their own (Vygotsky, 1978).

Artificial intelligence (AI) in education can be broadly defined as computer-based systems designed to carry out tasks that usually require human intelligence, such as reasoning, recognizing patterns, and making adaptive decisions. In educational settings, AI is not just a tool for automation—it acts as an intelligent system that supports learning through interaction, guidance, and meaningful feedback (Russell & Norvig, 2010).

In Thailand, secondary language education still relies heavily on exam-oriented instruction, especially in preparation for national assessments of Thai language proficiency. Both national achievement data and classroom observations show ongoing challenges in students' creative writing skills, revealing a gap between what the curriculum expects and what actually happens in classrooms. This situation highlights the need for new teaching approaches that better align creative writing instruction with 21st-century competencies and modern digital learning environments.

Despite increasing interest in AI-assisted learning, there is still limited systematic research on how AI can be integrated into creative writing instruction at the secondary school level, especially within the Thai educational context.

Background and Rationale

Artificial intelligence (AI) has quickly changed education around the world, especially in language learning and writing. Many AI tools, such as tutoring systems, automated feedback programs, and advanced language models, are now used to help students improve their writing by giving suggestions on content, structure, and language (Foltz, 2018; Hattie & Timperley, 2007). Studies show that these tools can reduce students' mental workload while writing and encourage them to draft and revise their work more often.

In Thailand, the use of AI in secondary language education is still at an early stage. Because of this, students receive little formative feedback and have limited chances to practice reflective or repeated writing. Many students also find creative writing difficult and stressful, especially when they do not feel confident in their writing skills.

Using AI in creative writing classes can help solve these problems. AI tools can help students think of ideas, give quick feedback, and guide them when they revise their writing. This makes creative writing feel less difficult. AI activities can also create a more student-centered classroom that supports independence, interest, and motivation.

Because of this, it is important to design and test AI-based creative writing activities that fit both good teaching practices and the needs of Thai secondary students.

Objectives

This study aimed to:

1. Design AI-integrated creative writing activities for Grade 10 students that meet the 80/80 effectiveness standard
2. Evaluate changes in students' creative writing ability before and after AI-integrated instruction
3. Assess how satisfied students are with AI-enhanced creative writing instruction This study addresses the identified gap by examining how AI-supported scaffolding can enhance students' creative writing processes. By bringing together Scaffolding Theory and Connectivism, the research positions AI as something closer to a sounding board than a search engine-a tool students can think alongside, not just look answers up in. The aim is to help writers move through uncertainty rather than around it.

Contribution

The findings of this study are expected to support both theory and practice in language education. On the theoretical side, the results provide evidence that constructivist and sociocultural ideas can be applied to writing instruction that uses AI. By viewing AI as a tool that offers cognitive support and feedback, this study adds to current discussions about how technology can help students learn and create more effectively.

From a practical point of view, the findings give clear guidance for teachers and curriculum designers on how to use AI effectively in secondary creative writing classes. The instructional framework and learning activities in this study can help educators improve students' creative writing through more modern and student-centered methods. This research also adds to the growing body of work on AI in Thai education and offers ideas that may support future policy decisions, curriculum planning, and teacher training programs.

Literature Review

Creative Writing in Secondary School

Creative writing is an important part of language learning because it allows students to express their own ideas, feelings, and viewpoints through meaningful use of language. In secondary school, creative writing helps build higher-order thinking skills, imagination, and independence in learning. Researchers note that creative writing is not only about correct grammar. It also involves originality, clear organization, creative use of language, and emotional impact (Guilford, 1967; Torrance, 1974).

Previous studies show that many secondary students struggle with creative writing, especially when it comes to generating ideas, organizing content, and creating clear and connected stories (Ennis, 2017; Amornsriwatanakul et al., 2021). These difficulties often come from teaching methods that focus mainly on the final piece of writing rather than the writing process. As a result, students have fewer chances to try out ideas, revise their work, or reflect on their writing. In contrast, a process-oriented approach has strong support in the literature

because it encourages students to plan, draft, revise, and reflect in multiple stages, which helps build creative writing skills more effectively (Flower & Hayes, 1981).

Creative writing in Thai schools is usually taught in a teacher-centered and exam-focused way. Students do not get many chances to be creative or express their own ideas. Because of this, many of them see creative writing as something difficult and stressful instead of something enjoyable. This shows that new teaching methods are needed—methods that support students through each step of the writing process and help them stay engaged and creative.

AI in Writing Education

Artificial intelligence (AI) has become increasingly prevalent in educational settings, particularly in the domains of language learning and writing instruction. AI-powered tools, including automated writing assessment systems, intelligent tutoring systems, and large language models, have demonstrated considerable potential to support learners' writing development through real-time feedback, personalized guidance, and adaptive learning pathways (Foltz, 2018; Li & Zhang, 2023).

Research indicates that AI-assisted writing environments can enhance students' writing accuracy, coherence, and confidence by reducing cognitive load and providing timely feedback on grammar, vocabulary, and textual organization (Hattie & Timperley, 2007; Al Naimiy et al., 2025). In contrast to traditional forms of feedback, which are often delayed and constrained by teachers' workload, AI-generated feedback is immediate, consistent, and scalable. These characteristics make AI particularly effective in supporting iterative drafting and revision processes.

Nevertheless, scholars caution that AI should not replace teachers but should instead function as a complementary tool within well-designed pedagogical frameworks. Effective integration of AI requires careful instructional planning, clearly defined learning objectives, and explicit guidance on ethical and responsible AI use. When implemented appropriately, AI can facilitate learner-centered and process-oriented writing instruction rather than serving merely as a shortcut for content generation.

Study's Conceptual Framework

Drawing on theories of creative writing, research on AI-enhanced learning, and established learning frameworks, this study proposes a conceptual model for the design and implementation of AI-enhanced creative writing instruction. Within this model, AI functions as a cognitive and metacognitive scaffold by supporting idea generation, formative feedback, and iterative revision within each instructional phase.

The independent variable of the study comprises AI-enhanced creative writing activities structured around a six-phase instructional model (C-R-E-A-T-E). These activities integrate AI tools throughout the entire writing process, including idea generation, structural planning, drafting, revision, reflection, and assessment. The use of AI is guided by explicitly designed prompts and clearly defined pedagogical objectives to ensure alignment with creative writing learning outcomes.

The dependent variables include students' creative writing competence, assessed in terms of originality, content quality, language proficiency, and emotional-intellectual depth, as well as students' satisfaction with AI-enhanced instruction. The conceptual framework also recognizes mediating mechanisms—such as instructional scaffolding, feedback provision, self-assessment, and learner engagement—that influence the relationship between the instructional activities and the resulting educational outcomes.

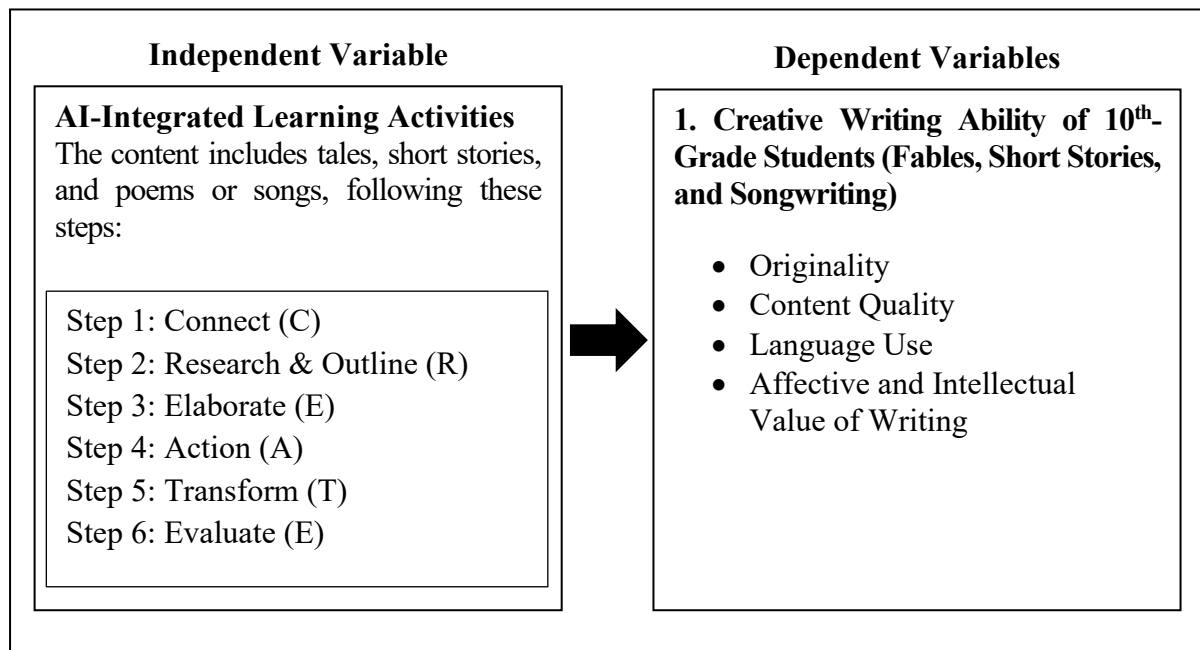


Figure 1: Conceptual Framework of the Study

Figure 1 depicts this research's conceptual model. The model shows how AI-enhanced creative writing activities, delivered through the six-phase instructional sequence (C-R-E-A-T-E), affect students' creative writing competence and educational satisfaction.

At the teaching level, AI plays a supportive role in the writing classroom. It helps students generate ideas, receive feedback, and revise their work during the writing process. AI also provides scaffolding that supports students as they develop their compositions. At the level of learning activities, students are encouraged to engage more actively with their writing. They practice self-regulation and reflection with support from both the teacher and AI tools. Together, these learning processes contribute to improved creative writing performance and more positive attitudes toward writing.

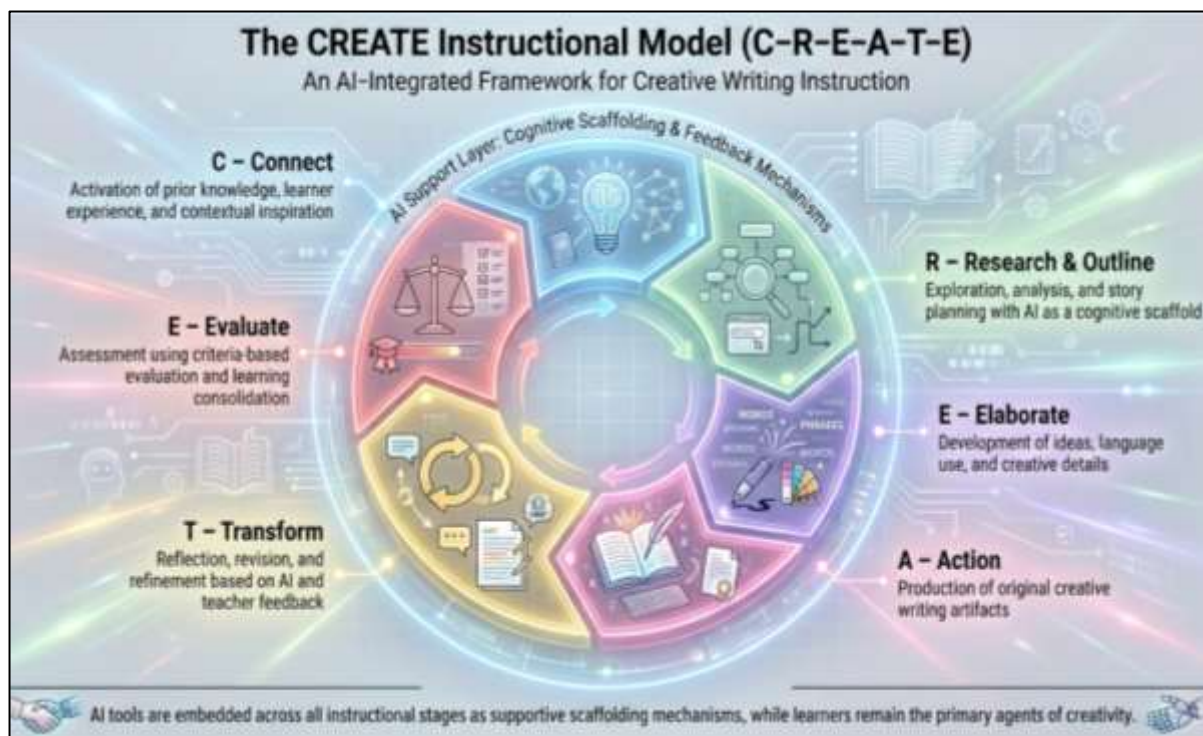


Figure 2: The CREATE (C-R-E-A-T-E) instructional model for AI-integrated creative writing instruction.

The CREATE (C-R-E-A-T-E) model was developed to organize AI-integrated creative writing instruction into a clear, process-oriented learning cycle. The model places strong emphasis on learner agency and active participation. Within this framework, AI is used as a supportive tool that provides cognitive scaffolding across different stages of the writing process, including idea generation, drafting, revision, reflection, and evaluation.

Research Methodology

Study Design

This research used a quasi-experimental design with a pretest-posttest control group ($n=30$) and experimental group ($n=32$) structure to investigate the effectiveness of AI-enhanced creative writing instruction. This design was selected to systematically evaluate students' creative writing competence before and after the teaching intervention while addressing practical constraints within the educational setting (Creswell & Creswell, 2018).

The study focused on both learning outcomes and students' perceptions of the instructional approach. Quantitative data were collected through standardized creative writing assessments and questionnaires in order to measure instructional effectiveness, students' writing achievement, and their level of satisfaction with the learning experience.

Participants

The participants in this study were 62 tenth-grade students from two intact classrooms at Weerawatyothin School, Surin, Thailand, during the second semester of the 2025 academic year. These students shared similar educational backgrounds and were taught by the same instructor to minimize teacher-related variables. The classrooms were assigned using a cluster random sampling technique into two groups: an experimental group ($n=32$) and a control group ($n=30$).

Research Instruments

Three research instruments were employed.

1. AI-Integrated Lesson Plans

The lesson plans were built around a six-phase teaching sequence (C-R-E-A-T-E) designed to support the creative writing process through systematic AI integration. The six phases were:

1. Connect - activating prior knowledge and experiences
2. Research and Outline - organizing and structuring ideas with AI help
3. Elaborate - writing creative pieces
4. Action - improving and refining drafts through AI-provided feedback
5. Transform - presenting revised work in meaningful formats
6. Evaluate - assessing writing quality and reflecting on learning outcomes

AI tools were integrated into each phase of the instructional process. They were used to support idea development, improve language use, and provide feedback during writing activities. Throughout the lessons, teachers continued to play an active role by guiding students' critical thinking and monitoring ethical and responsible AI use. In addition, expert reviewers examined the lesson plans to ensure content validity and confirm alignment with the intended educational objectives.

Table 1: Summary of the C-R-E-A-T-E Model with AI for Creative Writing

Step	Key Learning Activities	Use of AI Tools	Expected Outputs	Assessment Methods
C	Stimulate interest through media (videos, songs, sample texts); activate prior knowledge; discuss key concepts	ChatGPT (example texts)	Initial understanding, engagement	Observation, participation, questioning
R	Study and analyze structures (story, short story, song); explore writing techniques; create concept maps	ChatGPT, Canva, Gemini	Concept maps, structural analysis worksheets	Worksheet checking, concept evaluation
E	Develop ideas through brainstorming, group work, and creative thinking activities	Copilot, Gemini	Plot outlines, story frameworks, lyric concepts	Rubric-based evaluation (creativity, originality)
A	Produce creative writing (story, short story, song); draft and revise work	ChatGPT, Gemini, Canva	Drafts and final written works	Writing assessment (content, language use, creativity)
T	Reflect on learning; peer review; present work; discuss strengths and improvements	Padlet, Mentimeter, Copilot	Reflections, peer feedback	Reflection assessment, peer evaluation
E	Assess final products and learning outcomes; self and peer evaluation; present completed works	Mentimeter, Padlet	Final outputs (e.g., E-book, digital story, song)	Rubric-based assessment (creativity, content, language, value)

Table 1 lays out how the C-R-E-A-T-E model unfolds across six steps, each built around a different phase of the writing process. The sequence moves from building curiosity to producing finished work-but it is not a straight line so much as a progression that keeps circling back to the student's own thinking.

Creative Writing Assessment

The creative writing assessment was designed to evaluate student performance across four dimensions:

Table 2: Creative Writing Competence Assessment Rubric Sample

Dimension	Description
Creativity (Originality)	Ability to generate novel and unique ideas
Content Strength	Coherence, completeness, and relevance of content
Language Accuracy and Style	Accuracy and appropriateness of vocabulary and structure
Emotional and Intellectual Merit	Emotional impact and meaningful insights conveyed

The assessment required students to produce creative writing pieces based on specific prompts and guidelines. A rubric-based scoring system was used to evaluate the students' work. Subject-matter experts reviewed the assessment to ensure content validity. The instrument was also pilot tested prior to data collection in order to establish its reliability.

Table 3: Language Precision and Style Evaluation Standards

Assessment Dimension	Evaluation Criteria	Performance Indicators
Creativity (Originality)	Capacity to produce original concepts and imaginative expressions	Shows novel concepts, distinctive viewpoints, and imaginative language application; avoids imitation and exhibits personal voice
Content Strength	Pertinence, coherence, and thoroughness of content	Introduces concepts relevant to the designated topic; sustains logical arrangement, unity, and continuity throughout the composition
Language Accuracy and Style	Correctness and suitability of language application	Employs grammatically accurate sentence construction, correct spelling and punctuation, suitable word selection, and fluent stylistic expression appropriate for the writing type
Emotional and Intellectual Merit	Emotional influence and meaning depth	Communicates significant messages, values, or reflections; engages readers emotionally and intellectually and exhibits thoughtful understanding

Student Satisfaction Survey

A five-point Likert-scale questionnaire was developed to measure students' satisfaction with AI-enhanced creative writing activities. The questionnaire focused on four key areas which are the teaching process, instructional materials and resources, evaluation and feedback, and the learning environment. Subject experts reviewed the questionnaire to ensure clarity and appropriateness. Reliability testing indicated an acceptable level of internal consistency.

3.4 Teaching Procedure

The instructional intervention was conducted over a total of 15 teaching hours. Students in the experimental group took part in AI-enhanced creative writing activities designed according to the C-R-E-A-T-E instructional sequence. During the intervention, students completed prompt-based learning tasks that emphasized thoughtful and responsible use of AI, rather than simple copying of generated content.

AI helped students generate ideas, plan their writing, draft, revise, and reflect. Teachers guided discussions, checked students' progress, and gave additional support when needed. The control group learned creative writing through regular teaching methods and materials, without using AI.

Table 4: Experimental Timeline (15 Instructional Hours over 5 Weeks)

Week	Session (3 hrs/week)	Activity / Instructional Stage	Key AI Integration / Tasks
1	Session 1	Pre-test & Introduction	Administration of Creative Writing Pre-test and orientation on AI tools (e.g., Gemini, ChatGPT).
2	Session 2	Stage 1: Connect (C) & Stage 2: Research (R)	Stimulating background knowledge and using AI to research themes, vocabulary, and inspirations.
3	Session 3	Stage 3: Elaborate (E) & Stage 4: Action (A)	Using AI to expand ideas (scaffolding) and starting the initial drafting process of creative pieces.
4	Session 4	Stage 5: Transform (T) & Stage 6: Evaluate (E)	Refining work based on AI formative feedback and peer/teacher review. Finalizing the creative product.
5	Session 5	Post-test & Satisfaction Survey	Administration of Creative Writing Post-test and the 5-point Likert scale satisfaction questionnaire.

The experimental intervention spanned five weeks, with three instructional hours per week, totaling 15 hours. The first week involved pre-assessment and AI tool orientation. Weeks 2 through 4 focused on the implementation of the six-stage C-R-E-A-T-E model, where AI served as a cognitive scaffold for brainstorming (Connect/Research), drafting (Elaborate/Action), and refining (Transform/Evaluate). The final week concluded with the post-test and a student satisfaction survey.

Data Collection

The experimental intervention was conducted over a period of 5 weeks, totaling 15 instructional hours (3 hours per week). The first week was dedicated to the pre-test and introduction to AI tools. The subsequent three weeks focused on the implementation of the six-stage C-R-E-A-T-E teaching model, and the final week concluded with the post-test and the satisfaction survey.

We collected data in three phases. Before the teaching intervention, students in both the experimental and control groups completed a creative writing pretest. After the instructional period, a posttest was administered to examine changes in students' creative writing ability. In addition, students in the experimental group completed a satisfaction questionnaire at the end of the intervention to reflect their experiences with AI-enhanced learning.

Data Analysis

Quantitative data were analyzed using descriptive and inferential statistics. Teaching effectiveness was calculated using the E_1/E_2 efficiency index to evaluate both the learning process and learning outcomes. Independent samples t-tests were used to compare creative writing performance between the experimental and control groups before and after the intervention. This statistical method was selected because the two groups consisted of different students from intact classrooms. Statistical significance was set at the .05 level.

Research Finding

Effectiveness of AI-Enhanced Creative Writing Activities

The effectiveness of the AI-enhanced creative writing activities was evaluated using the E_1/E_2 efficiency index, which represents process effectiveness (E_1) and outcome effectiveness (E_2). The results showed an effectiveness score of 84.53/83.59, which exceeded the benchmark criterion of 80/80.

The E_1 score reflects students' performance during the learning process and indicates that students were able to participate effectively in the AI-supported activities. The E_2 score represents students' creative writing achievement after the instruction, suggesting that the learning activities helped students reach the expected learning outcomes.

Table 5: Effectiveness of AI-Enhanced Creative Writing Activities (E_1/E_2)

Effectiveness Metric	Result	Benchmark
E_1 (Process)	84.53	80
E_2 (Outcome)	83.59	80

These results demonstrate that the AI-enhanced learning activities proved successful in both the teaching process and learning outcomes.

Comparison of Creative Writing Competence Before and After Instruction

Independent samples t-test results showed no significant difference between the experimental and control groups in the pretest. However, a significant difference was found in the posttest at the .05 level. Students in the experimental group demonstrated higher creative writing competence after receiving AI-enhanced instruction.

The posttest mean score was higher than the pretest mean score, indicating improvement in creative writing performance across key areas such as originality, content quality, language use, and emotional depth.

Table 6: Creative Writing Competence Comparison Between Experimental and Control Groups at Pretest and Posttest Using Independent Samples t-test

		Statistic	DF	P	Mean difference	SE difference
PreTest	Welch's t	0.677	59.4	0.750	0.765	1.13
PostTest	Welch's t	-6.706	52.3	<.001	-6.738	1.00

Note. $H_a \mu_{\text{control}} < \mu_{\text{experimental}}$

Table 7: Pretest-Posttest Comparison of Creative Writing Competence Between Experimental and Control Groups

	Group	N	Mean	Median	SD	SE
PreTest	control	30	23.7	22.5	4.06	0.741
	experimental	32	23.0	22.0	4.82	0.851
PostTest	control	30	26.7	25.0	4.52	0.825
	experimental	32	33.4	33.0	3.24	0.573

The results show that AI-enhanced creative writing activities had a statistically significant effect on students' creative writing competence.

Creative Writing Competence Learning Progress

To illustrate students' improvement in creative writing, a visual comparison of pretest and posttest mean scores was presented. The results show a clear increase in creative writing performance after students participated in AI-enhanced learning activities. The comparison highlights the learning gains achieved through systematic AI integration across the writing process. Students improved not only in overall writing scores but also in idea development, content expansion, and language refinement through repeated drafting and revision.

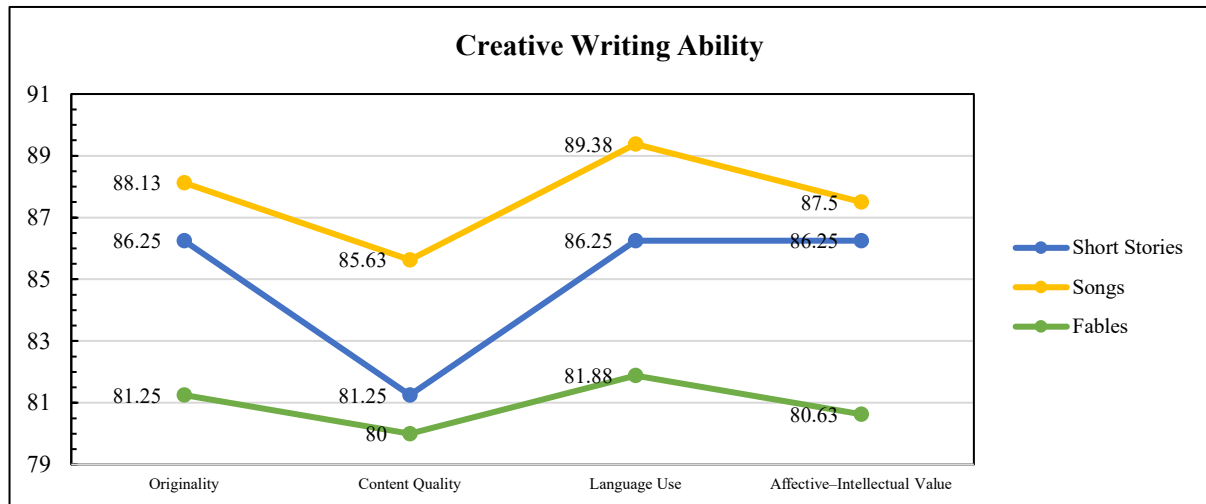


Figure 3: Creative Writing Ability of The Experimental Group After Instruction

Figure 3 shows students' creative writing scores after AI-integrated instruction. The results compare fable writing, short story writing, and songwriting across four areas: originality, content, language use, and overall value.

Songwriting received the highest scores in all areas, followed by short story writing. Fable writing had the lowest scores, although students still performed at a satisfactory level.

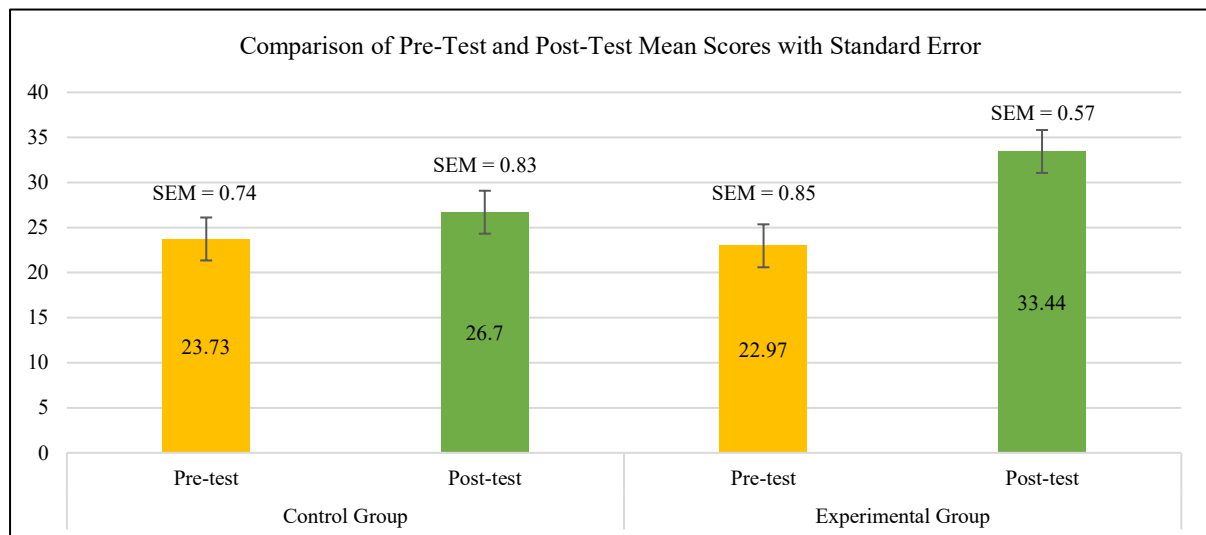


Figure 4: Comparison Of Pre-Test and Post-Test Mean Scores Between the Control and Experimental Groups. Error Bars Represent the Standard Error of The Mean (SEM).

Figure 4. Comparison of mean creative writing scores between the experimental and control groups. Error bars indicate the Standard Error of the Mean (SEM), highlighting the significant growth and reduced variability in the experimental group following the AI-integrated intervention.

Student Satisfaction with AI-Enhanced Creative Writing Instruction

Student satisfaction with AI-enhanced creative writing activities was analyzed using descriptive statistics. The results showed a very high overall satisfaction level (mean = 4.85), with high scores across all survey dimensions, especially the learning environment and educational materials.

Students expressed that AI tools helped reduce writing anxiety, support idea generation, and increase engagement. The lowest score, although still high, related to applying creative writing skills to daily life.

These results suggest that students valued the AI-enhanced approach, but clearer links between creative writing skills and real-life use could be developed.

Table 8 provides additional information about students' satisfaction with the AI-enhanced creative writing activities. The survey assessed students' opinions in four areas: the teaching process, learning resources and materials, assessment and feedback, and the overall learning environment. Responses were measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Table 8: Student Satisfaction Average Scores by Area (n=32)

Area	Mean ($\bar{X}$)	Interpretation
Teaching process	4.84	Highest
Educational resources and materials	4.86	Highest
Evaluation and feedback	4.78	High
Learning environment	4.94	Highest
Overall satisfaction	4.85	Highest

The findings show that students had very positive views of the AI-enhanced creative writing instruction, particularly regarding the learning environment and the materials used.

Samples of Student Creative Writing and AI-Integrated Learning Process

1. Examples of Student Creative Writing Progress

The following samples demonstrate how students overcame "blank page syndrome" and expanded their vocabulary through AI scaffolding.

Case Study: Student A (Songwriting/Poetry)



Figure 5: A Complete Song Titled "Lūk-Kheun Mai Ner... Hua-Jai" (Rise Up Again).

Sample AI Prompts and Scaffolding Process

To illustrate the pedagogical gap being bridged, below is a typical interaction during the writing process:

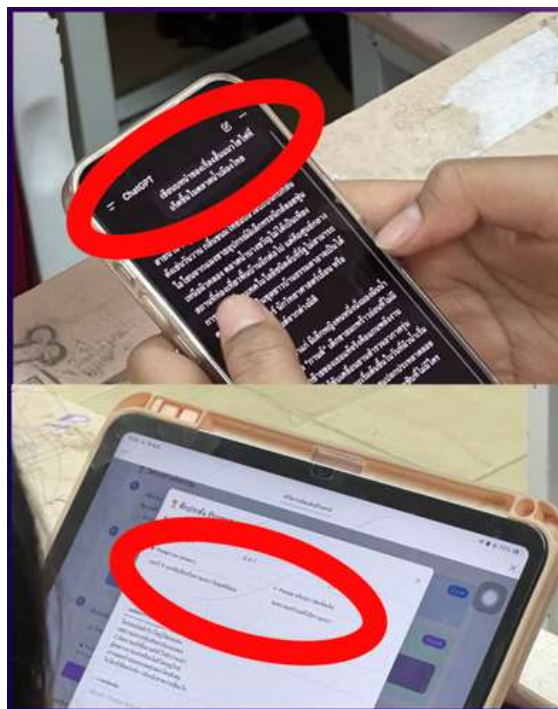


Figure 6: Student Prompt

Qualitative Feedback on AI Integration

Direct quotes from students highlighting the reduction of writing anxiety and the expansion of creative boundaries:

1. "For me, AI really helps, especially when I want beautiful vocabulary or want it to suggest multiple endings. It makes my writing much more fluid."
2. "I feel like when using AI, it keeps my thoughts from getting stuck. If I can't think of anything, I ask the AI first. It's like opening another door to my imagination."
3. "AI helps me write faster and makes me see the value in writing and developing myself more."

Samples of Student Creative Writing

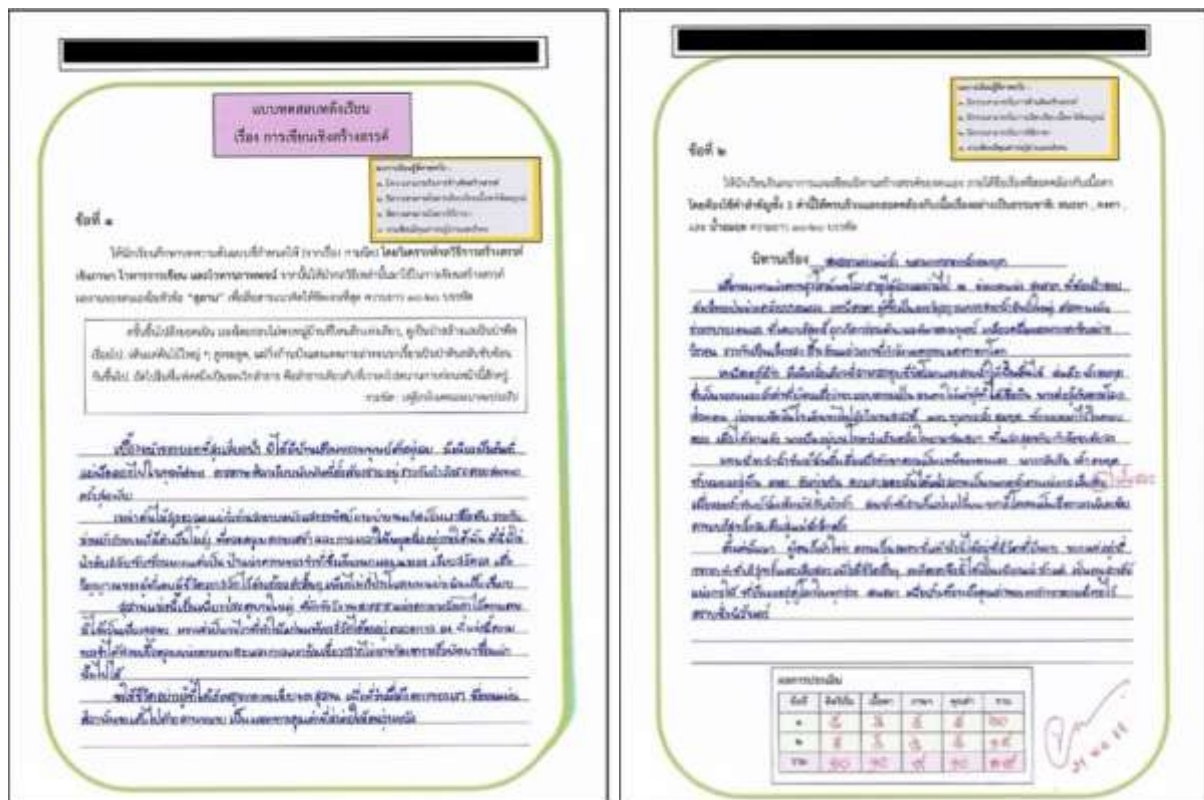


Figure 7: Samples of Student Creative Writing

Figure 7. A final creative writing sample from a student in the experimental group. This level of descriptive detail and structural coherence illustrates the effective transition from initial writing blocks to a polished creative composition, facilitated by AI-driven formative feedback and vocabulary expansion.

Discussion/Conclusion

The findings clearly indicate that students who worked through the AI-integrated activities wrote noticeably better by the end of the study their post-test scores climbed above both their own starting point and the scores of students who learned without AI support. The gap was not marginal; the experimental group's gains cleared the threshold for statistical significance ($p < .05$), which suggests the improvement was not a matter of chance.

What seemed to make the difference was less about the technology itself and more about what it made possible in the moment of writing. When students got stuck, they got feedback-not at the end of a lesson, but while they were still in the middle of figuring things out. When words failed them, they had somewhere to turn. Over time, that kind of immediate, low-stakes support appeared to loosen something: the paralysis that comes with staring at a blank page started to ease, and anxiety around writing seemed to soften. The C-R-E-A-T-E model, built around these AI-assisted touchpoints, gave students enough of a foothold to attempt writing they might have otherwise abandoned.

This pattern echoes what earlier research has found-that well-designed scaffolding lets learners reach further than they could on their own, not by doing the work for them, but by holding things steady while they find their footing.

Effectiveness of AI-Enhanced Creative Writing Activities

The results showed that the AI-enhanced creative writing activities achieved an effectiveness score of 84.53/83.59, exceeding the 80/80 benchmark. This indicates that the instructional design was effective in supporting both the learning process and learning outcomes. Students were actively engaged during the activities, and they were able to achieve the expected creative writing competencies after instruction.

These findings are consistent with constructivist learning principles, which emphasize active participation and learning through meaningful experiences (Jonassen, 1991). The C-R-E-A-T-E instructional model allowed students to repeatedly plan, write, revise, and reflect with support from AI tools, feedback, and learning resources. Similar results have been reported in previous studies showing that AI-supported instruction can improve learning effectiveness through ongoing scaffolding and formative feedback (Hattie & Timperley, 2007; Jamil, M. G., & Bhuiyan, Z.; 2021).

Learning theory suggests that students learn best with guidance, feedback, and supported practice. The AI-enhanced instruction met these conditions by integrating feedback and scaffolding throughout the writing process. (Schunk, 2012).

Students used AI to generate song and lyric ideas and then revised them to improve emotional expression and language.

Improvement in Students' Creative Writing Ability

Results revealed a statistically significant improvement in students' creative writing competence following participation in AI-enhanced learning activities. We can understand this improvement through Vygotsky's zone of proximal development (ZPD) framework, which suggests that learners can achieve higher performance levels when provided with appropriate guidance or scaffolding (Vygotsky, 1978).

In this research, AI acted as a more knowledgeable other (MKO) by providing timely and personalized feedback during the writing process. With support from AI in brainstorming, organizing ideas, and revising drafts, students were able to overcome common writing difficulties, such as getting started and structuring their ideas clearly. These findings are consistent with previous studies showing that AI-based support can enhance writing performance by reducing cognitive load and helping students gradually develop their writing skills (Graham & Harris, 2018; Yang et al., 2020).

Students showed improvement in several aspects of creative writing, such as originality, content development, and language use. AI tools helped students generate ideas and organize their thoughts more easily, making the writing process less difficult. By revising their work and reflecting on feedback, students were able to improve their writing step by step. During the Transform phase, students mainly focused on improving their own work, which shows that AI was used as a supporting tool rather than a source of copied content.

Students' reflections supported these findings. Many students reported that AI prompts helped them see new ideas in their writing and made them more confident when revising their

work. These reflections suggest that AI-supported instruction improved not only writing skills but also students' confidence in their own creativity.

In particular, songwriting activities showed the greatest improvement across all writing dimensions. This may be because songwriting allows more freedom in language use, emotional expression, and rhythm, which worked well with AI support during idea generation and revision.

The present findings are in line with previous studies in Thailand showing that AI-supported writing can enhance students' creative writing skills. For instance, Rangsipanya and Art-in (2025) found that integrating ChatGPT into creative learning activities led to clear improvements in students' originality and language use.

Student Satisfaction and Learning Experience

Results showed that students reported the highest level of overall satisfaction with AI-enhanced creative writing instruction. High ratings for the learning environment and educational materials suggest that AI integration helped create a positive and engaging classroom atmosphere. This finding is consistent with humanistic learning principles, which emphasize emotional comfort, learner autonomy, and intrinsic motivation as key factors in effective learning (Rogers, 1983).

Students tended to view AI as a supportive and non-threatening tool that helped reduce anxiety about making writing mistakes and encouraged experimentation. The availability of instant, personalized feedback allowed students to revise their work more confidently without fear of negative judgment. As a result, students developed a stronger sense of ownership and confidence in their writing. These findings are consistent with previous studies indicating that AI-supported feedback can enhance learner motivation and engagement by providing timely and individualized assistance (Foltz, 2018; Li & Zhang, 2023).

However, the lower satisfaction with how creative writing skills apply to daily life shows that this area still needs improvement. Although students saw that AI helped them write better, some were unsure how to use these skills outside the classroom. This suggests the need to clearly link creative writing tasks to real-life uses, such as digital storytelling, social media posts, or creating creative online content.

Overall, the discussion shows that using AI in creative writing classes can not only improve students' learning but also help build a more supportive and motivating classroom environment. When teachers use AI with clear teaching goals and proper guidelines, this approach can greatly enhance creative writing education at the secondary level.

Apart from improving their writing, the lesson design also helped students develop basic AI literacy by teaching them to question and evaluate AI suggestions instead of copying them directly. This encourages responsible AI use and supports the wider goals of building digital and critical literacy in secondary education.

Conclusion and Implications

This research aimed to design and evaluate AI-enhanced creative writing activities for Grade 10 students and to see how they affected students' writing skills and learning satisfaction. The findings showed that the AI-supported lessons were more effective than the set benchmark and led to clear improvements in students' creative writing. Students also reported very high satisfaction with the learning activities, reflecting their positive attitude toward this teaching approach.

It also provides empirical support for incorporating AI into creative writing instruction at the secondary level. By embedding AI tools within a structured six-phase teaching process, the learning activities effectively supported students throughout writing, including idea generation, drafting, revising, and reflection. These results correspond with constructivist and sociocultural learning frameworks, which emphasize active learning, scaffolding, and feedback

as fundamental mechanisms for skill development. In this research, AI functioned as a cognitive support tool and scaffolding within students' zone of proximal development, enabling learners to accomplish writing tasks beyond their initial competence level. (Schunk, 2012).

From a teaching standpoint, the findings show that AI can be integrated into creative writing lessons in a helpful and purposeful way when teachers set clear goals, design effective prompts, and guide students throughout the process. AI-assisted feedback and prompt-based activities motivated students to revise their work multiple times and think more deeply about their writing. Both of which are essential for building creative writing skills. Rather than replacing the teacher, AI should be used as a supportive tool that boosts students' independence, confidence, and engagement in learning.

For educational practice, the instructional sequence proposed in this study offers a practical model for designing AI-enhanced writing activities in secondary classrooms. The sequence is flexible and can be adapted to different writing genres and learning contexts, as long as ethical guidelines and responsible AI use are prioritized. The study also underscores the need to build students' AI literacy by teaching them to evaluate AI-generated suggestions thoughtfully and to use AI as a learning aid rather than a tool for copying content.

Despite its contributions, this study has some limitations. The participants were from a single school, which may limit how widely the results can be applied. The research also focused mainly on short-term learning outcomes. Future studies could build on this work by exploring the long-term effects of AI-supported writing instruction, testing the approach in different educational contexts, or examining the development of AI literacy and creative thinking skills in greater depth.

Overall, the findings of this study show that AI-enhanced creative writing instruction has strong potential to improve both students' writing performance and their overall learning experience. With thoughtful lesson design and proper teacher guidance, AI can serve as a powerful tool that supports and enriches creative learning in secondary education.

Suggestion

Suggestions for Implementation

The 6-step learning management model designed to enhance creative writing abilities through Artificial Intelligence (AI) is highly practical and can be effectively implemented in learning activities for Grade 10 (Mathayom 4) students.

In practice, educators should integrate Digital Literacy and Critical Thinking alongside the use of AI tools. It is crucial to emphasize the role of AI as a supportive learning tool rather than a definitive source of answers. This approach prevents over-reliance on technology and empowers students to independently evaluate, verify, and build upon AI-generated outputs.

Suggestions for Future Research

A comparative study should be conducted to evaluate the efficacy of different types of AI tools in promoting creative writing skills. This would help identify which specific tools are most suitable for diverse learning contexts and instructional objectives.

Future studies should prioritize qualitative or mixed-methods approaches that emphasize the student's workflow. This could involve analyzing Revision Logs or AI Usage Logs, including student decision-making processes—specifically how they formulate prompts and their reasoning for accepting or rejecting AI suggestions. Such data will provide in-depth insights into how AI affects the development of Digital Literacy and AI Ethics, and the extent to which students can refine AI outputs while maintaining authorship.

The scope of research should be expanded to include more diverse samples, such as schools in different geographic areas with varying levels of technological readiness, or across

different grade levels. This expansion would further validate the effectiveness of the learning model in a broader educational landscape.

Further research should explore the impact of AI integration on other essential 21st-century skills beyond creative writing, such as Problem-Solving, Collaboration, and Critical Thinking. This will ensure a holistic understanding of how AI influences overall student development.

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Potential Analysis of Creative Community-Based Tourism in The First Sunrise Area, Ubon Ratchathani Province

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Abstract

This qualitative research aimed to 1) study the potential of creative community-based tourism in the First Sunrise area of Ubon Ratchathani Province, and 2) analyze the potential of creative community-based tourism in the First Sunrise area of Ubon Ratchathani Province in accordance with the needs of creative tourists. The target group consisted of thirty key stakeholders relevant to the development of community-based creative tourism, including two community leaders, ten local residents, ten local entrepreneurs, and eight government officials. Participants were selected using purposive sampling, and data were collected through observation and in-depth interviews.

The findings revealed that the community's potential for creative tourism development can be categorized into twelve dimensions: cultural capital, human resources, spatial potential, management, participation, self-reliance, creative tourism activities, tourism routes, souvenir products, accommodation management, community storytellers, and problem-solving and overcoming obstacles. The analysis highlighted that Mueang Saeng Raek community possesses distinctive cultural capital, particularly cotton cultivation along the Mekong River and traditional hand-weaving, which reflect historical continuity, organic practices, and inherited natural dyeing wisdom. Furthermore, the existence of more than thirty homestays allows visitors to experience rural riverside lifestyles intimately. Simultaneously, fishing, bamboo weaving, and local cuisine based on Mekong fish represent unique local identities that enhance the community's attractiveness and provide a strong foundation for the sustainable development of creative tourism.

Keywords: Community-Based Tourism, Cultural Capital, First Sunrise Area

Introduction

The Thai government has implemented policies to promote income generation through tourism, recognizing that tourism serves as a key driver for stimulating the economy in the short term and creating significant employment opportunities (Thavisin, 2023). Tourism has, therefore, become a crucial industry that generates revenue for the nation by capitalizing on Thailand's diverse natural and cultural resources, which are marketed as tourism products. In recent years, despite the global COVID-19 pandemic, Thai people have demonstrated adaptability and resilience in coexisting with the virus. As a result, public anxiety has eased, and domestic and international tourists alike have resumed traveling to various destinations, including natural, historical, cultural, and community-based attractions across Thailand. According to the Tourism Authority of Thailand (2023), domestic tourism in 2022 generated approximately 641,554 million THB, while international arrivals reached 11,153,026 visitors, generating about 589,833 million THB. Consequently, Thailand's total tourism revenue from both domestic and international tourists amounted to 1,231,387 million THB in 2022. To ensure sustainable tourism development, tourism products must be rooted in cultural capital and integrated with community-based lifestyles. Such an approach not only enhances the distinctiveness and attractiveness of tourism products but also stimulates the local economy, reduces tourist congestion in major destinations, and distributes income more equitably to rural communities (Lamaijeen et al., 2021).

Creative community-based tourism is a tourism model that emphasizes job creation, supplementary income, and livelihood opportunities for local people, particularly in communities with limited economic prospects from their traditional occupations. This type of tourism has gained popularity among travelers seeking authentic cultural experiences through participatory learning of artistic, cultural, and heritage practices, thereby fostering meaningful connections with local communities—the custodians of living culture (UNESCO, 2006). In addition, creative community-based tourism integrates history, cultural heritage, local lifestyles, and place identity, allowing tourists to engage in direct experiential learning with cultural bearers. This approach adds value to cultural assets by highlighting the intrinsic worth of traditions and community practices, rather than merely prioritizing economic returns (Sangsanit, 2018). Importantly, such tourism nurtures local pride and cultural appreciation, while encouraging tourists to stay longer, spend more, and develop a deeper understanding of the host community. Consequently, income is distributed more equitably across the community, while cultural traditions and practices are sustained. Creative community-based tourism, thus, creates a balance between economic development, cultural continuity, and social well-being, making it suitable for tourists who seek hands-on, participatory activities such as hand-weaving, local cooking, Bai Sri (ceremonial tray) making, tie-dye fabric production, traditional dance, and folk music performance (Designated Areas for Sustainable Tourism Administration [DASTA], 2021).

Ubon Ratchathani Province covers a total area of 16,112 square kilometers and shares a 424-kilometer border with two neighboring countries: the Lao People's Democratic Republic and the Kingdom of Cambodia. The province is endowed with diverse tourism resources, including natural attractions, historical and cultural heritage, traditions, local lifestyles, and indigenous knowledge. Ubon Ratchathani is also recognized as the "Land of the First Sunrise in Siam," as Pha Chanadai, located in Pha Taem National Park in Khong Chiam District, is the first location in Thailand where the sunrise can be observed. In line with this unique identity, the province has formulated a development plan to enhance tourism in the "First Sunrise of Siam" area in Khong Chiam District as a strategy to stimulate the local economy. According to the Department of Tourism (2023), Ubon Ratchathani recorded 1,037,071 domestic tourists

and 161 international tourists in 2021, generating a tourism revenue of 1,498.02 million THB. In 2022, the number of domestic tourists increased significantly to 2,096,230, while international tourists rose to 7,074, generating 2,880.99 million THB in revenue. These statistics indicate a steady growth in tourist arrivals, which directly contributes to the increase in tourism income. The continuous growth in tourist numbers presents an opportunity for local communities to enhance their capacity in hosting visitors, thereby creating jobs, generating supplementary income, and promoting sustainable community-based tourism development.

Based on the preliminary study, it was found that certain communities in the “First Sunrise” area have initiated community-based tourism activities but have not yet achieved success and require further development. These include Ban Khan Tha Kwian and Ban Thung Na Mueang, both of which serve as buffer zones for Pha Taem National Park. The communities are situated in forested and mountainous areas, where local residents primarily engage in farming, rice cultivation, and livestock raising. During their free time, men traditionally practice handicrafts such as weaving bamboo baskets, nets, and fish traps for household use, while women focus on embroidery and weaving textiles for daily use. The natural environment of the villages has fostered a lifestyle deeply connected with nature, as inherited from their ancestors. Villagers have long utilized local natural resources-such as cotton bark, mango leaves, eucalyptus leaves, butterfly pea flowers, indigo leaves, indigo bark, padauk bark, Lagerstroemia bark, jackfruit heartwood, and lac insects-to develop traditional knowledge and cultural practices that sustain their livelihood. This has given rise to a distinctive cultural heritage reflected in weaving practices (such as Sai Yai Khong textile weaving), fishing, agriculture, local cuisine, organic cotton dyeing, and cotton planting along the Mekong River. However, these cultural assets have not yet been fully elevated to become the foundation of tourism activities, routes, or community products. As a result, the communities remain unable to effectively present or market them to visitors. Moreover, they still lack adequate knowledge of mechanisms for managing creative community-based tourism on the basis of cultural capital. Consequently, their tourism products and services lack unique community identity and do not sufficiently encourage participatory and safe engagement between hosts and tourists. This limitation has reduced the potential of tourism to generate supplementary income for local livelihoods.

It is, therefore, essential that local communities in the “First Sunrise” area must be developed with adequate knowledge of creative community-based tourism management. In particular, presenting their cultural foundations through creative tourism activities can serve as a vital mechanism to strengthen tourism development. Such an approach enables local communities in the First Sunrise area of Ubon Ratchathani Province to transform their culture, way of life, and indigenous wisdom into sources of creativity that add value to their cultural heritage. At the same time, this process helps preserve and enhance cultural capital by elevating it into a meaningful and marketable resource through shared learning experiences between hosts and visitors. Consequently, communities are able to generate supplementary income from creative community-based tourism, while also fostering a collective awareness of the importance of conserving and sustaining their cultural heritage. Ultimately, this serves as a mechanism for promoting sustainable grassroots economic development.

Objectives

1. To study the potential of creative community-based tourism in the First Sunrise area of Ubon Ratchathani Province.
2. To analyze the potential of creative community-based tourism in the First Sunrise area of Ubon Ratchathani Province in accordance with the needs of creative tourists.

Literature Review

Creative tourism is a contemporary form of tourism that has expanded in response to culturally creative consumers seeking more participatory and hands-on experiences. It enhances opportunities for tourists to develop themselves creatively and fosters the formation of new identities among traditional cultural tourists (Wongmanee & Wongsaroj, 2021). The concept of creative tourism was first discussed by Pearce and Butler in 1993. Although in its early stage, the concept lacked a clearly defined meaning and systematic framework. Later, it has been continuously developed, particularly in countries that emphasize tourism development based on cultural capital (Decha-um, 2013).

Later, Richards and Raymond (2000) defined creative tourism as a form of tourism that offers tourists opportunities to develop their creative potential through active participation in learning experiences characteristic of the destination. Such experiences may include learning local culinary practices, participating in traditional handicrafts, or engaging in various cultural activities. This form of tourism, therefore, emphasizes “participation” rather than passive observation, allowing tourists to establish meaningful connections with the host community and its cultural heritage.

Similarly, UNESCO (2006) further explained that creative tourism refers to travel directed toward authentic engagement and genuine experiences through learning about arts, cultural heritage, and the distinctive characteristics of a particular place. It also fosters relationships between tourists and local people, who are the creators and custodians of living culture. This perspective highlights the importance of interaction, experiential learning, and cultural exchange as essential dimensions of creative tourism (Prueksapong, 2011; Saengsanit, 2011).

Research Methodology

This study employed qualitative research methodology and followed the steps outlined below.

1. Research Implementation Procedures

This research utilized a qualitative research approach, consisting of two main stages.

Stage 1: This stage focused on studying the community's potential for developing a creative community-based tourism model grounded in cultural capital within the "Mueang Saeng Raek" area of Ubon Ratchathani Province. The methodology involved in-depth interviews and group interviews with key informants.

Stage 2: This stage involved developing the creative community-based tourism model based on cultural capital in the "Mueang Saeng Raek" area. Data collected from Stage 1 were subjected to content analysis and potential analysis. This led to the development of creative tourism activity bases, creative tourism routes, creative souvenir products, and homestay or homelord accommodations, all based on the community's cultural capital. Focus Group discussions were utilized in the development process.

2. Population and Sampling

The research study utilized the following population and sample.

Population: The population consisted of the key stakeholders (key informants) involved in developing the creative community-based tourism model based on cultural capital in the Mueang Saeng Raek area, Ubon Ratchathani Province. The population consisted of thirty samples including one community sage, two community leaders, ten local residents, ten local entrepreneurs, seven government sector personnel involved in tourism development. Purposive Sampling was used to select key informants with relevant knowledge and experience in developing creative tourism activities.

3. Data Collection

In this study, data were collected from the following sources. 1) In-depth Interviews: Data on the potential of communities in developing a model of creative community-based tourism were collected through in-depth interviews with local experts, village sages, ritual successors, and villagers in Kan Tha Kwian Village and Thung Na Mueang Village, Khong Chiam District, Ubon Ratchathani Province. A total of thirty key informants were interviewed until data saturation was reached. The participants were selected using purposive sampling. 2) Observation: Both participant and non-participant observation methods were employed to gather in-depth data on the development of creative community-based tourism. Observations were conducted in Kan Tha Kwian Village and Thung Na Mueang Village, Khong Chiam District, Ubon Ratchathani Province. Data were collected from twelve key informants, including local experts, village sages, ritual successors, and villagers, until data saturation was achieved. Purposive sampling was also applied in this process.

4. Research Instruments and Validation

The research instruments consisted of the followings.

1) In-depth interview guide: This instrument was used to collect data on the potential of the community in order to address both research objectives. It contained guiding questions designed to explore and elicit in-depth information.

2) Observation record: Both participant and non-participant observation methods were employed to collect data on the development of creative community-based tourism. This instrument was utilized to respond to both research objectives.

In addition, fieldwork equipment such as digital cameras, video cameras, and audio recorders were used to support data collection.

Validation of Research Instruments

To ensure the accuracy and reliability of the qualitative research findings, a triangulation check was employed. Multiple strategies were applied to validate the instruments as follows. Data Triangulation: Data on the same issues were collected from different sources. People Triangulation: Data were collected from different individuals, including local sages, monks, government officials, and community members. Methodological Triangulation: Various data collection methods, such as in-depth interviews, observations, focus group discussions, and workshops, were used to cross-verify information and enhance the accuracy and validity of the findings (Chantavanich, 2004).

5. Data Analysis

This study employed qualitative data analysis. Data obtained from different sources and groups of key informants were examined to ensure accuracy and consistency. Data verification was conducted through multiple methods, including semi-structured interviews, focus group discussions, repeated questioning, and respondent validation. To further enhance credibility, data triangulation was applied by cross-checking information across sources, methods, and informants (Chantavanich, 2000). Verified data were then analyzed using content analysis to

identify patterns, themes, and categories relevant to the potential and development of creative community-based tourism in the First Sunrise area of Ubon Ratchathani Province.

Research Finding

Objective 1: To study the potential of creative community-based tourism in the First Sunrise area of Ubon Ratchathani Province.

1. **Cultural Capital:** The community possesses rich cultural assets derived from traditional ways of life connected to the Mekong River, such as local fishing, hand-weaving, natural dyeing, and basketry. Traditional dishes made from Mekong fish also reflect inherited cultural wisdom. Furthermore, local traditions such as Heet Sib Song-Khong Sib Si, rooted in Buddhism and Lan Xang influence, foster unity and social cohesion. These cultural capitals can be developed into creative tourism activities that provide authentic experiences for visitors.

2. **Human Capital:** Most residents engage in agriculture and fishing, with knowledge of local wisdom such as weaving and dyeing. However, there is a lack of expertise in creative tourism management, marketing, and storytelling. A major strength lies in the community's pride and hospitality, yet challenges include knowledge transfer to younger generations and the development of skilled interpreters and marketers.

3. **Spatial Potential:** The area features significant natural resources and attractions such as the Mekong River, Sam Phan Bok, Don Khan Khao, Saeng Chan Waterfall, and Thung Na Mueang Waterfall. These sites hold potential for eco-cultural tourism. A current limitation is the absence of storytelling and integrated promotional strategies linking natural and cultural assets.

4. **Management Potential:** Local groups such as the Kan Tha Kwian Tourism Group, weaving groups, and food groups demonstrate self-organization. Nonetheless, standardized management systems—particularly revenue-sharing models—remain underdeveloped. Transparent financial management could enhance sustainability.

5. **Community Participation:** Residents actively participate in decision-making processes through meetings, referendums, and financial management. This reflects strong social capital, a critical factor in creative tourism development. Future growth requires joint strategic planning and network building to strengthen economic bargaining power.

6. **Self-Reliance:** The community sustains diverse livelihoods through homestays, restaurants, weaving, agriculture, and boat services. Local resources are creatively utilized, generating circulating income. However, improvements in service standards and market linkages are needed for long-term sustainability.

7. **Creative Tourism Activities:** Current activities are mostly demonstrations and passive observations, limiting visitor engagement. The study suggests that more participatory activities, such as fabric dyeing, local cooking, and fishing, would enhance visitor experience and market competitiveness.

8. **Tourism Routes:** Presently, tourism routes are not systematically organized. Visits are limited to specific sites, such as riverside viewpoints, cotton cultivation and processing demonstrations, local restaurants, and nearby waterfalls. A lack of interconnected networks reduces tourism appeal.

9. **Community Souvenirs:** Available products include food (Mekong fish, jaew bong dipping sauce, fermented fish), textiles (cotton, tie-dye, local designs), basketry, and agricultural goods. However, creative development focuses mainly on textiles, while other products lack innovation in design or value-added processing.

10. **Homestay Management:** The community operates over thirty homestays, offering authentic rural experiences along the Mekong. Yet, none have been officially certified by the Department of Tourism, indicating the need for standardized quality assessment.

11. Community Storytellers: Skilled storytellers exist in weaving and cotton cultivation, but other fields such as fishing, farming, and local cuisine lack engaging narrators. Although knowledge exists, storytelling skills remain underdeveloped.

12. Challenges and Constraints: The community faces multiple issues, including limited tourism management skills, declining tourist numbers and revenue, depletion of Mekong fish resources, insufficient intergenerational knowledge transfer, a shortage of storytellers (mostly elderly), and inadequate promotion. These factors significantly hinder the sustainability of creative community-based tourism.

Research Objective 2: To analyze the potential of creative community-based tourism in the First Sunrise area of Ubon Ratchathani Province in accordance with the needs of creative tourists.

Overall community potential of the First Sunrise area

The First Sunrise community demonstrates a distinctive cultural capital, particularly in cotton cultivation along the Mekong River and traditional weaving practices. These reflect both the community's long-standing heritage and its organic identity, as well as the inherited knowledge of natural dyeing techniques. Additionally, the community offers over thirty homestays, allowing tourists to experience the riverside rural lifestyle firsthand. At the same time, riverside livelihoods such as fishing, bamboo basketry, and local cuisine derived from Mekong fish are key elements that contribute to the area's unique charm and suitability for sustainable creative tourism development. From an academic perspective, the Kan Tha Kwian and Thung Na Mueang communities share strong cultural assets, particularly in cotton cultivation and weaving using traditional methods and natural dyes. These practices form unique cultural products with significant value. Moreover, the presence of more than thirty homestays reflects the rural lifestyle and facilitates local income circulation. Riversides occupations, including fishing, basketry, and preparation of local cuisine, further reinforce the community's distinctive appeal. The reliance on natural resources and local knowledge represents a key strength that can be leveraged to develop sustainable creative community-based tourism. Community participation plays a crucial role in driving sustainability, promoting economic, social, and cultural benefits, and enhancing the value of the community's cultural capital for both residents and visitors.

Discussion/Conclusion

Research Objective 1: Potential for creative community-based tourism in the First Sunrise area, Ubon Ratchathani Province

The study found that the First Sunrise community possesses distinctive cultural capital, including traditional lifestyles, the "Heet Sib Song – Khong Sib Si" ritual cycle, and local wisdom closely linked to the Mekong River. These assets can be leveraged to develop creative tourism activities that directly connect tourists with local ways of life (Smith, 2009; Richards & Raymond, 2000). However, the utilization of cultural capital for tourism products and activities is currently limited, as most offerings emphasize demonstration rather than participatory experiences, which is inconsistent with the principles of creative tourism that prioritize hands-on engagement and experiential learning (Tan, Luh, & Kung, 2014). Regarding human resource and management potential, local residents possess craftsmanship skills, weaving techniques, and traditional culinary knowledge. Nonetheless, they lack expertise in tourism management, marketing, and cultural interpretation. This aligns with findings by Jelinčić and Žuvela (2012), who highlight that "creative tourism needs capacity building," particularly in storytelling and organizational management, to ensure standardized

and sustainable operations. The community's geographic and environmental assets, including the Mekong River, Sam Phan Bok Rapids, and important waterfalls, support the development of both ecological and cultural tourism (Lane & Kastenholz, 2015). Nevertheless, there is a lack of integrated cultural narratives and promotion strategies that connect natural and cultural resources into a cohesive tourism experience.

In terms of self-reliance and community participation, the community demonstrates economic diversity through homestays, local restaurants, and textile products, reflecting strong social and economic capital (Bourdieu, 1986). However, challenges remain in service standards, market linkages, and transparent revenue-sharing mechanisms. Kontogeorgopoulos et al. (2014) emphasize that sustainable community-based tourism requires transparent management and equitable benefit distribution. With regard to souvenirs and tourism routes, the community offers products such as textiles, Mekong fish, and basketry. Yet creative development is largely limited to textiles, and tourism routes are unstructured, preventing the establishment of a distinctive market identity (Richards, 2011). Key obstacles include a shortage of personnel skilled in management and marketing, insufficient storytelling capability, inadequate intergenerational knowledge transfer, declining natural resources, and weak promotional activities, all of which undermine long-term sustainability (Suansri, 2003).

Overall, the First Sunrise community and neighboring areas demonstrate high potential for creative tourism, particularly through cotton cultivation, weaving, natural dyeing, riverside livelihoods such as fishing, basketry, and local cuisine, as well as the operation of over thirty homestays. These resources support the creation of meaningful participatory tourism experiences, aligning with the principles of creative tourism that emphasize learning and engagement (Richards & Raymond, 2000; Tan et al., 2014). Moreover, leveraging local natural resources and cultural knowledge reflects the concept of a cultural economy, which emphasizes the use of cultural capital as a foundation for local development (UNESCO, 2013).

Nevertheless, effective storytelling, tourism management skills, and marketing strategies are critical areas requiring improvement to ensure sustainable economic, social, and cultural outcomes (Jull & Graham, 2017). Enhancing participatory activities, strengthening local identity through narrative, and developing standardized management systems will maximize the community's potential for sustainable creative tourism development.

Research Objective 2: Analysing the potential of creative community-based tourism in the First Sunrise area of Ubon Ratchathani Province in accordance with the needs of creative tourists. The findings reveal that the First Sunrise community and its neighboring villages possess rich cultural and lifestyle assets, particularly cotton cultivation along the Mekong River, weaving, and natural dyeing. These practices reflect inherited wisdom and constitute a valuable cultural heritage that strengthens the identity of the area. The presence of more than thirty homestays, together with riverside ways of life such as fishing, basketry, and preparing meals from Mekong fish, enhances the community's distinctiveness and offers authentic experiences that can be developed into sustainable creative tourism initiatives. Richards and Raymond (2000) emphasize that creative tourism enables tourists to participate and learn cultural skills directly from the community, which resonates with the area's potential activities, including natural dyeing, weaving, and traditional cooking. These experiences not only enrich tourists' cultural knowledge but also foster meaningful engagement and long-lasting impressions. This aligns with Tan, Luh, and Kung (2014), who argue that creative tourism contributes to economic and social value through community participation. In the case of the First Sunrise area, the integration of local knowledge and resources into tourism activities provides both income generation and cultural preservation, while strengthening social cohesion through collective participation.

Furthermore, the community's reliance on local natural resources such as cotton, fish, and indigenous plants in producing tourism products and services reflects the concept of a cultural economy, which prioritizes the utilization of cultural capital as the foundation for local development (UNESCO, 2013). By embedding tourism activities within traditional practices, the community not only safeguards cultural heritage but also transforms it into a driver of sustainable livelihoods.

However, the study also highlights key challenges. A lack of effective storytelling diminishes the ability to communicate local identity, while limited skills in tourism management and marketing restrict the community's competitiveness in wider markets. This finding is consistent with Jull and Graham (2017), who note that the sustainability of community-based tourism relies on management capacity, knowledge sharing, and strong networking. Without addressing these gaps, the long-term viability of creative tourism may be compromised.

In conclusion, the First Sunrise community demonstrates significant potential for developing creative tourism rooted in cultural heritage and participatory experiences. To achieve sustainability, future initiatives should emphasize the design of hands-on activities, the development of compelling storytelling strategies that reflect local identity, and the establishment of standardized management practices. Such efforts will ensure that creative tourism contributes not only to economic growth but also to the preservation of cultural heritage and the strengthening of social capital within the community.

Recommendations

Practical Recommendations: The community should continuously adopt and apply the creative tourism model developed from this study to enhance sustainable cultural-based tourism. Moreover, government agencies and local authorities should consider using this model as a prototype for expanding creative tourism development in other communities, thereby promoting broader cultural and economic benefits at both regional and national levels.

Recommendations for Further Studies: Future studies should explore the integration of low-carbon tourism practices and community-based digital marketing strategies to strengthen sustainable development and global competitiveness. In addition, further research should investigate tourist behavior, motivations, and current demands, in order to design tourism activities and experiences that effectively respond to evolving tourist preferences.

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Project-Based Learning Management in Collaboration with Local Enterprises to Enhance Students' Entrepreneurial Skills

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Abstract

The objectives of this research were 1) to develop a project-based learning management model in collaboration with local enterprises to enhance students' entrepreneurial skills; 2) to assess students' entrepreneurial skills; and 3) to evaluate the satisfaction of local business establishments toward the developed learning model. The sample consisted of 80 undergraduate students enrolled in the Digital Business Entrepreneurship course and entrepreneurs from the Agarwood Community Enterprise in Ubon Ratchathani Province. The research instruments included the learning management model, an entrepreneurial skills assessment form, and a satisfaction questionnaire. Data were analyzed using mean, standard deviation, and paired samples t-test. The research findings revealed that

1. The developed learning management model consists of six stages, known as the P-P-I-D-P-E Model.

2. Students' entrepreneurial skills after the implementation ($\bar{X} = 41.59$) were significantly higher than the pre-test scores ($\bar{X} = 18.44$) at a .05 level of statistical significance. The Cohen's d effect size was 5.22, indicating an exceptionally large effect size. Specifically, the communication and collaboration dimension yielded the highest mean score ($\bar{X} = 4.76$).

3. The local business establishments' satisfaction toward the learning management model was at the highest level ($\bar{X} = 4.59$), confirming that the model effectively bridges the gap between academic theory and real-world community practice. Keywords: Project-Based Learning, Entrepreneurial Skills, Local Enterprises.

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Introduction

The rapid changes in 21st-century society and economy require educational systems to adapt learning management to the modern global context by developing learners' key skills such as analytical thinking, problem-solving, collaboration, and innovation (Trilling & Fadel, 2009; Chakkrakrit, 2025; Mala et al. & Chakkrakrit, 2024), along with entrepreneurial skills. These enable students to adapt to economic and social changes and create future career opportunities (Hisrich, Peters, & Shepherd, 2017). Project-based learning (PBL) promotes active learning through real hands-on practice, systematic thinking, analysis, and problem-solving (Thomas, 2000; Condliffe et al., 2017). However, many institutions still focus on knowledge transmission, limiting students' exposure to authentic situations. Connecting learning with local enterprises allows students to experience real work contexts, study actual business problems and needs, and develop entrepreneurial competencies like planning,

decision-making, and problem-solving, consistent with experiential learning (Kuratko, 2016). Research also supports that PBL effectively enhances analytical thinking, problem-solving, and collaboration skills (Nuaiphot, 2021; Kitcharoenrueng et al., 2022). Therefore, the researcher developed a project-based learning model in collaboration with local enterprises to strengthen students' entrepreneurial skills in line with current socio-economic contexts. This model can serve as a guideline for educational institutions and promote university-local business partnerships to enhance learners' potential for future careers or entrepreneurship.

In Ubon Ratchathani Province, traditional entrepreneurship courses emphasize theory and simulations, leaving students without real-world experience and unable to apply digital technology to develop local businesses upon graduation. Integrating the Agarwood Community Enterprise Group into project-based learning makes this model superior to conventional PBL in three key aspects: 1) replacing hypothetical problems with real business challenges, enabling students to solve actual issues and design digital businesses for genuine community products; 2) learning directly from real entrepreneurs through guidance and firsthand experience; and 3) upgrading local resources by training students to use digital technology to add value to agarwood, the province's valuable heritage. The involvement of local enterprises not only equips students with practical entrepreneurial skills but also creates innovations that address community economic needs. Thus, developing this project-based learning model with local enterprises is not merely an improvement in teaching methods but the creation of a learning ecosystem that links higher education institutions with the community. It cultivates students with ready-to-use entrepreneurial skills, enabling them to become a driving force in advancing the economy of Ubon Ratchathani Province.

Objectives

1. To develop a project-based learning model in collaboration with local enterprises that enhances students' entrepreneurial skills.
2. To evaluate students' entrepreneurial skills after implementing the developed model.
3. To assess local enterprises' satisfaction with the learning management model.

Outcomes and Benefits

This study is expected to yield the following benefits: 1) The development of a project-based learning model in collaboration with local enterprises. 2) Clear development in students' entrepreneurial skills, particularly in business thinking processes, resource management planning, and hands-on practice in real situations. 3) Local enterprises will receive new ideas and prototype innovations from students' projects that help solve business problems, add value to products or services, and can be further developed for commercial application.

Theoretical Framework, Hypotheses, and Conceptual Framework

1. Research Hypotheses

1.1) Students participating in the project-based learning management model collaborated with local enterprises will demonstrate entrepreneurial skills at a very high level after the implementation.

1.2) Local business establishments show very high satisfaction toward the developed learning management model.

2. Conceptual Framework

In this research titled Development of a Project-Based Learning Management Model Collaborated with Local Enterprises to Enhance Students' Entrepreneurial Skills, the researcher has determined the operational scope based on the conceptual framework as follows:

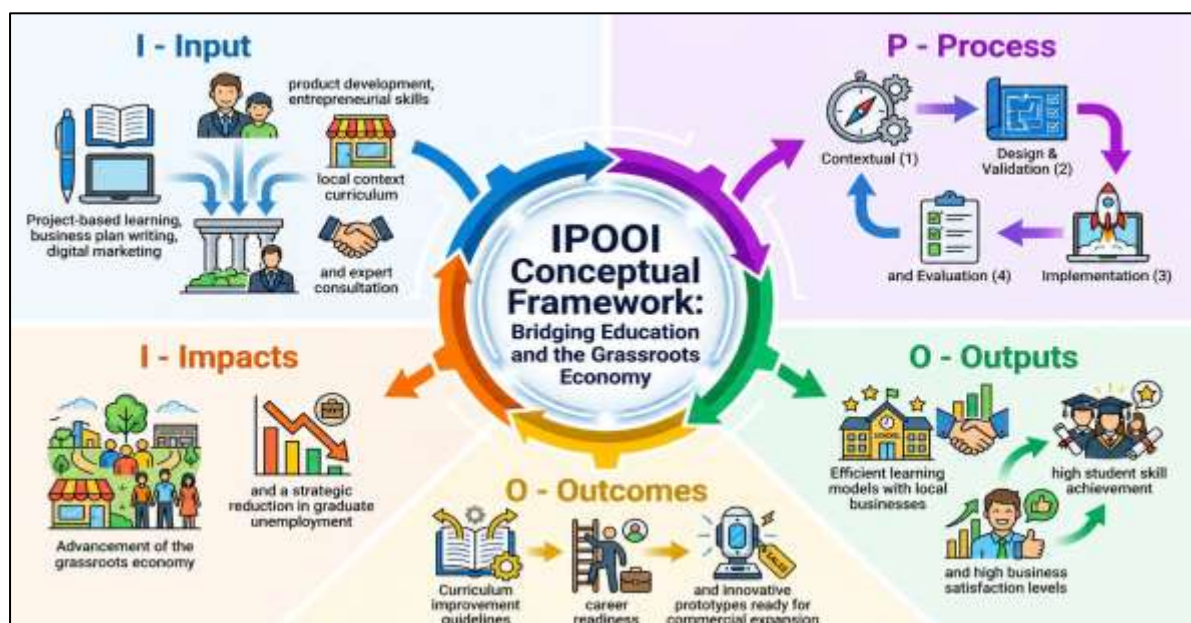


Figure 1: Conceptual Framework

From Figure 1, The conceptual framework for conducting the research followed the IPOOI steps as follows:

1. Input Factors consist of 1) Project-based learning process 2) Business plan writing principles 3) Digital marketing 4) Product development 5) Product development 6) Entrepreneurial skill 7) Local Enterprise Context Curriculum Content 8) Project-Based Learning 9) Expert Consultation

2. Process Phase 1: Contextual, Phase 2: Model Design & Validation Phase 3: Model Implementation Phase 4: Evaluation

3. Outputs The outputs resulting from this research consist of 1) An efficient project-based learning management model developed in collaboration with local business establishments. 2) Learners' development, with students achieving entrepreneurial skills scores at a very high level after the learning process. 3) The evaluation of local business establishments' satisfaction with the learning management model at a very high level

4. Outcomes The research serves as a guideline for curriculum improvement, enabling students to apply the acquired skills to pursue freelance careers or become entrepreneurs upon graduation. Furthermore, local business establishments gain innovative approaches or prototype products that can be commercially expanded to enhance sales performance.

5. Impacts The study promotes the advancement of the community's grassroots economy and provides a strategic approach to reducing graduate unemployment by ensuring that graduates possess the specific skills required by business establishments.

Literature Review

Concepts and Theories on Project-Based Learning

Project-Based Learning is a learner-centered instructional approach that provides opportunities for students to learn through hands-on practice, research, questioning, and systematic problem-solving to construct their own knowledge while working collaboratively in groups (Thomas, 2000; Bilgin, I., et al., 2015; Yoon, S. Y., et al., 2018). This concept aligns with

Constructivism theory, which views learning as occurring through learners' interactions with experiences and their surrounding environment, enabling them to develop key 21st-century skills such as analytical thinking, problem-solving, communication, and collaboration. It also helps learners connect theoretical knowledge to real-life situations, resulting in meaningful learning that can be appropriately applied (Condliffe et al., 2017; Moolkam et al., 2019). In project-based learning, teachers act as facilitators and advisors, supporting and guiding the learning process, while students play a central role in selecting project topics, planning implementation, and executing their own work. This promotes responsibility for learning and develops self-directed learning skills. Furthermore, assessment in project-based learning should focus on authentic evaluation, assessing both the process and outcomes of learning for example, through observing work behaviors, monitoring project progress, and presenting student work (Kitisak Srisamut and Pinantra Chatwatana, 2021; Kanyarat Nityawan, 2019). Based on these concepts, the researcher adopts the principles of project-based learning as the conceptual framework for designing the learning process in this study.

Concepts and Theories on Business Plan Writing

Business plan writing is a systematic process of planning business operations, aimed at defining concepts, goals, and approaches across various aspects such as marketing, management, and finance. It serves as a framework for establishing strategies and directions to achieve set objectives. A business plan is a crucial tool that enables entrepreneurs to analyze the business environment, assess venture feasibility, and plan operations effectively (Somkid Bangmo, 2019; Aphasilp, 2020; Serirat et al., 2017; Jaturongkakul, 2018). In recent times, the Business Model Canvas framework has become popular for business planning. It comprises nine key components: Customer Segments, Value Propositions, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partnerships, and Cost Structure. This helps entrepreneurs gain a systematic overview of the business model and the interconnections among various activities (Osterwalder & Pigneur, 2010). Business plan writing plays a vital role in analyzing business opportunities and risks, supporting strategic decision-making, and serving as an effective tool for communicating business ideas to investors or relevant agencies (Suphap, 2020). The researcher applies these concepts as a framework for designing learning activities and as an integral part of the project-based learning process to systematically promote learners' entrepreneurial skills.

Concepts and Theories on Marketing Fundamentals

Marketing is a management process focused on analyzing consumer needs, developing products and services, and delivering value to customers to create satisfaction and long-term relationships between the business and consumers (Siriwan Serirat et al., 2017). Marketing activities involve planning, pricing, sales promotion, and distribution of goods and services to effectively meet market needs (Aduly Jaturongkakul, 2018). A key concept in marketing activities is the Marketing Mix (4Ps): Product, Price, Place (distribution channels), and Promotion. These serve as essential tools for formulating business strategies (Somkid Bangmo, 2019). Additionally, marketing concepts are linked to business idea development and business plan preparation. They can be integrated with the Business Model Canvas framework to analyze key business components, such as customer segments, value propositions, and channels (Osterwalder & Pigneur, 2010). Integrating these concepts with project-based learning allows learners to engage in real hands-on practice from market analysis and business idea design to marketing planning and result presentation-thereby promoting entrepreneurial skills such as business thinking, planning, and collaboration (Wongmontha, 2020; Suphap, 2020).

Concepts and Theories on Digital Marketing

Digital marketing involves conducting marketing activities through digital technologies and online media to communicate information about products and services to target customers. Its goals include building awareness, stimulating interest, and encouraging purchase decisions

(Chaffey & Ellis-Chadwick, 2019). Digital marketing enables businesses to reach customers quickly, overcome time and location constraints, analyze consumer behavior, and measure marketing activity outcomes effectively (Ryan, 2017; Siriwan Serirat et al., 2017). In the context of developing entrepreneurial skills, integrating digital marketing concepts with project-based learning-connected to local enterprises-allows learners to gain real-world experience from market analysis, strategy planning, testing marketing activities, to evaluating results from actual data. This process significantly contributes to developing learners' entrepreneurial skills in business thinking, digital skills, and collaboration, aligning with the digital economy context and sustainable local development (Kotler et al., 2017).

Concepts and Theories on Product Development

Product development is a critical process for creating goods and services that meet consumer needs and provide competitive advantages in business. A product refers to anything offered to the market for use or consumption, which may take the form of goods, services, or the value received by consumers (Siriwan Serirat et al., 2017; Aduly Jaturongkakul, 2018). The general product development process includes key stages: idea generation, idea screening, concept development and testing, prototype development, and market testing before commercial launch. This reduces risks and increases the chances of product success in the market (Kotler & Armstrong, 2016; Crawford, 2020). In an educational context, these concepts can be integrated with project-based learning to enable learners to experience real product development- from business idea generation and prototype design to business feasibility analysis. This promotes entrepreneurial skills, creativity, and problem-solving-essential competencies for 21st-century learners.

Concepts and Theories on Entrepreneurial Skills

Entrepreneurial skills refer to an individual's ability to initiate, innovate, and manage a business effectively and efficiently. These encompass key skills such as identifying business opportunities, planning, decision-making, resource management, and risk management-core competencies that enable businesses to operate and compete in a rapidly changing economic environment (Natthaphon Yai Phirojn, 2018; Somkid Bangmo, 2019). Entrepreneurs play a vital role in creating innovation, developing products, and driving societal economic growth (Kuratko, 2016; Barringer & Ireland, 2019; Hassan, A., et al., 2019). They can apply resources and knowledge to create economic value and expand business opportunities (Hisrich, Peters, & Shepherd, 2017). In an educational context, these concepts can be integrated with project-based learning (Project-Based Learning) to help learners develop business thinking, innovation creation, and real-situation problem-solving skills, which are crucial for enhancing entrepreneurial competencies (Kozlinska, I., et al., 2020).

Research Methodology

Research Participants and Samples

The participants and samples for this research consist of four main groups as follows: Group 1: 80 undergraduate students from Ubon Ratchathani Rajabhat University enrolled in the Digital Entrepreneurship course subject code 3603217 during the second semester of the 2025 academic year, Group 2: The Agarwood Community Enterprise Group in Ubon Ratchathani Province, which serves as the authentic learning site for students to conduct situational analysis and develop their projects, Group 3: Six experts interviewed to obtain foundational data and requirements for the development of the learning management model, Group 4: Three experts tasked with evaluating and validating the quality and efficiency of the developed learning model.

Research Design

In this study, the researcher employed a Quasi-Experimental Research design, specifically utilizing the One-Group Pretest-Posttest Design, as illustrated in the following table 1

Table 1: Research Design for A Comparative Study of University Students' Entrepreneurial Skills

Target Group	Pre-test	Treatment	Post-test
Sample Group (Students)	O1	X	O2

Definition of Symbols:

O1 refers to the Pre-test assessment of digital entrepreneurial skills before the intervention.

X refers to the Treatment, which is Project-Based Learning in collaboration with business enterprises based on the P-P-I-D-P-E Model.

O2 refers to the Post-test assessment of digital entrepreneurial skills after the intervention.

Research Instruments and Data Collection Procedures

This research conducted the data collection process following the One-Group Pretest-Posttest Design. The procedures were divided into three main phases as follows:

Phase 1: Preparation and Pre-testing

Before implementing the learning model, the researcher established baseline data through a pre-test. An entrepreneurial skill assessment consisting of 50 items, which had been validated for quality using the Index of Item-Objective Congruence (IOC). To evaluate the students' initial entrepreneurial skills prior to the intervention.

Phase 2: Learning Management (Intervention)

The researcher implemented the learning management model based on Project-Based Learning in collaboration with a local enterprise. The instruction was conducted over a total of 60 hours, utilizing five lesson plans as the primary instructional tools. These plans covered essential topics, including Business Plan Writing, Digital Marketing, and Product Development. The instructional process followed the six core steps of the learning model as follows:

1. Students engaged in hands-on activities at the Agarwood Community Enterprise in Ubon Ratchathani to gather real-world data for their business plan development.

2. Development and Refinement: Students refined their business plans and enhanced their prototypes or services. The instructor served as a mentor and facilitator, monitoring progress and providing guidance to resolve issues encountered during the process.

3. Presentation Students presented their finalized projects through a Final Pitch to demonstrate the business feasibility to both the instructor and the entrepreneur.

4. Evaluation The project outcomes and teamwork were collectively evaluated by the instructor and the community entrepreneur.

Phase 3: Post-intervention Evaluation

Upon completion of the 60-hour instructional period, students' entrepreneurial skill development was evaluated using the same assessment tool as the pre-test, while participating enterprises provided feedback on project outcomes and business feasibility to measure overall satisfaction.

Data Analysis

The data collected from various research instruments were analyzed in accordance with the research objectives as follows:

1. Quantitative Data Analysis

The Index of Item-Objective Congruence was analyzed based on expert evaluations to determine the content validity of the learning management plans and the entrepreneurial skill assessment tools.

1.1) To compare students' entrepreneurial skills, pre-test and post-test scores were analyzed using basic statistics, including Mean and Standard Deviation. Furthermore, a t-test for Dependent Samples was employed to test the differences between pre-test and post-test scores and to determine if the learning management model significantly contributed to skill development at a statistically significant level.

1.2) Data from satisfaction surveys completed by both the participating enterprises and the students were analyzed using Mean and Standard Deviation. The resulting means were then interpreted according to the predefined satisfaction level criteria.

2. Qualitative Data Analysis

Content Analysis was performed on the data obtained from initial expert interviews to synthesize and identify the key components of the proposed learning model. Data from post-instructional logs, Final Pitch presentations, and in-depth feedback from the Agarwood Community Enterprise were analyzed through thematic grouping. The findings were then summarized using descriptive analysis to provide a profound explanation of student behavior and their developmental progress in depth.

Research Findings

Regarding the research on the Development of a Project-Based Learning Model in Collaboration with Local Enterprises to Enhance Students' Entrepreneurial Skills, the researcher has summarized the findings into three main parts, corresponding to the research objectives, as follows:

Part 1: Development of the Project-Based Learning Model in collaboration with Local Enterprises to Enhance Entrepreneurial Skills

This research has produced a project-based learning management model in collaboration with local enterprises to enhance students' entrepreneurial skills, as shown in Figure 2.

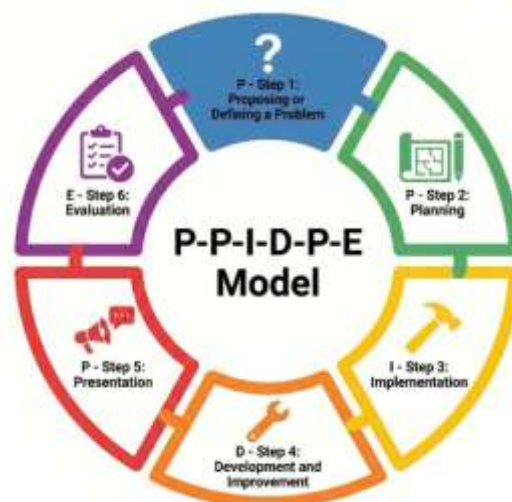


Figure 2: Project-Based Learning Management Model in Collaboration with Local Enterprises to Enhance Students' Entrepreneurial Skills

From Figure 2, the developed project-based learning management model in collaboration with local enterprises is a learner-centered model that emphasizes hands-on practice. It integrates cooperation among educational institutions, instructors, students, and entrepreneurs, enabling students to gain authentic experiences aligned with real business contexts and develop entrepreneurial skills effectively. The details of the model are as follows:

Stage 1: Problem Proposal or Definition Stage

1. Instructor: Acts as a learning facilitator by stimulating interest and analytical thinking through provocative questions and preparing relevant resources on entrepreneurship and community enterprises for further study.

2. Students: Play the main role in researching information, analyzing data, and exchanging ideas in class to identify problems or business opportunities from the community context.

3. Entrepreneurs: Serve as a real-world information source and contextual reference, helping students appropriately link problems and business opportunities to the community's economic and social environment.

Stage 2: Planning Stage

1. Students: Take the lead in data analysis and business concept design by creating a Business Model Canvas (BMC) covering all 9 components, along with designing product/service prototypes, product imagery, and brand concepts to form a feasible business model.

2. Instructor: Provides consultation, suggests analytical approaches, and offers recommendations to refine and strengthen the business plan.

3. Entrepreneurs: Supply contextual information on local markets, resources, or product trends, enabling students to design business concepts that are more aligned with real conditions.

Stage 3: Implementation Stage

1. Students: Engage in real-world practice by testing the business prototype in the community, collecting data through interviews or conversations with community enterprise members, and using the findings to analyze and improve their business plans.

2. Instructor: Supervises, advises, and monitors activity progress to ensure fieldwork is appropriate and maximally beneficial for learning.

3. Entrepreneurs: Provide information, suggestions, and feedback on students' business concepts, helping students gain deeper insight into actual business operations.

Stage 4: Development and Improvement Stage

1. Students: take the main role in analyzing and reviewing data obtained from real fieldwork or suggestions from community enterprise groups to identify weaknesses. They then revise the Business Model Canvas, further develop the product or service prototype to make it more complete, and summarize the acquired knowledge in preparation for the final presentation.

2. Instructor: acts as an advisor and facilitator by monitoring progress, providing advice on problem-solving, checking the quality of the improved work to ensure it meets the learning objectives, and supplementing necessary content (such as cost management or market research).

3. Entrepreneurs: serves as a mentor, providing in-depth information and reflecting real-world business experience. They jointly review the correctness and feasibility of the business ideas so that the products developed by learners truly meet market needs and align with the local resource context.

Stage 5: Presentation Stage

1. Students: Summarize all knowledge gained from the project, prepare project reports and presentation media, and deliver the business concept in a Final Pitch format, highlighting problems, business opportunities, product value, and real-world testing outcomes.
2. Instructor: Evaluates the presentation, offers feedback, and creates a realistic presentation atmosphere to enhance students' communication and presentation skills.
3. Entrepreneurs: Participate as listeners or provide additional suggestions, offering practical perspectives from real business experience.

Stage 6: Evaluation Stage

1. Instructor: Assesses learning outcomes across multiple elements project work, complete reports, presentations, and team behavior to reflect students' development in knowledge, skills, and entrepreneurial characteristics.
2. Students: Conduct self-assessment and reflect on their learning to improve critical thinking, analysis, and future business concept refinement.
3. Entrepreneurs: May offer opinions on the feasibility of business concepts, adding practical insights for students.

This learning management process clearly demonstrates the interconnected roles of the three parties: students actively construct knowledge through hands-on work, instructors serve as facilitators and academic advisors, and community entrepreneurs act as real-world experience providers and information sources. The collaboration among these three parties is the key mechanism that ensures meaningful learning fully aligned with actual business contexts.

Part 2: Results of the Students' Entrepreneurial Skills Assessment This part evaluates the development of students' skills

Table 2: Comparison of Students' Entrepreneurial Skills Scores Before and After the Implementation (n=80)

Assessment	Mean	S.D.	DF	T	P	MD	Cohen's d
Pre-test	18.44	4.89	79	46.73*	.000	23.15	5.22
Post-test	41.59	5.02					

Table 2 illustrates that the students' entrepreneurial skills scores after the implementation ($\bar{X} = 41.59$, S.D. = 5.02) were significantly higher than the pre-test scores ($\bar{X} = 18.44$, S.D. = 4.89) at the .05 level, with a mean difference (MD) of 23.15. Furthermore, the analysis revealed a Cohen's value of 5.22, indicating a very large effect size. This suggests that the developed P-P-I-D-P-E learning management model had a substantial practical impact on enhancing the students' entrepreneurial skills.

Table 3: Results of the Evaluation of Entrepreneurial Skills after Implementing the Learning Management Model on Enhancing Students' Entrepreneurial Skills

Entrepreneurial Skills	$\bar{X}$	S.D.	Interpretation
1. Entrepreneurial thinking skills	4.66	0.55	Very High
2. Hands-on practice and project management skills	4.56	0.57	High
3. Communication and community presentation skills	4.76	0.47	Very High
4. Basic business management skills	4.42	0.57	High
5. Courage and time management skills	4.54	0.57	Very High
6. Business research skills	4.50	0.57	High
7. Entrepreneurial attitude	4.70	0.46	Very High
Overall	4.59	0.54	Very High

Table 3 illustrates that the evaluation of students' entrepreneurial skills after implementing the learning management model revealed an overall mean score of 4.59 with a standard deviation of 0.54, which was at a very high level. When considering each aspect, the highest mean score was in communication and collaboration skills ($\bar{X} = 4.76$, S.D. = 0.47), followed by entrepreneurial attitude ($\bar{X} = 4.70$, S.D. = 0.46) and entrepreneurial thinking skills ($\bar{X} = 4.66$, S.D. = 0.55). These aspects also had relatively low standard deviations, indicating that most students had similar opinions in these areas. The aspects of project implementation and management skills ($\bar{X} = 4.56$, S.D. = 0.57) and design skills ($\bar{X} = 4.54$, S.D. = 0.57) were also at a very high level. The lowest mean scores were found in business research skills ($\bar{X} = 4.50$, S.D. = 0.57) and basic business management skills ($\bar{X} = 4.42$, S.D. = 0.57); however, both remained at a high level.

Part 3 : Results of Local Business Establishments' Satisfaction Toward the Learning Management Model

Table 4: Enterprise Satisfaction Toward the Learning Management Model on Enhancing Entrepreneurial Skills

Item	$\bar{X}$	S.D.	Satisfaction Level
A. Learning Management Model			
1. The model and learning activities are appropriate and aligned with learners' needs	4.67	0.58	Very High
2. Activities are arranged according to learners' aptitudes and interests	4.33	0.58	High
3. Promotes development of occupational skills	4.67	0.58	Very High
4. Overall suitability of the learning management model	4.33	0.58	High
5. Appropriate time allocation for activities	4.33	0.58	High
Subtotal	4.47	0.58	High
B. Instructional Media Supporting the Model			
6. Uses a variety of teaching media	4.67	0.58	Very High
7. Involves knowledgeable and expert resource persons	4.33	0.58	High
8. Uses media that stimulate learners' interest	4.33	0.58	High
Subtotal	4.44	0.58	High

Item	$\bar{X}$	S.D.	Satisfaction Level
C. Assessment and Evaluation			
9. Uses diverse methods of assessment and evaluation	4.67	0.58	Very High
10. Involves self-assessment, peer assessment, local wisdom persons, parents, and enterprises	4.67	0.58	Very High
Subtotal	4.67	0.58	Very High
D. Benefits Received from the Model			
11. Helps learners recognize the value of the local community in Ban Phaeo District	4.67	0.58	Very High
12. Develops learners' desirable characteristics for entrepreneurship	4.67	0.58	Very High
13. Develops entrepreneurial skills that can be applied in real occupations	5.00	0.00	Very High
Subtotal	4.78	0.39	Very High
Overall	4.59	0.53	Very High

Table 4 illustrates that the local enterprises' overall satisfaction with the developed learning management model was at the highest level ($\bar{X} = 4.59$, S.D. = 0.53). The Benefits Received dimension yielded the highest satisfaction score ($\bar{X} = 4.78$, S.D. = 0.39), followed by 'Assessment and Evaluation' ($\bar{X} = 4.67$, S.D. = 0.58). Although the 'Learning Management Model' and Instructional Media dimensions were rated at a high level, the overall findings demonstrate that the P-P-I-D-P-E model is highly appropriate and effective. This underscores its success in bridging academic theory with practical community-based applications.

Discussion

The results regarding the development of a project-based learning model in collaboration with local enterprises to enhance students' entrepreneurial skills revealed that, after the implementation, students' entrepreneurial skills were at the highest level ($\bar{X} = 4.59$). Specifically, the communication and collaboration dimension yielded the highest mean score ($\bar{X} = 4.76$). When considering the effect size, the analysis revealed a Cohen's d value of 5.22, indicating an exceptionally large effect size according to Sawilowsky's (2009) criteria. This reflects the substantial practical impact of this learning model on student skill development. This success stems from the P-P-I-D-P-E learning process, which provides students with opportunities for Situated Learning through real-world practice with the Agarwood Community Enterprise. By encountering authentic business challenges, students were able to construct knowledge through problem-solving and effectively bridge the gap between theoretical concepts and community-based contexts. These findings align with the research of Nuaiphot (2021), who found that project-based learning enhances analytical thinking skills. They also support the concepts proposed by Kitcharoenrueng et al. (2022) and Phomma (2023), who noted that experiential learning promotes the development of essential 21st-century skills. Furthermore, this is consistent with the findings of Mala and Chanthakoon (2024), who emphasized that active learning management is a critical factor in promoting learner competency and fostering practical skills. Additionally, the model achieved the highest level of satisfaction from local enterprises ($\bar{X} = 4.59$), particularly in the dimension of practical career application. This confirms that the learning model successfully fosters digital entrepreneurial competencies that meet local labor market demands and facilitates a concrete transition from academic instruction to real-world implementation within local community

enterprises. that the P-P-I-D-P-E model effectively transforms students from passive learners into Digital Solutions Providers who are both technologically savvy and community-oriented.

Conclusion

The development of the project-based learning model in collaboration with local enterprises, structured into the six-step P-P-I-D-P-E process (Problem Identification, Planning, Implementation, Development and Improvement, Presentation, and Evaluation), was validated by experts as a highly comprehensive and effective framework for bridging academic theory with real-world practice. The implementation of this model significantly enhanced students' entrepreneurial skills to the highest level ($\bar{X} = 4.59$), with the most notable growth in communication and collaboration, followed by entrepreneurial attitude and thinking; these results were further substantiated by a very large effect size (Cohen's $d = 5.22$), confirming the model's substantial practical impact. Furthermore, local enterprises expressed the highest level of satisfaction ($\bar{X} = 4.59$), particularly regarding the tangible benefits received, which underscores the model's success in creating a mutually beneficial partnership that produces both high-quality student competencies and practical value for community-based businesses, ultimately proving its appropriateness for modern educational and professional contexts.

Suggestion

For practical implementation, educational institutions should integrate the P-P-I-D-P-E model into various practice-oriented curricula by fostering partnerships with local enterprises that can serve as co-educators, thereby providing students with authentic experiential learning environments. Instructors are encouraged to further enhance students' digital entrepreneurial competencies by incorporating advanced digital tools for project management and professional presentations, while maintaining a continuous feedback loop among students, faculty, and community stakeholders. For future research, a longitudinal study is recommended to track the long-term career outcomes and business ventures initiated by graduates to assess the model's lasting impact. Additionally, comparative studies across different academic disciplines and various types of community enterprises should be conducted to validate the model's versatility and scalability, ultimately supporting its adoption as a sustainable framework for higher education and local economic collaboration.

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The Influence of Social Media on Impulsive Buying Decision Behavior Among Female Consumers in The Pre-Retirement and Retirement Age Groups in Thailand

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Abstract

This study examines how social media influences impulsive buying decision behavior among pre-retirement and retired female consumers in Thailand. It focuses on the effects of promotion factors, emotional factors, and urge to buy impulsively on impulsive buying decision behavior. A quantitative approach was employed, with data collected from 125 female respondents using structured questionnaires administered both offline and online. The sample size was determined using Yamane (1967), and convenience sampling was applied. Data were analyzed using descriptive statistics and multiple regression analysis.

Most respondents were aged 50-59, held a bachelor's degree, and had a monthly income of 15,001-30,000 baht. The results indicate that the influence of influencers, limited-quantity scarcity, online visual merchandising, and flash sales significantly affect impulsive buying decision behavior. emotional factors, including both positive and negative emotions, as well as self-control, were also found to play important roles. In addition, urge to buy impulsively factors-namely, cognitive impulse and intolerance of uncertainty-significantly contribute to impulsive buying decision behavior.

Mean scores ranged from 3.060 to 3.928, indicating a moderate to strong level of influence. Regression analysis showed that positive emotions had the strongest significant effect ($\beta = .376$, $p = .000$), followed by cognitive impulse ($\beta = .248$, $p = .007$) and self-control ($\beta = .215$, $p = .014$).

Overall, promotion, emotional, and urge to buy impulsively factors significantly influence impulsive buying decision behavior. The findings provide practical implications for marketers in developing effective strategies through emotional engagement and psychological triggers, while contributing to consumer behavior literature in digital contexts.

Keywords: Emotional factors, Positive Emotions, Self-Control, Urge to Buy Impulsively factors, Cognitive Impulse, Impulse Buying Decision

Introduction

In an era of rapid technological advancement, communication patterns and consumer behavior have undergone significant transformation. This change has been particularly evident in the rapid growth of social media platforms such as Facebook, Instagram, TikTok, and YouTube, which have become primary channels for information exchange and have increasingly influenced consumer decision-making processes (Mishra et al., 2023). These platforms have created an environment conducive to influencer marketing, which plays a crucial role in shaping consumer attitudes and purchasing behavior through credible content and the development of emotional relationships with audiences (Febriandika et al., 2023).

At present, social media serves not only as a communication medium but also as an important channel for building consumer trust and purchase motivation. This is achieved through various promotion factors, including flash sales, limited-quantity scarcity, online visual merchandising, and influencer advertising. These stimuli have been identified as powerful drivers that effectively accelerate impulsive buying behavior (Olumekor et al., 2025).

However, most existing studies on impulsive buying behavior have primarily focused on younger consumer segments, particularly Generation Z and Millennials. Previous research indicates that these groups are more likely to engage in impulsive purchases through digital platforms (McKinsey & Company, 2023). In contrast, consumers in the pre-retirement stage aged 50–59 years and those in the retirement stage aged 60 years and above—despite possessing substantial purchasing power and playing a vital role in the longevity economy—have received relatively limited academic attention (World Bank, 2024).

In the Thai context, the country has officially entered a complete aging society, with individuals aged 60 years and above accounting for more than 20 percent of the population in 2024, a proportion that continues to increase steadily (National Statistical Office of Thailand, 2024). This demographic group demonstrates rising purchasing power, greater availability of leisure time, and growing engagement with social media platforms (Bangkok Biz News, 2024; PBS Policy Watch, 2024). Consequently, older consumers represent a high-potential market with strong demand for consumption, particularly in areas related to health, beauty, and online entertainment (Lin & Liu, 2022).

Furthermore, older adults in the digital era exhibit increasing technological awareness and a willingness to learn digital skills to maintain social connections and access information that enhances emotional well-being, psychological stability, and meaningful life experiences. Their consumption behavior tends to emphasize emotional fulfillment rather than trend-driven purchasing. As a result, this group—especially female consumers who place importance on personal happiness and self-image—demonstrates heightened sensitivity to emotional and motivational consumption stimuli (Liao & Yu, 2023; Hajli & Sims, 2022).

Upon entering retirement, consumers often seek experiences that alleviate loneliness, fulfill emotional needs for recognition, and provide a sense of life purpose. Zhang et al. (2022) found that flow experience derived from social media-based shopping can generate positive emotions, emotional attachment, and life satisfaction among older adults, simultaneously reducing feelings of isolation and increasing emotionally driven consumption. In addition, socially interactive features such as group-buying functions and promotional sharing mechanisms foster a sense of belonging, which positively influences impulsive buying behavior (Liu & Chen, 2023).

Although social media has a substantial influence on consumer behavior, existing research lacks in-depth analysis focusing specifically on pre-retirement and retired female consumers, particularly in relation to impulsive buying behavior (Febriandika et al., 2023). Older consumers possess emotional characteristics and motivational structures that differ from

those of younger age groups, and their increased online engagement following retirement further amplifies the influence of social media on impulsive purchase decisions.

Nevertheless, significant research gaps remain in understanding purchase motivation factors within this demographic, particularly regarding intolerance of uncertainty and cognitive impulse (Mishra et al., 2023). Therefore, this study seeks to address these gaps by examining the effects of three primary groups of factors-promotion factors, emotional factors, and urge-to-buy-impulsively factors- on impulsive buying behavior among female consumers in the pre-retirement and retirement stages. The findings are expected to provide valuable insights that enable businesses to develop digital marketing strategies aligned with the consumption behavior and psychological characteristics of this growing consumer segment.

Objectives

1. To study the influence of influencers on impulsive buying decision behavior among pre-retirement and retirement-aged female consumers.
2. To study the influence of limited-quantity scarcity on impulsive buying decision behavior among pre-retirement and retirement-aged female consumers.
3. To study the influence of online visual merchandising on impulsive buying decision behavior among pre-retirement and retirement-aged female consumers.
4. To study the influence of flash sales on impulsive buying decision behavior among pre-retirement and retirement-aged female consumers.
5. To study the influence of positive emotions on impulsive buying decision behavior among pre-retirement and retirement-aged female consumers.
6. To study the influence of negative emotions on impulsive buying decision behavior among pre-retirement and retirement-aged female consumers.
7. To study the influence of self-control on impulsive buying decision behavior among pre-retirement and retirement-aged female consumers.
8. To study the influence of cognitive impulse on impulsive buying decision behavior among pre-retirement and retirement-aged female consumers.
9. To study the influence of intolerance of uncertainty on impulsive buying decision behavior among pre-retirement and retirement-aged female consumers.

Research Hypotheses

- H1: The influence of influencers has a significant effect on impulsive buying decision behavior.
 H2: Limited-quantity scarcity has a significant effect on impulsive buying decision behavior.
 H3: Online visual merchandising has a significant effect on impulsive buying decision behavior.
 H4: Flash sales have a significant effect on impulsive buying decision behavior.
 H5: Positive emotions have a significant effect on impulsive buying decision behavior.
 H6: Negative emotions have a significant effect on impulsive buying decision behavior.
 H7: Self-control has a significant effect on impulsive buying decision behavior.
 H8: Cognitive impulse has a significant effect on impulsive buying decision behavior.
 H9: Intolerance of uncertainty has a significant effect on impulsive buying decision behavior.

Literature Review

The Influence of Influencers

The influence of influencers refers to their ability to shape consumers' decision-making, including purchasing behavior, brand loyalty, and engagement (Tantracheewathorn, 2023). Influencers who are perceived as credible, knowledgeable, and attractive can help reduce perceived risk and influence consumer attitudes and purchase decisions (Ohanian, 1990).

In addition, two-way communication, such as real-time interactions, helps build trust and strengthen the relationship between consumers and brands. This aligns with Social Identity Theory, which suggests that consumers are more likely to connect with influencers who reflect their own identities (Chotikawiboon & Sathawetin, 2023). As a result, influencer influence plays an important role in shaping emotional engagement and encouraging impulsive buying behavior. Therefore, it is hypothesized that influencer influence significantly affects impulsive buying behavior.

Limited-Quantity Scarcity

Limited-quantity scarcity refers to products that are offered in restricted quantities or for a limited time, with the intention of creating a sense of scarcity and encouraging impulsive purchases (Rice & Keller, 2009; Song et al., 2015). According to the Scarcity Principle, products that are perceived as rare tend to be viewed as more valuable (Brock, 1968).

From the perspective of the S-O-R framework, scarcity acts as a stimulus that triggers internal reactions such as fear of missing out (FOMO), which can lead to impulsive buying behavior (Basha et al., 2022). Thus, limited-quantity scarcity is expected to significantly influence impulsive buying behavior.

Online Visual Merchandising

Online visual merchandising refers to how visual elements are presented on digital platforms to attract consumers and influence their purchase decisions (Kerfoot et al., 2003). High task-relevant cues, such as clear product information, help reduce perceived risk, while low task-relevant cues, such as visual design, can enhance emotional responses (Eroglu et al., 2001; Menon & Kahn, 2002).

Together, these elements shape how consumers perceive products and feel during the shopping process, which can encourage impulsive buying behavior. Therefore, it is hypothesized that online visual merchandising significantly influences impulsive buying behavior.

Flash Sales

Flash sales use time and quantity limitations to create a sense of urgency and encourage quick purchase decisions (Song et al., 2015). Within the S-O-R framework, these limitations act as stimuli that trigger FOMO and lead to impulsive buying behavior (Basha et al., 2022).

In addition, the perception of scarcity can increase the perceived value of products and heighten emotional responses, leading consumers to make immediate purchase decisions (Chen & Yao, 2018). Therefore, flash sales are expected to significantly influence impulsive buying behavior.

Positive Emotions

Positive emotions, such as happiness and excitement, can increase motivation and strengthen emotional attachment to products, which in turn encourages impulsive buying behavior (Fredrickson, 2001; Zhao et al., 2022).

These emotions are often triggered by marketing activities, such as promotions or discounts, and can also help build stronger relationships between consumers and brands (Kholis et al., 2023). Thus, positive emotions are expected to significantly influence impulsive buying behavior.

Negative Emotions

Negative emotions, including stress and anxiety, can also lead to impulsive buying, as consumers may use purchasing as a way to cope with or reduce these feelings (Lazarus, 1993; Yu et al., 2020).

According to Mood Management Theory and Reduced Self-Control Theory, negative emotions can weaken self-control and increase the likelihood of impulsive decisions (Baumeister, 2002). Therefore, negative emotions are expected to significantly influence impulsive buying behavior.

Self-Control

Self-control refers to an individual's ability to regulate behavior and resist short-term temptations in order to achieve long-term goals (Baumeister et al., 2007). Individuals with lower levels of self-control are more likely to respond to marketing stimuli and engage in impulsive buying (Rook & Fisher, 1995).

The concept of ego depletion further explains that when self-control is reduced, individuals become more vulnerable to impulsive behavior, especially in online environments (Vohs & Faber, 2007). Thus, self-control is expected to have a negative influence on impulsive buying behavior.

Cognitive Impulse

Cognitive impulse refers to spontaneous purchase decisions made with little evaluation or planning (Verplanken & Herabadi, 2001). In many cases, consumers rely on mental shortcuts, especially in online settings, which can lead to quick and unplanned decisions (Yu et al., 2022).

As a result, these processes increase the likelihood of impulsive buying behavior. Therefore, cognitive impulse is expected to significantly influence impulsive buying behavior.

Intolerance of Uncertainty

Intolerance of uncertainty refers to a tendency to perceive uncertain situations as stressful or uncomfortable (Buhr & Dugas, 2002). Individuals with high levels of IU are more likely to engage in impulsive buying as a way to reduce psychological discomfort, particularly in uncertain online environments (Rook, 1987).

Thus, intolerance of uncertainty is expected to significantly influence impulsive buying behavior.

Impulsive Buying Decision Behavior Factors

Impulsive buying behavior refers to spontaneous and unplanned purchases that occur in response to immediate stimuli (Rook & Fisher, 1995). This behavior is influenced by a combination of emotional, cognitive, and situational factors, such as promotions and time pressure (Beatty & Ferrell, 1998).

While impulsive buying may provide short-term satisfaction, it can also lead to post-purchase regret, as decisions are often driven more by emotion than careful consideration. Overall, the literature suggests that promotional factors, emotional responses, and individual characteristics all play important roles in influencing impulsive buying behavior. These variables are integrated into the research framework (Figure 1) to examine their relationships with the purchasing behavior of pre-retirement and post-retirement female consumers.



Figure 1: Illustrates the Research Framework, Explaining the Relationships Among Promotional Factors, Emotional Factors, And Impulsive Buying Tendencies That Influence Impulsive Buying Decision Behavior.

Research Methodology

Population and Sample Selection

The target population of this study consists of female consumers in the pre-retirement and post-retirement stages. This group was selected because their emotional characteristics and motivational drivers differ from those of other age groups. Moreover, after retirement, these consumers tend to spend more time engaging with online media, thereby increasing social media's influence on their impulsive buying decisions.

This study employed a convenience sampling method, selecting respondents who were readily accessible and willing to provide information. This approach is appropriate for exploratory research in consumer behavior, particularly studies that aim to provide descriptive insights.

However, the use of convenience sampling may present limitations in terms of representativeness of the overall population, which may affect the generalizability of the findings. Therefore, the results of this study should be interpreted within the context of the specific sample examined.

Research Instrument

This study employed a survey research method, using a questionnaire as the primary instrument for in-depth data collection. The questionnaire consisted of both closed-ended and open-ended questions and was divided into four sections as follows.

Section 1 comprised screening questions to identify eligible respondents.

Section 2 included questions related to the general demographic characteristics of the respondents.

Section 3 focused on examining the influence of social media on impulsive buying decision behavior among female consumers in the pre-retirement and retirement stages.

Section 4 provided space for additional comments and suggestions.

Section 3 of the questionnaire, which examined social media influences on impulsive buying decision behavior among pre-retirement and retirement female consumers, was structured around three main factors. The first factor was promotion factors, which included the influence of influencers, limited-quantity scarcity, online visual merchandising, and flash sales. The second factor was emotional factors, comprising positive emotions, negative emotions, and self-control. The third factor was the urge to buy impulsively, which consisted of cognitive impulse and intolerance of uncertainty. These factors were analyzed in relation to impulsive buying decision behavior.

Respondents were asked to indicate their level of agreement using a five-point rating scale, which was employed to measure data at the interval scale level. The scale ranged from 5 = strongly agree, 4 = agree, 3 = moderately agree, 2 = slightly agree, to 1 = strongly disagree.

Instrument Validation

Research Instrument Validation and Research Procedure

Review of Concepts, Theories, and Related Literature

The research process began with an extensive review of relevant concepts, theories, and prior studies. The literature review focused on promotion factors, including the influence of influencers, limited-quantity scarcity, online visual merchandising, and flash sales; emotional factors, comprising positive emotions, negative emotions, and self-control; and urge-to-buy factors, including cognitive impulse and intolerance of uncertainty. These factors were examined in relation to impulsive buying decision behavior among female consumers in the pre-retirement and retirement stages. The reviewed literature was consistent with and informed the variables used in developing the conceptual framework of this study.

Questionnaire Development

The questionnaire was developed in alignment with the conceptual framework and relevant theories. It was then submitted to a panel of four academic experts for evaluation of content relevance, clarity, and accuracy. Based on their feedback and recommendations, the questionnaire was revised to enhance its quality and appropriateness prior to further testing.

Pilot Testing and Reliability Analysis

The revised questionnaire was administered to a pilot group consisting of 30 respondents. The collected data were analyzed using SPSS software to assess the reliability of the instrument. Reliability was evaluated using Cronbach's alpha coefficient, which is widely accepted for measuring internal consistency.

Response Rate

The study achieved a response rate of 100%, as all 125 distributed questionnaires were returned and deemed usable. This response rate was considered sufficient and appropriate for subsequent data analysis.

Full-Scale Data Collection

After refinement and confirmation of reliability, the finalized questionnaire was used to collect data from the target sample of 125 female consumers in the pre-retirement and retirement age groups.

Content Validity

To establish content validity, the questionnaire was reviewed and evaluated by a panel of academic experts to ensure the accuracy, relevance, and alignment of the items with the research objectives. The evaluation was conducted by faculty members from the Faculty of

Management Sciences, Department of Digital Marketing and Branding, Kasetsart University, Sriracha Campus.

Data Collection

This study, entitled “Social Media Influences on Impulsive Buying Decision Behavior among Female Consumers in the Pre-Retirement and Retirement Stages,” employed a combination of interview research and survey research methods. Data were collected through both offline interviews and online surveys administered via Google Forms.

The data collection period was conducted in December 2025, from December 1 to December 7, covering a total duration of seven days. The sample consisted of 125 respondents. Offline interviews were conducted with female consumers in the pre-retirement and retirement stages who exhibited impulsive buying decision behavior and served as questionnaire respondents. The collected data were subsequently analyzed using SPSS (Statistical Package for the Social Sciences) following the procedures outlined below.

The researchers utilized questionnaire items that had already been tested for reliability. These items were used to develop both offline interview questionnaires and online questionnaires distributed via Google Forms, which provided a convenient and efficient channel for data collection from the target sample.

Data collection was carried out through offline interviews, during which respondents completed the questionnaires designed for this study. A total of 125 questionnaires were distributed to female consumers in the pre-retirement and retirement stages.

Upon completion of data collection and receipt of all questionnaires, the researchers conducted statistical analysis using SPSS.

Data Analysis

Descriptive Statistics

Descriptive statistics were used to describe the sample's general characteristics. This included the use of frequency, percentage, mean, and standard deviation.

Inferential Statistics

Inferential statistics were used, including correlation and multiple linear regression, to examine relationships among variables.

The independent variables included:

- Promotional factors
- Emotional factors
- Purchase motivation

The results of the multicollinearity test indicated that Tolerance values ranged from 0.370 to 0.634, and Variance Inflation Factor (VIF) values ranged from 1.578 to 2.700. These values fall within acceptable thresholds (Hair et al., 2014).

These findings suggest that there is no multicollinearity problem among the independent variables. All variables are therefore suitable for multiple linear regression analysis, supporting the reliability and robustness of the statistical model.

Inferential Statistics

Inferential statistical analysis included correlation analysis and multiple linear regression analysis, which were employed to examine the relationship between one dependent variable and multiple independent variables. This approach was used to investigate the relationships among the study variables.

In this study, the independent variables comprised promotion factors, including the influence of influencers, limited-quantity scarcity, online visual merchandising, and flash sales; emotional factors, including positive emotions, negative emotions, and self-control; and urge-to-buy factors, including cognitive impulse and intolerance of uncertainty.

The results indicated that the tolerance values ranged from 0.370 to 0.634, which were greater than 0, while the variance inflation factor (VIF) values ranged from 1.578 to 2.700, which were below the threshold of 10 as recommended by Hair et al. (2014). These findings suggest that there was no multicollinearity among the independent variables, and therefore, all variables were appropriate for inclusion in the multiple linear regression analysis.

Research Findings

Demographic Characteristics of the Sample

The analysis of general demographic data from 125 respondents revealed that all participants (100%) had used social media as a tool for impulsive purchasing decisions in Thailand. The sample consisted entirely of female respondents ($n = 125$, 100.00%). The majority of respondents were aged between 50–59 years, accounting for 108 individuals (86.40%). In terms of educational background, most respondents held a bachelor's degree ($n = 83$, 66.40%). Regarding occupation, the largest group was homemakers, comprising 39 individuals (31.20%). Additionally, most respondents reported a monthly income between 15,001 and 30,000 Thai Baht ($n = 50$, 40.00%).

These findings suggest that female consumers in the pre-retirement and post-retirement age groups, particularly those aged 50–59 years, play a significant role in using social media as a tool for impulsive purchasing decisions. This may be explained by the characteristics of this age group, which often has increased leisure time and a greater tendency to engage with online media for entertainment and information consumption. Furthermore, the predominance of homemakers with moderate income levels may contribute to a higher sensitivity to marketing stimuli, such as promotional offers and emotionally engaging content, which can lead to impulsive purchasing behavior.

This pattern is consistent with consumer behavior theories, which indicate that demographic factors such as age, occupation, and income level can influence individuals' responsiveness to marketing stimuli and their tendency toward Impulsive Buying Decision Behavior. Therefore, female consumers aged 50–59 years represent a key target segment for social media marketing strategies, particularly those that leverage Emotional Factors and Urge to Buy Impulsively Factors to stimulate buying decisions. Moreover, these demographic characteristics may also be associated with the degree of influence exerted by Promotion, Emotional, and Urge to Buy Impulsively Factors on Impulsive Buying Decision Behavior.

Table 1: The mean, standard deviation, and interpretation of the levels of respondents' opinions, both overall and by each dimension.

Variable	x	S.D.	Interval scale level
Total	3.590	.873	agree
1. Promotion Factors			
The Influence of Influencers	3.710	.843	agree
Limited-Quantity Scarcity	3.826	.858	agree
Online Visual Merchandising	3.854	.975	agree
Flash Sales	3.928	.864	agree

Variable	x	S.D.	Interval scale level
2. Emotional Factors			
Positive Emotions	3.782	.765	agree
Negative Emotions	3.402	.998	moderately agree
Self-Control	3.346	.865	moderately agree
3. Urge To Buy Impulsively Factors			
Cognitive Impulse	3.300	1.012	moderately agree
Intolerance of Uncertainty	3.060	.756	moderately agree
4. Impulsive Buying Decision Behavior Factors			
Impulsive Buying Decision Behavior Factors	3.700	.801	agree

Table 1 The mean and standard deviation indicate that the overall level of respondents' opinions is high, with a mean score of 3.590. Considering each dimension, all factors are also rated at a high level. The variables can be ranked from the highest to the lowest mean scores as follows: Flash Sales, Online Visual Merchandising, Limited-Quantity Scarcity, Positive Emotions, The Influence of Influencers, Impulsive Buying Decision Behavior Factors, Negative Emotions, Self-Control, Cognitive Impulse, and Intolerance of Uncertainty.

The results of the analysis examining the influence of Promotion factors-namely The Influence of Influencers, Limited-Quantity Scarcity, Online Visual Merchandising, and Flash Sales Promotions; Emotional Factors-namely Positive Emotions, Negative Emotions, and Self-Control; and Urge to Buy Impulsively Factors-namely Cognitive Impulse and Intolerance of Uncertainty-on Impulsive Buying Decision Behavior were conducted using Multiple Regression Analysis.

Table 2: Analysis of the influence of Social Media on Impulsive Buying Behavior Among Female Consumers in the Pre-retirement and Retirement Age Groups in Thailand.

[illegible]

Table 2 presents the results of the analysis examining the influence of Promotion Factors, Emotional Factors, and Urge to Buy Impulsively Factors on Impulsive Buying Behavior Among Female Consumers in the Pre-retirement and Retirement Age Groups in Thailand. The Promotion Factors include The Influence of Influencers, Limited-Quantity Scarcity, Online Visual Merchandising, and Flash Sales. Emotional Factors consist of Positive Emotions, Negative Emotions and Self-Control, while Urge to Buy Impulsively Factors include Cognitive Impulse and Intolerance of Uncertainty. The findings reveal that Positive Emotions has the strongest positive and statistically significant influence on impulsive buying behavior ($\beta = .376$, $p = .000$). This indicates that when consumers experience positive emotional states, they are more likely to engage in impulsive purchasing. The second most influential factor is Cognitive Impulse, which also shows a significant positive effect ($\beta = .248$, $p = .007$), highlighting the role of internal motivation in driving spontaneous purchasing decisions. Similarly, Self-Control demonstrates a significant positive influence ($\beta = .215$, $p = .014$). In contrast, Promotion Factors-including The Influence of Influencers, Limited-Quantity Scarcity, Online Visual Merchandising, and Flash Sales-as well as Negative Emotions and Intolerance of Uncertainty, do not show statistically significant effects ($p > 0.05$). In conclusion, positive emotion, cognitive impulse, and self-control are key determinants that significantly explain impulsive buying behavior. This is consistent with the model's explanatory power, as indicated by $R^2 = 0.656$, Adjusted $R^2 = 0.629$, $F = 24.345$, and $p = .000$.

Discussion and Conclusion

This study aimed to investigate the factors influencing impulsive buying decision behavior among pre-retirement and retirement-aged female consumers, with a specific focus on promotion factors, emotional factors, and urge to buy impulsively factors. Based on the data collected from 125 respondents, the findings are discussed and concluded as follows.

Promotion factors, including the influence of influencers, limited-quantity scarcity, online visual merchandising, and flash sales, were found to have no significant influence on impulsive buying decision behavior. This phenomenon can be explained through the Stimulus-Organism-Response (S-O-R) framework (Mehrabian & Russell, 1974), which suggests that these marketing stimuli fail to activate the internal psychological states of older consumers to generate a sense of urgency. This finding contradicts several prior studies grounded in the Scarcity Principle, which assert that urgency cues, such as countdown timers, can strongly stimulate impulsive buying through the fear of missing out (FOMO) (Cialdini, 1984; Fathia & Vania, 2023). However, this discrepancy can be attributed to the maturity and accumulated life experience of female consumers in this age group. Their high level of caution renders marketing strategies that rely on time or quantity pressure insufficient to motivate unplanned purchases.

Positive emotions exhibited a significant positive effect on impulsive buying decision behavior. This relationship aligns with the Experiential View of Consumption (Holbrook & Hirschman, 1982), which posits that consumption is an experience driven by feelings, enjoyment, and imagination. When online environments generate satisfaction and excitement, consumers are motivated to make immediate purchases to sustain those positive emotional states, which is consistent with prior findings identifying positive emotions as primary drivers of unplanned purchases (Beatty & Ferrell, 1998; Kholis et al., 2023). Conversely, while some studies suggest that negative emotions can trigger impulsive purchasing as a form of mood repair (Kukar-Kinney et al., 2009), the current study found that negative emotions and

intolerance of uncertainty had no significant effect. This indicates that older consumers do not use shopping as an escapism mechanism to alleviate stress; rather, their impulsive buying is predominantly driven by self-reward.

Self-control was found to have a significant positive influence on impulsive buying decision behavior. This is a particularly compelling finding that challenges traditional theories such as Ego Depletion (Baumeister, 2002), which typically associate lower self-control with a higher tendency for impulsive buying. In the context of older consumers, however, this phenomenon can be explained through the dimension of 'decisional control' (Averill, 1973). Consumers in this age group possess strong financial discipline. When they encounter products that genuinely meet their needs, a higher level of self-control actually provides them with the confidence to authorize a "justified indulgence." This enables them to make swift and decisive purchase decisions without experiencing post-purchase regret (Rook & Fisher, 1995).

Cognitive impulse also demonstrated a significant positive effect on impulsive buying decision behavior, which aligns with the concept of consumers making rapid, point-of-purchase decisions with shortened evaluation times (Bayley & Nancarrow, 1998). While some studies attribute this impulse to a lack of cognitive flexibility when facing information overload (Yu et al., 2022), in the context of this study, cognitive impulse reflects the use of heuristic processing. Relying on their accumulated life experience, these consumers can rapidly evaluate a product's value, activating an automatic system that efficiently drives impulse purchases without the need for complex analytical processing.

In conclusion, the overall findings align with the S-O-R theoretical framework (Mehrabian & Russell, 1974) while offering a novel, demographic-specific perspective. The primary mechanism driving impulsive buying behavior among pre-retirement and retirement-aged female consumers is an experience-driven process fueled by positive emotions, combined with the ability to make rapid decisions governed by confident self-control. This knowledge demonstrates that impulsive buying in older consumers is rooted in the pursuit of positive satisfaction and rapid value evaluation, which is crucial for developing sustainable digital marketing strategies tailored to the Silver Economy.

Suggestions

1. Focus on Positive Experiences over Urgency: Since urgency-driven promotions (e.g., flash sales) do not significantly affect this demographic, marketers should prioritize creating joyful and satisfying online shopping experiences. Stimulating positive emotions is highly effective in driving their impulsive purchases.

2. Facilitate Rapid Heuristic Evaluation: As cognitive impulse significantly influences buying decisions, businesses should provide clear, straightforward product value propositions. This allows older consumers to use their life experience for quick evaluation without being overwhelmed by excessive marketing stimuli.

3. Support "Justified Indulgence": Because high self-control in this group leads to confident purchasing, marketers should position products as well-deserved rewards or practical investments. Aligning products with their financial discipline will help trigger swift, guilt-free purchase decisions.

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Effects of Circuit Training Program on Improving The Physical Fitness of The Grade 6-Boys in Primary School

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Abstract

This study investigated the impact of a circuit training program on the physical fitness of grade 6 boys. Using a quasi-experimental design, 60 boys from Dongfeng Road Primary School were divided into an experimental group (n=30) and a control group (n=30) via matched-pairs assignment. The experimental group underwent an 8-week circuit training program (3 times/week, 40 min/session), while the control group performed traditional physical training. Physical fitness was assessed via the 50-meter sprint (speed), standing long jump (muscle power), and 1000-meter run (cardiorespiratory endurance). Data were analyzed using one-way repeated-measures ANOVA and independent samples t-tests. The investigation revealed that after 8 weeks, both groups showed significant improvements ($p < 0.05$). Notably, the experimental group achieved significant improvement in the 1000-meter run after only 4 weeks (mean improvement: 10.3 seconds, $p < 0.05$), whereas the control group showed no significant change. At 8 weeks, the experimental group significantly outperformed the control group in the standing long jump (189.83 cm vs. 182.17 cm, $p < 0.01$). These findings demonstrate that circuit training is more efficient than traditional physical training, particularly in enhancing muscle power and cardiorespiratory endurance, providing an effective optimization strategy for primary school physical education.

Keywords: Circuit Training, Physical Fitness, Grade 6 Boys

Introduction

Against the backdrop of the "Opinions on Comprehensively Strengthening and Improving School Physical Education in the New Era" (General Office of the CPC Central Committee & General Office of the State Council, 2020) and the "Implementation Plan for Deepening the Reform of the High School Examination and Enrollment System in Inner Mongolia Autonomous Region" (General Office of the People's Government of Inner Mongolia Autonomous Region, 2022), improving students' physical fitness has become an important goal of school physical education. In Inner Mongolia, China, the first exam for students graduating from primary school and entering middle school (three months after graduation) includes a physical fitness test (PFT). This test primarily reflects students' physical fitness during primary school, and the results directly affect their admission to higher grades. Therefore, physical fitness is extremely important for upper-primary school students. Previous physical fitness test data show that most boys are weaker in speed, muscle power,

and cardiorespiratory, requiring more scientific and systematic training methods to improve these areas. Traditional physical training methods often focus on repetitive practice of single items, which can easily lead to boredom among students, and training efficiency is difficult to maximize within the limited class time. Circuit training, as a method of enhancing physical fitness by rotating through multiple training stations within a fixed time, is characterized by multiple stations, high density, multiple forms, and strong adjustability. Therefore, exploring the impact of circuit training on the physical fitness of grade 6 boys not only helps enrich primary school physical training methods but also provides scientific experimental evidence for accurately improving students' physical fitness, which has significant practical educational value.

This study focuses on grade 6 boys at Dongfeng Road Primary School in Saihan District, Hohhot, and aims to address the following core question: In an 8-week physical training program, is the circuit training program significantly effective in improving students' speed (50-meter sprint), muscle explosiveness (standing long jump), and cardiorespiratory (1000-meter run)? Is it superior to traditional physical training?

The overall conclusion of this article is that circuit training is a highly effective physical fitness improvement program that aligns with the physical and mental development characteristics of primary school students. Compared to traditional physical training, circuit training, through its well-designed station loads, can more comprehensively stimulate the body to produce physiological adaptations, especially showing significant immediate advantages in improving cardiorespiratory and muscle power during the initial intervention period (the first four weeks). Through comparative experiments, this study demonstrated that the scientific implementation of circuit training can significantly and sustainably improve the overall physical fitness of grade 6 boys.

Objectives

1. To study the effects of a circuit training program on improving the physical fitness of grade 6 boys.
2. To compare the differences between circuit training programs and traditional physical training in improving the physical fitness of grade 6 boys.

Literature Review

Circuit training, first proposed by Morgan and Adamson of the University of Leeds in 1953, is based on setting up multiple training stations according to the training goals. Trainees complete the exercises at each station sequentially and repeat the cycle. Physiologically, circuit training follows the principles of "progressive overload" and "biological adaptation." High-density, multi-station training not only effectively recruits more motor units and improves the coordination of the neuromuscular system but also induces the body to undergo a mixed aerobic and anaerobic metabolism while maintaining a high heart rate, thereby comprehensively improving muscle strength, explosive power, and cardiorespiratory (Morgan & Adamson, 1957).

Circuit training has significant advantages in improving the basic physical fitness of school-aged children. Studies have shown that modular circuit training is more effective in improving cardiovascular function and skeletal muscle strength in students aged 10-12 who are in a sensitive period of growth and development (Mayorga-Vega et al, 2013).

In recent years, circuit training has gained widespread attention in the field of youth physical education and sports training because of its high efficiency and multifunctionality.

Multiple studies have shown that compared to traditional teaching or single-method training, circuit training has a more significant advantage in simultaneously improving muscle power and cardiorespiratory. Regarding muscle power improvement, circuit training effectively stimulates the neuromuscular system through high-density strength training exercises. Pang Kaihui (2024) Studies have found that, compared with the control group that used traditional physical training, the experimental group that used circuit training showed a significant improvement in explosive power indicators such as the standing long jump. Circuit training has a unique advantage in enhancing cardiorespiratory. Short-term structured circuit training can effectively improve students' cardiorespiratory function (Marinho et al,2022).

In summary, the advantage of circuit training lies in its ability to combine high-intensity strength training with sustained physiological stress. By shortening the rest intervals between sets and increasing the variety of movements, circuit training allows the body to perform muscle exertion exercises while maintaining a high heart rate. This dual intervention model of "strength + endurance" is the key to its superior effectiveness compared to traditional physical training. Therefore, circuit training has proven to be a more efficient and practical training system than traditional methods for improving 50-meter sprint performance (representing speed), standing long jump performance (representing explosive power), and 1000-meter run performance (representing cardiorespiratory) (Yang Baiyang, 2021).

Shuba (2020) research confirms that circuit training can be seamlessly integrated into physical education classes. Studies of 9–10-year-old children have shown that scientifically designed circuit training methods can effectively optimize elementary school physical education, significantly increasing class density. Kuyliyevich (2023) Experiments have demonstrated that using circuit training in elementary school physical education classes is significantly more effective than traditional teaching systems, improving students' overall physical fitness level by 12.5%. The application of circuit training in the "practice in every class" component of junior high school physical education classes has shown that this model not only addresses the problem of low student interest in practice but also enables the completion of high-intensity physical fitness build-up within a limited time (Yuan Sifan, 2022).

Research Methodology

Research Design

This study employed quasi-experimental design and was conducted at Dongfeng Road Primary School to investigate the impact of a circuit training program on the physical fitness of grade 6 students. The study participants were grade 6 boys from Dongfeng Road Primary School. Sixty boys were selected using purposive sampling and divided into experimental and control groups. The experimental group received an 8-week circuit training program, whereas the control group received routine physical fitness training. They were trained three times a week for 40 min each time.

The selection criteria were as follows: 1) Grade 6 boys. 2) Able to participate in training continuously (8 weeks). 3) In good health, without any disease or injury. 4) Voluntary participation; 5) In the pre-experiment test, the 50-meter sprint time was $>8.2s$, the standing long jump time was <195 cm, and the 1000-meter run time was $>270s$.

The exclusion criteria were as follows: 1) history of serious injury or illness. 2) Inability to guarantee attendance during the study period; 3) In the pre-experiment tests, a 50-meter sprint time $\leq 8.2s$, a standing long jump time ≥ 195 cm, and a 1000-meter run time $\leq 270s$.

Ethical considerations

All procedures of this study were approved by the Ethics Committee of the Inner Mongolia Normal University of China Ethics Committee with approval number IMNU-2025-11-10115.

Research Instruments

Training Plan: Based on the fundamental characteristics of circuit training, multiple items, short duration, and high efficiency," training programs with high safety, moderate technical difficulty, and suitability for grade 6 students were selected from running and jumping exercises. The final plan identified eight training stations: fast shuffle. 20-meter sprint. high Knee. high Knee Run. straight-leg jumps. tuck Jumps. rope kipping. 20-meter shuttle run.

Each training session lasted 40 min, including 8 min of warm-up, 24 min of circuit training, and 8 min of cool-down. The circuit training consisted of three rounds, with each station's training time being 25-35 seconds and rest periods of 3-5 minutes between rounds. The station training time and rest periods between rounds were gradually adjusted as the students adapted.

The content validity of the research instrument was assessed by five experts in the field. The Scale-level Content Validity Index was 0.92, indicating excellent content validity and suitability for the formal survey.

Testing: The testing tools were based on the "National Student Physical Fitness and Health Standards (2014 Revision)" (Ministry of Education. 2014). The 50-meter sprint, standing long jump, and 1000-meter run were selected. The testing process was standardized and conducted by the same personnel to ensure the reliability and validity of the data.

Data Collection

1. Physical fitness tests (50-meter sprint, standing long jump, 1000-meter run) were conducted before the experiment, and data were collected.

2. The participants were divided into experimental and control groups.

3. The experimental group underwent circuit training, whereas the control group underwent traditional physical training.

4. The training program lasted for eight weeks, with three training sessions per week (Monday, Wednesday, and Friday). Each training session lasted for 40 min.

5. Physical fitness tests (50-meter sprint, standing long jump, 1000-meter run) were conducted on both groups of participants in the fourth and eighth weeks, and data were collected.

Data Preparation and Analysis

In this study, the researchers used the SPSS statistical software to process the test data, following these steps:

1. The mean, standard deviation, t-value, and p-value for the experimental and control groups were calculated before the experiment, after 4 weeks, and after 8 weeks.

2. A one-way repeated-measures ANOVA was used to compare the trends in physical fitness changes in the experimental and control groups at different stages. For indicators showing significant changes, multiple comparison corrections were performed using the Bonferroni test. The statistical significance threshold was set at $p < 0.05$.

Research Finding

The effects of circuit training on the physical fitness of grade 6 boys at Dongfeng Road Primary School are as follows:

Table 1: Comparison of Physical Performance Indicators Between Experimental and Control Groups Across Different Training Stages

Time	Test Project	Experimental group Mean $\pm$ SD	Control group Mean $\pm$ SD	T	P
Before training	50-meter sprint(s)	9.75 $\pm$ 1.07	9.76 $\pm$ 0.84	-0.030	0.977
	Standing long jump(cm.)	162.73 $\pm$ 12.53	163.23 $\pm$ 14.88	-0.141	0.889
	1000-meter run(s)	307.87 $\pm$ 37.65	308.63 $\pm$ 31.72	-0.085	0.932
After 4 weeks of training	50-meter sprint(s)	9.50 $\pm$ 1.03	9.63 $\pm$ 0.85	-0.556	0.580
	Standing long jump(cm.)	174.47 $\pm$ 10.56	170.93 $\pm$ 15.01	1.054	0.296
	1000-meter run(s)	297.57 $\pm$ 35.48	304.60 $\pm$ 31.45	-0.813	0.420
After 8 weeks of training	50-meter sprint(s)	9.26 $\pm$ 0.99	9.48 $\pm$ 0.88	-0.943	0.349
	Standing long jump(cm.)	189.83 $\pm$ 12.48	182.17 $\pm$ 16.84	1.999	0.050
	1000-meter run(s)	278.97 $\pm$ 33.06	293.60 $\pm$ 31.12	-1.765	0.083

* $P \leq 0.05$

Table 1 shows that before the experiment, the 50-meter sprint time was 9.75 ± 1.07 s for the experimental group and 9.76 ± 0.84 s for the control group. The standing long jump time was 162.73 ± 12.53 cm for the experimental group and 163.23 ± 14.88 cm for the control group. The 1000-meter run time was 307.87 ± 37.65 s for the experimental group and 308.63 ± 31.72 s for the control group. There were no significant differences in any of the physical fitness indicators between the experimental and control groups before training (p-values were all greater than 0.05). This indicates that there was no significant difference in the baseline physical fitness levels of the two groups before the experiment, making them comparable to each other.

After 4 weeks of experimentation, various indicators of both groups of subjects showed varying degrees of change, The experimental group's 50-meter sprint time was 9.50 ± 1.03 s, while the control group's was 9.63 ± 0.85 s; the standing long jump time was 174.47 ± 10.56 cm, while the control group's was 170.93 ± 15.01 s; and the 1000-meter run time was 297.57 ± 35.48 s, while the control group's was 304.60 ± 31.45 s. Although the average performance of the experimental group was better than that of the control group, the t-test results showed no significant difference ($p > 0.05$).

After 8 weeks of experimentation, the experimental group's lead in various indicators further widened: 50-meter sprint: The experimental group's average time improved to 9.26 ± 0.99 s, while the control group was 9.48 ± 0.88 s. Although the experimental group was numerically superior, the difference is not statistically significant at this point. ($p=0.349$). Standing long jump: The experimental group (189.83 ± 12.48 cm) and the control group (182.17 ± 16.84 cm) showed a further widening of the gap, The difference is significant. ($p=0.050$). 1000-meter run: The experimental group (278.97 ± 33.06 s) demonstrated better cardiorespiratory compared to the control group (293.60 ± 31.12 s). The difference was not significant. ($p=0.083$)

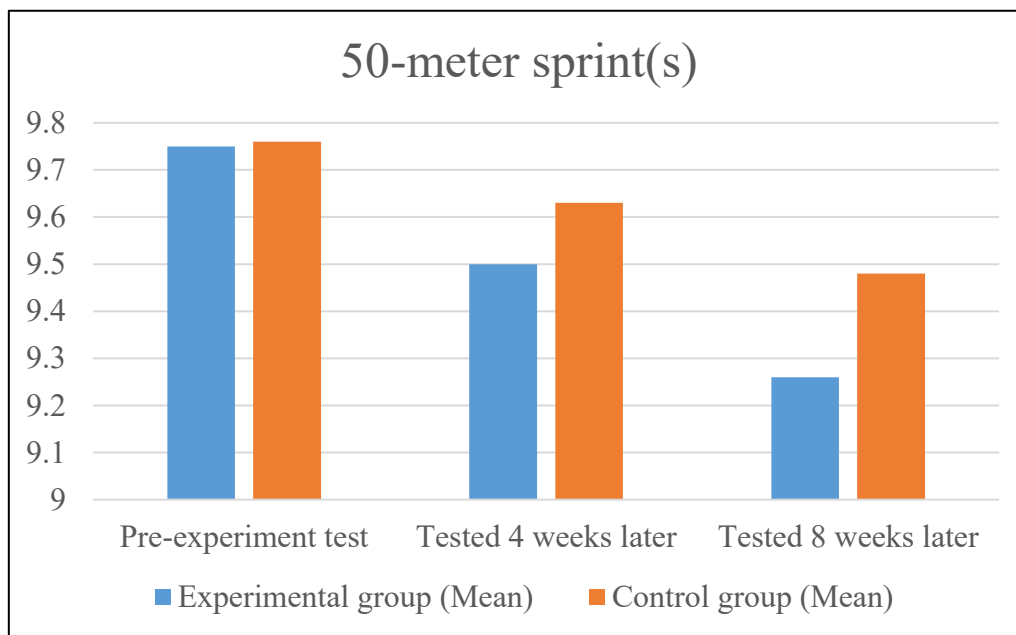


Figure 1: Trends In Physical Performance Indicators for Experimental and Control Groups Over the Training Period in the 50-Meter Sprint

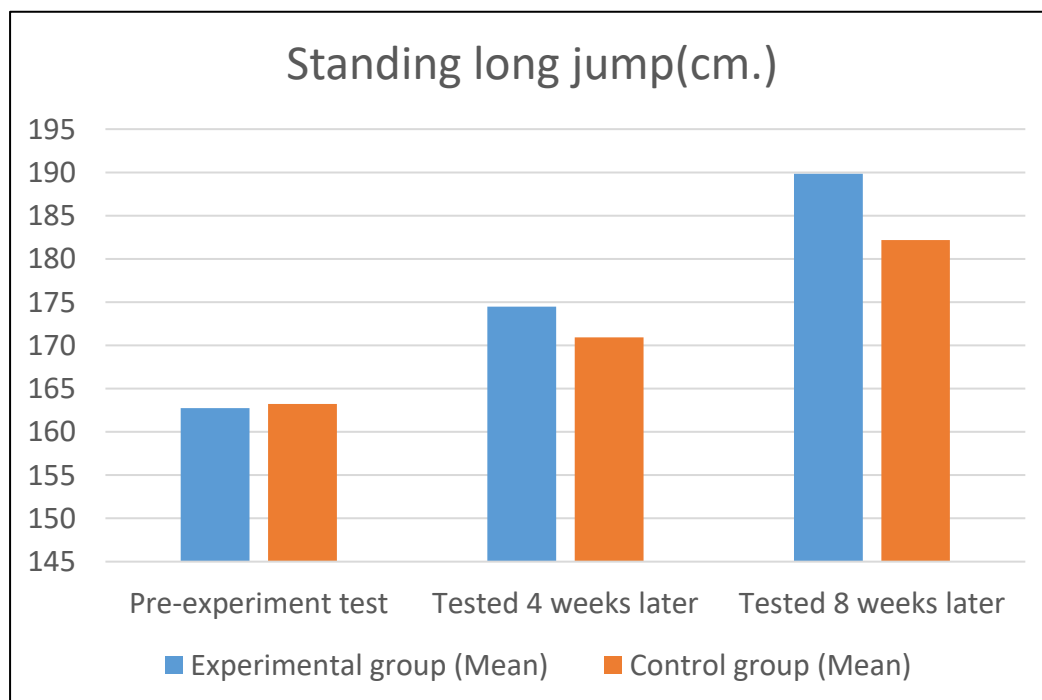


Figure 2: Trends in Physical Performance Indicators for Experimental and Control Groups Over the Training Period in the Standing Long Jump

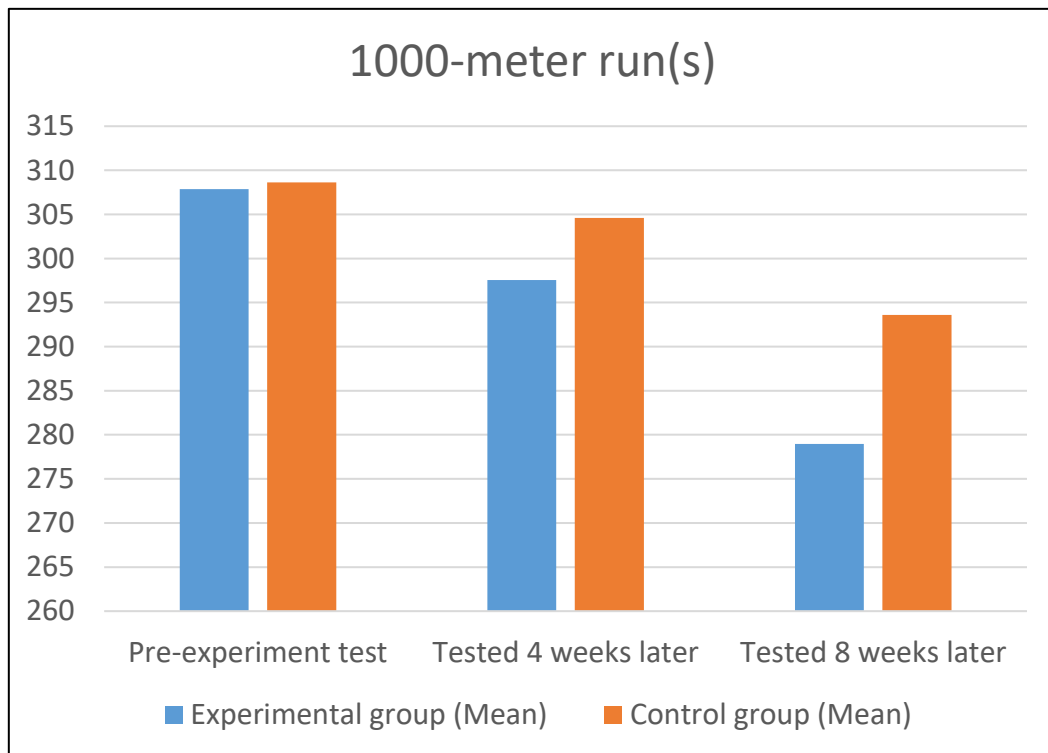


Figure 3: Trends in Physical Performance Indicators for Experimental and Control Groups Over the Training Period in the 1000-Meter Run

Changes in physical fitness metrics in the experimental and control groups over an 8-week training period. Performance was evaluated before training, and at 4 and 8 weeks post-training. In the 50-meter sprint and 1000-meter run charts, a decrease in time indicates an improvement in speed and aerobic endurance, respectively. In the standing long jump chart, an increase in distance indicates an improvement in muscle power. As shown in the figure, the experimental group outperformed the control group in terms of physical fitness data after 4 and 8 weeks.

Table 2: One-Way ANOVA Was Performed on the 50-Meter Sprint, Standing Long Jump, and 1000-Meter Run in The Experimental and Control Groups Before the Experiment, After 4 Weeks of the Experiment, and After 8 Weeks of the Experiment

Group	Test Project	Source of Variation	SS	DF	MS	F	p
Experimental group	50-meter sprint	Time Error	3.717 0.804	1.305 37.837	2.849 0.021	134.023	<.001
	Standing long jump	Time Error	11082.156 1323.844	1.552 44.997	7142.344 29.421	242.765	<.001
	1000-meter run	Time Error	12872.600 780.733	1.321 38.307	9745.180 20.381	478.147	<.001

Group	Test Project	Source of Variation	SS	DF	MS	F	p
Control group	50-meter sprint	Time	1.158	1.101	1.052	59.143	<.001
		Error	0.568	31.919	0.018		
	Standing long jump	Time	5439.489	1.224	4445.603	179.152	<.001
		Error	880.511	35.483	24.815		
	1000-meter run	Time	3632.689	1.517	2393.932	22.584	<.001
		Error	4664.644	44.006	106.000		

*P≤ 0.05

Table 2 shows that both the experimental and control groups exhibited highly significant time effects ($P < .001$) in the 50-meter sprint, standing long jump, and 1000-meter run. This indicates that the physical fitness levels of both groups improved over time, but the F-values for each indicator were larger in the experimental group, suggesting that the circuit training intervention was more effective in improving students' performance in the 50-meter sprint, standing long jump, and 1000-meter run.

Table 3: Comparison Of 50-Meter Sprint, Standing Long Jump, and 1000-Meter Run Performances at Different Stages in The Experimental Group Control Group (T1: Pre-Experiment Test. T2: Tested After 4 Weeks of Experiment. T3: Tested After 8 Weeks of Experiment)

Group	Test Project	I vs J	IJ	SE	P(Bonferroni)
Experimental group	50-meter sprint	T1 vs T2	0.259*	0.027	<.001
		T2 vs T3	0.239*	0.022	<.001
		T1 vs T3	0.498*	0.040	<.001
	Standing long jump	T1 vs T2	- 11.733*	0.967	<.001
		T2 vs T3	- 15.367*	1.149	<.001
		T1 vs T3	- 27.100*	1.519	<.001
	1000-meter run	T1 vs T2	10.300*	0.673	<.001
		T2 vs T3	18.600*	0.846	<.001
		T1 vs T3	28.900*	1.234	<.001
Control group	50-meter sprint	T1 vs T2	0.131*	0.008	<.001
		T2 vs T3	0.147*	0.032	<.001
		T1 vs T3	0.278*	0.030	<.001
	Standing long jump	T1 vs T2	-7.700*	0.523	<.001
		T2 vs T3	-11.233*	1.049	<.001
		T1 vs T3	-18.933*	1.289	<.001
	1000-meter run	T1 vs T2	4.033	1.697	0.073
		T2 vs T3	11.000*	2.260	<.001
		T1 vs T3	15.033*	2.846	<.001

*P≤ 0.05

Table 3 shows that the experimental group using the circuit training method demonstrated sustained and highly significant improvement in all physical fitness indicators. In the 50-meter and 1000-meter races: the mean difference (I-J) was positive in both the T1-T2 and T2-T3 phases, with $p < .001$, indicating significant improvements in students' speed and cardiorespiratory. In the standing long jump: this indicator showed a large positive increase (a negative mean difference indicates performance improvement, e.g., the T1 vs T3 difference was -27.100 cm), and the p values for all phase comparisons were $< .001$, indicating that circuit training had an excellent effect on enhancing muscle power.

The control group also showed improvement in physical fitness under traditional physical training, but its rate of improvement and stability were slightly inferior to the experimental group. In the 50-meter sprint and standing long jump, the control group showed significant differences in both the T1-T2 and T2-T3 phases ($p < .001$). However, in the 1000-meter endurance event, the control group did not show significant progress in the first 4 weeks of the experiment (T1 vs T2) ($p = 0.073 > .05$) and only showed significant progress after 8 weeks of the experiment (T1 vs T3).

Discussion

This study evaluated the impact of an 8-week circuit training intervention on physical fitness in grade 6 boys. Both circuit training and traditional physical training significantly improved fitness ($P < 0.05$). However, circuit training demonstrated superior efficiency, particularly regarding muscle power and cardiorespiratory endurance.

The rapid progression in the 1000-meter run within 4 weeks in the experimental group-contrasting with the control group-suggests that circuit training induces faster cardiovascular adaptations. This aligns with Kosaka et al. (2025), who noted that high-intensity circuit formats facilitate more efficient aerobic threshold stimulation. Physiologically, this likely reflects enhanced mitochondrial biogenesis and capillary density resulting from sustained metabolic stress, which are less pronounced in traditional lower-intensity physical education sessions.

Regarding muscle power, the superior standing long jump performance in the experimental group ($P < 0.05$) highlights specific neuromuscular adaptations. Unlike traditional physical training, the circuit training format demands rapid transitions between explosive movements, improving motor unit recruitment efficiency and the rate of force development (RFD). As Mayorga-Vega et al. (2013) and Yunus et al. (2024) suggest, this "threshold of stimulus" is critical for adolescents; our findings imply that for 6th-grade students, training intensity acts as the primary determinant for fitness optimization, effectively overcoming the adaptation plateaus often observed in traditional PE.

These findings suggest that circuit training is an optimal strategy for school-based physical education, as it maximizes fitness outcomes within the limited time available in the school curriculum.

Limitations and Future Research Directions

This study has several limitations. First, the small sample ($n=60$) from a single school limits generalizability. Second, the 8-week duration provides only short-term evidence, leaving long-term sustainability unverified. Finally, potential confounders-such as extracurricular activities and nutrition-were not strictly controlled. Future research should utilize larger, multi-site samples and longitudinal designs to assess long-term efficacy. Additionally, integrating physiological markers and qualitative measures would further elucidate the mechanisms through which circuit training enhances physical fitness in youth.

Conclusion

In conclusion, both circuit and traditional physical training are effective methods for enhancing the physical fitness of grade 6 boys over an 8-week period. However, circuit training proves to be more efficient, particularly regarding the development of muscle power and cardiorespiratory endurance. Given its ability to yield significant improvements in a shorter timeframe, circuit training serves as an optimized and practical strategy for physical education in primary schools. Future research should consider extending the intervention duration to examine long-term adherence and the sustainability of these physical gains.

Suggestion

Promoting the circuit training method to optimize classroom efficiency: Given the immediate advantages of circuit training in improving cardiorespiratory and explosive power, it is recommended that physical education teachers give priority to this method in the early stages of physical training or when class time is limited to achieve efficient transformation of physical fitness.

Implement progressive load monitoring: To avoid students experiencing physiological adaptation that leads to stagnation in improvement during the later stages, the difficulty and intensity of practice sites should be dynamically adjusted based on test feedback, following the principle of gradual progression to maintain continuous stimulation during training.

Balancing fun and scientific rigor: Considering the psychological characteristics of upper elementary school students, diverse equipment and competition formats should be incorporated into circuit training to enhance students' willingness to participate and their initiative in training by increasing the fun factor of the exercises.

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2. In case of a research article, the method and findings should be presented systematically with the following components (the topic and components may vary).

2.1 Introduction: significance and background of the study together with overall view of the article.

2.2 Objective

2.2 Literature Review

2.3 Research Methodology: steps of doing the research, samples for the study, data collection, research instrument and statistics.

2.4 Research Finding

2.5 Discussion and Conclusion

2.6 References

References

In submitting an article for consideration, you need to write citations of other documents or the sources of information used at the end of the article. By providing references only in English and categorized in APA style, the submitter should check the correctness and completeness of the citation in accordance with the criteria specified by the journal. Any articles on topics that have a citation format that has not yet been complied with the journal will not be forwarded to a qualified reader for reviewing in the next step. The submitter must adhere to the following main guidelines.

Example of APA style: <https://libguides.murdoch.edu.au/APA>

Review Process

The articles to be published in the journal must be approved by the editorial board and at least three experts in the related field of study, following the process below:

1. The editorial board will inform the author upon receipt of the manuscript in accordance with the submission criteria.
 2. The editorial board will examine the title and content of the manuscript to ensure that they are appropriate, consistent with the journal's objectives, and of sufficient quality in terms of theoretical and practical contributions in the fields of humanities and social sciences.
 3. In case the manuscript is not accepted for further consideration, the editorial board will inform the author of the rejection, along with reasons and brief suggestions, via email.
 4. In case the editorial board accepts the manuscript for review, it will be forwarded to at least three experts from different institutions in the relevant field for peer review. The reviewers will evaluate the manuscript and provide recommendations on whether it should be accepted, rejected, or revised. This process follows a double-blind review system, in which both the reviewers and the authors remain anonymous to each other.
 5. After the peer review process, the editorial board will make a decision based on the reviewers' recommendations as to whether the manuscript should be accepted for publication, revised (major/minor), or rejected.
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Paper Submission

Those who wish to submit an article for review in the journal, please send the original file (Microsoft Word) in English using the Times New Roman font, size 12 point only. (Text Size: Research Topic 18, Topic in Journal 14, Journal Content 12). The channel for submitting the article is ThaiJo system. <https://so04.tci-thaijo.org/index.php/ubruij/login>
