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# Tomorrow's Chip Industry: Challenge of The Unknowns

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## Abstract

**Purpose** – Few industries are as volatile as the chip industry. The rather short history of the industry has witnessed all types of dramatic cyclical swings and disruptions from the technological to the geopolitical. Technology drove the industry from the simple “few transistors on a silicon wafer” state to the billion transistors on the same silicon wafer profile.

**Design/Methodology/Approach** – All of that will most likely pale against potential events of the coming decade. The future state of technologies, the evolving forces of data sciences, and the unraveling currents of geopolitics will all induce grass root change. A blend of these disruptive forces will expose the chip industry to genuine challenge.

**Findings** – The article is an attempt at dealing with some of those variables and suggests a few hypotheses. It starts with a brief history of the chip industry followed by an analysis of the prospective threat from never heard of technologies and heavy R and D investment to high industry concentration and distinctive pattern of rivalry follows.

**Research Implications** – The question, however, is where will the industry be tomorrow given all those disruptive variables? More specifically what is the level of concentration of the industry that will emerge from those ever-changing drivers? This article provides an attempt at answering this question. The answer will be a set of hypotheses built around an analytical matrix. The article relies on the myriad of material produced on the chip industry today. Analysis is qualitative. And it complements the concept with an operational model leading to specific modes of this strategic behaviour.

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**Keywords:** chip industry, technology, concentration, strategic positioning

**JEL Classifications:** 033, O38, L63, L82, Q55, L14

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## I. A brief history of the chip industry

The development of the chip industry began in the 1950s but progressed rapidly in the 1960s and 1970s, and became one of the world's leading manufacturing industries in the 1980s. The industry became a complex chain with design, production, manufacturing, sales and service facilities. Design covered functionality and performance requirements, architecture and circuit diagrams, and simulating and verifying them. Production implied producing the chip through wafer dicing, crystallization, and photo lithography. Manufacturing included placing components on the chip and testing them.

The transistor is one of the most important inventions of the 20th century. It was invented at Bell Labs in New Jersey in 1947. It stands at the heart of almost all electronic devices. The invention of the integrated circuit, took place simultaneously at Fairchild and Texas Instruments from 1957 to 1959. Jean Hoerni at Fairchild developed the planar transistor then Jack Kilby at Texas Instruments and Robert Noyce at Fairchild developed the integrated circuit. By 1962 Fairchild was producing integrated circuits with about a dozen transistors. Much has changed in the intervening years but this same basic principle is applied in the building of today's billions of transistor chips. (A Brief History of Semiconductors - Semi Wiki).

The chip industry is having its share of problems. There is process technology, player's competition, government regulation and demand uncertainties. (Imedia, A brief introduction to the development history of the chip industry, 17.05.2023).

The industry is based on the foundry model, which consists of semiconductor fabrication plants (foundries) and integrated circuit design operations, each belonging to separate companies or subsidiaries. Some companies, known as integrated device manufacturers, both design and manufacture semiconductors (see figure).

The dynamic state and outlook of the industry is perfectly described by the leader of the industry TSMC (or Taiwan region Semi conduct Manufacturing Company). It states: "The power-performance-area (and cost) advances of the last five decades have mostly been achieved through dimensional scaling of the transistor. What will the semiconductor industry do after transistor scaling crosses the nanometer threshold from the once applied threshold of 16/12 nm to today's much touted 2 nm and 1.4 nm and the current search for sub nanometer size? New applications will undoubtedly demand new chip capacities and technologies, one of the most pressing questions facing the semiconductor industry today.

"The path for IC technology development going forward is no longer a straight line. The need for out-of-the-box solutions is ushering in a golden age of innovation. Future electronic systems will require co-innovation of the computing architecture together with device and packaging technology." (<https://research.tsmc.com/english/research-areas.html>)

### 1. Technology: The race of the manometers.

A key dimension of semi-conductors is the size of the transistor gate length as measured in billionths of a meter, or nanometer (nm). The extraordinary advances in chip processing power have resulted primarily from continued reductions in the size nanometers. The smaller the "nanometer", the more powerful the chip given the larger number transistors that can be placed.

An ongoing race towards narrower nanometer is led by key chip industry operators in the United States, Taiwan region, China and Korea. Others as Germany and India, who do not want to be left behind, are joining the fray. This nanometer race revolves around achieving smaller but potent internal components of chips. Reason is Moore's Law claims that the maximum number of transistors on a silicon chip will double every two years, a claim that is losing credence.

The standard length of transistors was, for some time, 10 nanometers. Twenty and sixteen nm chips had, however, problems with copper-transistor interconnection and the challenge of moving currents through small wires and smaller nanometers. The GAA architecture, a next-generation foundry micro fabrication process, seemed to provide a next technology solution. It emerged as a response to the race among the microchip industry for the fastest, finest and most energy-efficient circuitry. Gate-all-around or GAA transistors are in fact an upgraded transistor structure where the gate can come into contact with the channel on all sides. These separate horizontal sheets are vertically stacked so that the gate surrounds the channel on all four sides. The outcome is an improved performance induced by superior electrical signal

passing through and between the transistors. (ASML).

GAA transistors are poised to become part of the most advanced chip designs in the near future. These transistors can be manufactured at an “accommodating” cost, striking a balance between cost of mass production of advanced chips and enhanced performance. GAA’s reduced leakage and lower energy consumption makes them, moreover, superior to older designs.

Semiconductor manufacturers are chasing this GAA technology in search of improved electrostatic properties, increased performance, optimized chip design, and reduced power usage. (Avi Gopani, the race to reduce nanometers in chips, AIM, January 5, 2022).

This constitutes a challenge and a threat.

In brief, Moore’s law innovation continues, driven by multiple engines of performance scaling. Meanwhile, process technology innovation continues attracting new applications.

**2.Concentration: Industry structure**

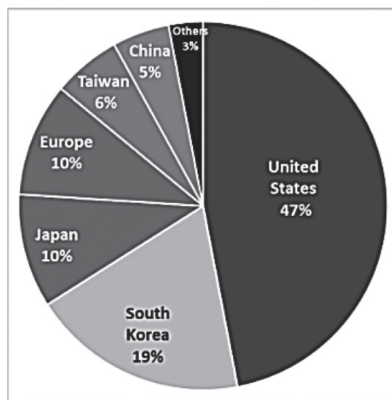
The chip industry is highly concentrated whether from manufacturing or supplying points of view.

The global semiconductor industry is dominated in terms of manufacturing and supplying by companies from the United States (47%) , Taiwan region, South Korea, Japan and the Netherlands. The United States leads, followed by South Korea (19%), Japan (10%), Europe (10%), Taiwan region (6%), and China (5%) in terms of global market share (see figure below).

The world’s top five semiconductor suppliers accounted for an estimated 43 percent of 2017 total chip sales. The trend is for more market share being concentrated in fewer hands. (The Concentration of Semiconductor Market Share, By Dylan McGrath , EE Times, 04.12.2018).

Concentration in equipment making is remarkably high. ASML is the only company in the world that owns the technology and makes the machinery to make physical chips out of silicon wafers. Chip makers like TSMC, NVIDIA and Intel would not be able to make the chips they do without ASML’s EUV technology.

Concentration in advanced semi-conductor making is also high.TSMC of Taiwan region, Samsung of South Korea, and Intel of the United States are, as of 2021 are the only three firms able to manufacture the most advanced semiconductors:



**Figure 1.** Global semiconductor industry market share, by sales, 2017  
 Source:SIA 2020 State of the US Semiconductor Industry p7.

**3.Rivalry: Geopolitical stride.**

Chip making relies on complex equipment. This equipment is made and sold by not so recognized names in the West.



Those include ASML (Netherlands), Applied Materials, Tokyo Electron, KLA and Lam Research whose equipment are irreplaceable in the manufacture of the microscopic integrated circuits that power the digital economy. This equipment handles the complex processes of scratching billions of electric circuits into the silicon wafer. And this generates considerable revenue. In 2014 those five main toolmakers sales amounted to \$3.3bn and 10% of that went to China. Today China makes up a quarter of global revenues (see chart). This new reliance has created political problems especially for Applied Materials. China's appetite for chipmaking tools is also causing commercial difficulties for non-Chinese chipmakers, depriving them of equipment and hence the capacity to manufacture chips. America's allies—in particular Japan and the Netherlands, home to Tokyo Electron and ASML— were asked to impose export controls on their toolmakers similar to those imposed by the USA.

Chinese government has invested heavily in domestic chip making but relied on equipment provided by US sources. More than 90% of the semiconductors China uses are either imported or made domestically by foreign chip makers. In 2019, 24 of the 126 300mm wafer fabrication plants in operation worldwide were located in China, according to SEMI (Economist “America has a plan to throttle Chinese chip makers”, Apr 30th 2022)

This leaves the United States with a critical problem.

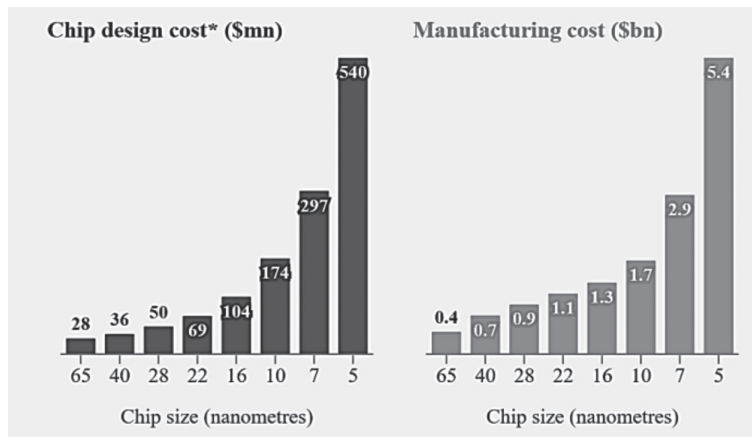
Most advanced fab production in China is performed by non-Chinese firms. Intel, Samsung, and TSMC are among the major global semiconductor firms that operate fabrication facilities in China. Chinese firms, such as Semiconductor Manufacturing International Corporation (SMIC), appear to be advancing their capabilities due to collaboration with foreign companies. China continues to attract global industry collaboration with the pull of government financing, leading to the expansion of China's fabrication capacity.

#### **4.Capital: R and D investment**

Chip design and manufacturing are associated with heavy capital outlays (see figure below). These outlays are needed in order to cover main industry investments from chip design and manufacturing to chip packaging and testing. And investment is also needed in order to provide supporting industry investments as intellectual property and electronic design automation. The fabrication of each new generation of semiconductors requires more costly equipment and capital-intensive processes. Leading-edge semiconductor manufacturers have, moreover, to make parallel R&D investments in support of multiple generations of technology.

EUV lithography machine costs more than 100 million US dollars, for example. In 2018, SMIC and ASML signed an agreement to acquire an EUV lithography machine against US\$120 million. A higher price and higher quality ASML second-generation EUV lithography machine will be the NXE:5000 series. It was originally planned to be released in 2023, but it is now postponed to 2025/2026, and the price is expected to exceed 300 million US (Designing a 2nm Chip Costs at Least \$725 Million, Mila Liu, December 12, 2022 LinkedIn).

Strategic considerations made almost each and every lead player, whether a company or a country, contemplate a substantial investment in both elements of the process. The USA, the EU, China and Taiwan region head the list.



**Figure 2.** Chip design and manufacturing costs  
 Source: IBS, McKinsey, FT June 1st, 2023.



**Figure 3.** Chip investment over time.  
 Source: Future Horizons, Jan-Nov. The Economist

The future will therefore, be more complicated from both product and process point of view. It will not only be a question of physics but of novel constraints not thought of before. And investment implications could, in addition, be dire. Chip breakthroughs tend, as a result, to be more zealously guarded.

## II . Tomorrow ‘s scenario: a hypothesis

It is the authors contention, hypothesis, that tomorrow ‘s chip industry will be driven by known and unknown drivers. Technology will be the dominant variable and much of the future will depend on the state of today’s technology as opposed to the state of tomorrows. Concentration will provide a second inclusive driving force i.e. Reflects the impact of the other two

variables; rivalry and capital.

The following matrix provides an approximation of the strategic positioning of some of today’s players and their tomorrow outlook within this strategic space. The matrix tries to relate technology to concentration. It scales technology along a knowledge scale i.e. known and unknown and concentration along intensity level i.e. low versus high concentration. The matrix reveals four possible positions. An A or “superior” position is a position where unknown technology is combined with high concentration. A “D” position relates known technology to low concentration.

A “B” position relates high concentration to known technology. And a “C” position relates unknown technology to low concentration. Conversion of unknown technologies to known technologies would introduce a dynamic element in the matrix and underline the strategic choices facing today’s operators.

Today’s key operators i.e. ASML and TSMC could be placed in a today “B” position. This judgmental positioning is subjective and further research will have to substantiate several of the assumptions and the outcomes. “Their strategies should aim at the “A” position assuming that their search for new currently unknown technologies will lead to known technologies, enhance their posture and increase their market hold. And demonstrate the dynamics of the matrix “

Further research should explore these hypotheses and reveal a potential long term positioning profile.

<b>Technology</b>	Unknown	C	A
	Known	D	B
		<b>Low</b>	<b>High</b>

**Industry concentration**

**Figure 4.** Concentration versus technology over time

### III .Summery and conclusions

Few industries are as volatile as the chip industry. The rather short history of the industry has witnessed all types of dramatic cyclical swings and disruptions from the technological to the geopolitical. Technology drove the industry from the simple “few transistors on a silicon wafer” state to the billion transistors on the same silicon wafer profile. All of that will most likely pale against potential events of the coming decade. The future state of technologies, the evolving forces of data sciences, and the unraveling currents of geopolitics will all induce grass root change. A blend of these disruptive forces will expose the chip industry to genuine challenge.

A brief history of the chip industry is followed by an analysis of prospective industry challenges from never heard of technologies and heavy R and D investment to high industry concentration. This level of concentration is the focus of analytical matrix where concentration is related to the measure of technology development. The ultimate hypothesis is that unknown technologies will lead to a high measure of concentration. Who will feature in this concentration is an issue for further analysis.

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<https://research.tsmc.com/english/research-areas.html>)



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# Application and Effect Evaluation of Visual Marketing in Live E-commerce

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## Abstract

**Purpose** – This study investigates the influence of visual marketing strategies employed during live streaming on consumer impulse buying behavior.

**Design/Methodology/Approach** – Utilizing the Stimulus-Organism-Response (S-O-R) framework, it explores how different visual marketing tactics like color intensity, layout dynamics, and influencer interactions amplify consumer emotional arousal and affect their cognitive assessments and purchasing decisions.

**Findings** – The research, based on a survey conducted on Douyin (TikTok), analyzes how emotional arousal mediates the relationship between visual marketing and impulse buying while also examining the moderating role of cognitive assessment.

**Research Implications** – Results indicate that effective visual marketing can significantly enhance consumer emotional responses, which in turn, influence impulse purchasing behaviors, highlighting the importance of strategic visual marketing to capitalize on the interactive potentials of live streaming.

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**Keywords:** Visual Marketing, Live Streaming, Impulse Buying, Consumer Behavior, Stimulus-Organism-Response (S-O-R) Model  
**JEL Classifications:** M31, L82

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## I . Introduction

Live streaming has emerged as a significant force in digital marketing, especially within e-commerce platforms. With advancements in internet bandwidth and technology, platforms like Douyin (TikTok), Twitch, and YouTube have soared in popularity, captivating millions of daily users. These platforms enable brands to connect with consumers in real time, offering a unique space for visual marketing. Visual marketing in live streaming includes high-quality visuals, engaging product demonstrations, and attractive graphic representations, all crucial for capturing viewer attention and enhancing the shopping experience. The effectiveness of visual stimuli, combined with real-time interaction, creates a potent environment for influencing consumer behaviors, notably impulse buying.

Impulse buying is characterized by a spontaneous and immediate purchase decision, marked by a sudden and powerful urge to buy something instantly. The context of live streaming significantly heightens impulse buying due to its real-time nature of consumer engagement. Strategies such as limited-time offers, live product demonstrations, and immediate calls to action are expertly employed to trigger emotional responses from viewers, thus increasing the likelihood of impulse purchases. The immediate feedback loop provided by live streaming, where viewers can see products, ask questions, and make purchases instantaneously, amplifies the impulsiveness of shopping decisions.

The study explores the specific impact of visual marketing strategies employed during live streaming sessions on consumer impulse buying behavior. By examining how different visual marketing tactics affect impulse purchasing, the research provides insights into consumer behavior that help marketers optimize their strategies for the live streaming environment. This is particularly relevant in today's market, where digital shopping experiences are becoming more interactive and immersive. Given the rapid growth of e-commerce and the increasing sophistication of consumer expectations, the research addresses the growing need for strategies that effectively leverage the unique dynamics of live streaming to boost sales and consumer engagement. This exploration aligns with current trends and underscores the importance of adapting marketing strategies to the evolving digital landscape.

## II . Literature Review

Previous research has highlighted the profound impact of visual marketing on consumer behavior, particularly within digital platforms. Visual marketing leverages elements such as imagery, colors, and videos to capture attention and influence consumer perceptions and decisions (Cheng, 2020). These visual elements are especially potent in live streaming, where real-time interaction and visually rich content create an engaging shopping environment that can significantly alter consumer behavior.

The Stimulus-Organism-Response (S-O-R) model, a cornerstone in environmental psychology, has been adapted to study consumer behavior in e-commerce settings. This model suggests that environmental stimuli (S) affect the internal state of the organism (O), which in turn influences the response (R), or behavior, of the individual. In the context of e-commerce, stimuli are often visual and auditory cues provided during live streaming sessions, which impact consumer emotions and cognitions, leading to various forms of consumer responses including impulse buying (Qi, 2023).

Research has extensively explored how visual cues in live streaming influence consumer behavior. Live streaming platforms provide a unique set of visual and interactive cues that are not present in traditional online shopping environments. For example, the immediacy and visual appeal of products showcased in real time can trigger emotional responses that accelerate purchasing decisions. Studies by Li, Wang, and Cao (2022) demonstrate that the social presence and real-time engagement found in live streaming can enhance the effects of visual marketing, leading to increased impulse buying. Furthermore, the dynamic interaction between streamers and the audience creates a persuasive environment where visual cues are more influential due to the heightened emotional engagement of consumers.

These findings underscore the importance of understanding and leveraging visual marketing strategies in live streaming to effectively influence consumer purchasing behaviors, aligning with the theoretical underpinnings provided by the S-O-R

model. This body of research provides a critical foundation for developing marketing strategies that capitalize on the unique characteristics of live streaming to enhance consumer engagement and drive sales.

### III .Hypotheses Development

#### 1.Theoretical Model

Enhanced S-O-R Model: Mediating and Moderating Effects in Live Streaming Visual Marketing

The advanced theoretical model integrates the classic Stimulus-Organism-Response paradigm with computational analyses to elucidate the pathways through which visual marketing elements affect consumer purchasing behavior during live streaming sessions. The model delineates the mediating role of emotional arousal and the moderating influence of cognitive assessment within this dynamic.

#### 2.Mediation by Emotional Arousal

In this model, emotional arousal is posited as a mediator that translates the impact of visual marketing stimuli into cognitive changes and subsequent buying actions. Visual stimuli, such as dynamic layouts, vibrant color schemes, and interactive influencer behaviors, are processed using computational algorithms that quantify their intensity and effects on viewers. The resultant emotional arousal is hypothesized to influence cognitive assessments of products, which in turn drives impulse buying decisions.

Mediating Effect Formula:

$$\text{CognitiveAssessment} = \gamma + \delta * \text{EmotionalArousal} + \epsilon$$

Where:

$\gamma$  (gamma) is the intercept, representing the baseline level of cognitive assessment.

$\delta$  (delta) measures the effect of Emotional Arousal on Cognitive Assessment.

$\epsilon$  (epsilon) is the error term, accounting for variability not explained by the model.

Here, EmotionalArousal acts as a mediator affecting both the direct path to ImpulseBuying and through CognitiveAssessment.

#### 3.Moderation by Cognitive Assessment

Cognitive assessment is further theorized to moderate the relationship between emotional arousal and impulse buying, suggesting that the extent of cognitive processing can influence how emotional responses translate into purchasing decisions. This moderating effect is analyzed through interaction terms in regression models, providing insights into how cognitive clarity can amplify or mitigate the impacts of emotional stimuli on purchasing behaviors.

Moderating Effect Formula:

$$\text{ImpulseBuying} = \beta_0 + \beta_1 * \text{EmotionalArousal} + \beta_2 * \text{CognitiveAssessment} + \beta_3 * (\text{EmotionalArousal} * \text{CognitiveAssessment}) + \epsilon$$

Where:

$\beta_0$  (beta zero) is the intercept.

$\beta_1$  (beta one) quantifies the effect of Emotional Arousal on Impulse Buying.

$\beta_2$  (beta two) quantifies the effect of Cognitive Assessment on Impulse Buying.

$\beta_3$  (beta three) measures the interaction effect, indicating how Cognitive Assessment moderates the impact of Emotional Arousal.

$\epsilon$  (epsilon) is the error term.



This formula captures the interaction between Emotional Arousal and Cognitive Assessment, highlighting how cognitive clarity affects the translation of emotional stimuli into purchasing decisions.

#### 4. Development of Hypotheses

This study posits a series of hypotheses aimed at exploring the dynamics of consumer responses to visual marketing in live streaming contexts. These hypotheses are grounded in the Stimulus-Organism-Response (S-O-R) model and tailored to address specific interactions between visual stimuli, emotional arousal, cognitive assessment, and consumer behavior.

**Hypothesis 1 (H1)** concerns the role of visual marketing elements—such as color intensity, layout dynamics, and influencer interactions—in enhancing consumer emotional arousal. It is proposed that these elements significantly captivate attention and stimulate emotional responses, which are crucial for maintaining viewer engagement and enhancing the perceptual experience.

**Hypothesis 2 (H2)** explores the impact of this enhanced emotional arousal on consumers' cognitive assessment of the products being presented. The hypothesis asserts that a heightened emotional state can positively influence the cognitive evaluations of products, as emotionally engaged consumers are more likely to absorb and react positively to product details.

**Hypothesis 3 (H3)** extends this relationship to the realm of impulse buying behavior, suggesting that positive cognitive assessments directly increase the likelihood of impulse purchases during live streams. This relationship underscores the importance of cognitive factors in the purchasing process, particularly under conditions that favor quick decision-making typical of live streaming environments.

**Hypothesis 4 (H4)** examines the mediating role of emotional arousal between the initial visual stimuli and the ultimate buying behavior. This hypothesis posits that emotional arousal serves as a crucial mediator, transmitting the influence of visual marketing on impulse buying both directly and through its impact on cognitive assessment.

**Hypothesis 5 (H5)** introduces a moderating variable, cognitive assessment, into the model. It proposes that the degree to which emotional arousal affects impulse buying is contingent upon the level of cognitive clarity consumers possess about the product. This suggests that consumers with a higher cognitive understanding of a product are more likely to convert their emotional responses into purchase actions effectively.

Together, these hypotheses aim to delineate the pathways through which visual marketing strategies deployed during live streaming can influence consumer behavior. By testing these hypotheses, the study seeks to provide actionable insights into how marketers can optimize visual cues to enhance consumer engagement and drive sales effectively in live streaming settings. The outcomes of these hypotheses could offer substantial contributions to both academic research and practical applications in digital marketing strategies tailored for live streaming platforms.

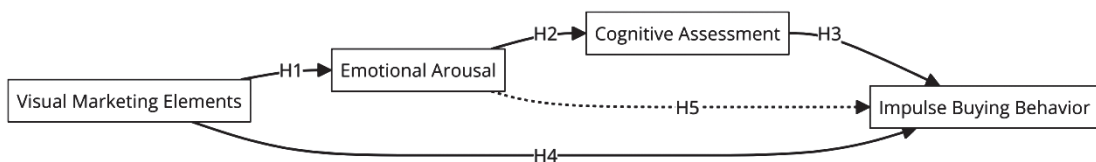


Figure 1. Research Model

## **IV . METHODOLOGY**

### **1.Measurement Development**

The survey was structured into two sections. The first section captured demographic information from the participants, while the second section consisted of the main survey questions, which were designed to investigate the impact of visual marketing on impulse buying during live streaming sessions on Douyin. The survey incorporated several variables informed by well-established scales from previous research to ensure the validity of the constructs measured. Items were formatted using a five-point Likert scale, ranging from one (strongly disagree) to five (strongly agree), to gauge the intensity of respondents' agreement or disagreement with the statements. To maintain the survey's relevance across language barriers, the questionnaire, originally developed in Chinese, underwent a meticulous back-translation process to ensure its accuracy and applicability in English contexts. A pilot test with a subset of participants ensured that the survey items were clear and unambiguous.

### **2.Data Collection**

Data was collected via a professional online survey platform suitable for the target demographic in China ([www.wjx.cn](http://www.wjx.cn)). The target respondents were active consumers who had previously engaged with live streaming platforms and participated in e-commerce activities. To ensure that the responses were from the intended audience, a screening question was included at the beginning of the survey: "Have you ever made a purchase during a live streaming session?" Participants who responded negatively were automatically excluded from further sections of the survey. The survey aimed to motivate participation by offering a small monetary incentive, randomly awarding a red envelope worth between 1-5 RMB upon completion of the survey. Over the data collection period, a robust total of 1,528 responses were gathered. The integrity of the responses was safeguarded by excluding incomplete surveys or those that displayed uniform answers across all questions. Additionally, IP address checks were conducted to prevent multiple submissions from the same respondent.

### **3.Data Analysis**

This study employed IBM SPSS 20.0 for initial statistical analysis to process and analyze the survey data collected from 1,528 participants. Statistical procedures included frequency analysis, descriptive statistics, and inferential statistics to determine the relationships between visual marketing elements and impulse buying behaviors during live streaming sessions on Douyin.

#### **3.1Descriptive Statistics of Respondents' Characteristics**

Below is the breakdown of the demographic characteristics of the survey respondents, formatted similarly to your example for clarity:

**Table 1.** Descriptive Statistics of Respondents' Characteristics

Demographic	Category	Samples (%)
Gender	Male	727 (47.58%)
	Female	801 (52.42%)
Age	18-24	432 (28.27%)
	25-34	355 (23.23%)
	35-44	328 (21.47%)
	45-54	336 (21.99%)
	55-64	35 (2.29%)
	65 and above	42 (2.75%)
Occupation	Student	275 (18%)
	Professional	331 (21.66%)
	Technician	425 (27.81%)
	Other	497 (32.53%)
Education	High School or less	243 (15.9%)
	Some College	351 (22.97%)
	Bachelor's Degree	453 (29.65%)
	Graduate Degree	481 (31.48%)
Online Shopping Frequency	Less than once a month	284 (18.59%)
	1-3 times a month	692 (45.29%)
	More than 3 times a month	552 (36.13%)
Monthly Income	Less than 3000 RMB	147 (9.62%)
	3000-5000 RMB	356 (23.3%)
	5000-8000 RMB	427 (27.95%)
	8000-12000 RMB	385 (25.2%)
	More than 12000 RMB	213 (13.94%)

## 4.Results

The study conducted Pearson correlation analysis to verify the hypotheses regarding the impact of visual marketing elements in live streaming on consumer impulse buying behavior. The analysis included various visual elements such as colors, layout, and interactions with influencers.

Hypothesis H1 Analysis:

**Table 2.** Correlation analysis between visual marketing and consumer psychological process

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1												
2	0.688**	1											
3	0.676**	0.654**	1										
4	0.674**	0.623**	0.641**	1									
5	0.679**	0.634**	0.623**	0.614**	1								
6	0.676**	0.641**	0.650**	0.646**	0.624**	1							
7	0.684**	0.661**	0.656**	0.639**	0.664**	0.659**	1						
8	0.509**	0.483**	0.493**	0.466**	0.478**	0.481**	0.493**	1					
9	0.438**	0.430**	0.437**	0.422**	0.411**	0.414**	0.426**	0.685**	1				
10	0.452**	0.451**	0.435**	0.433**	0.421**	0.429**	0.443**	0.700**	0.679**	1			
11	0.454**	0.452**	0.433**	0.430**	0.421**	0.421**	0.448**	0.695**	0.656**	0.640**	1		
12	0.428**	0.417**	0.421**	0.414**	0.417**	0.397**	0.455**	0.687**	0.633**	0.654**	0.656**	1	
13	0.473**	0.457**	0.430**	0.438**	0.443**	0.435**	0.448**	0.694**	0.639**	0.655**	0.650**	0.634**	1

\* p<0.05 \*\* p<0.01

Hypothesis H1 explored the impact of visual marketing elements—color intensity, layout dynamics, and influencer interactions—on consumer emotional arousal during live streaming on Douyin. The analysis affirmed that these visual elements significantly enhance emotional arousal.

Supporting data from Pearson correlation analysis indicated strong positive correlations between these elements and increased emotional arousal. Notably:

Diversity in product offerings and the comprehensiveness of product information exhibited a correlation coefficient of 0.688 ( $p < 0.01$ ).

Viewer interest, stimulated by live stream advertisements, correlated positively with both product diversity and information richness.

Hypothesis H1 suggested that visual marketing elements like color, layout, and influencer interaction positively enhance consumer emotional arousal. The correlation analysis supported this hypothesis, showing significant positive correlations between these elements and consumer emotional arousal.

Hypothesis H2 Analysis:

**Table 3.** Correlation analysis of consumer psychological process and cognitive assessment

	14	15	16	8	9	10	11	12	13
14	1								
15	0.715**	1							
16	0.704**	0.669**	1						
8	0.518**	0.492**	0.475**	1					
9	0.487**	0.477**	0.460**	0.685**	1				
10	0.494**	0.468**	0.438**	0.700**	0.679**	1			
11	0.471**	0.467**	0.429**	0.695**	0.656**	0.640**	1		
12	0.490**	0.475**	0.452**	0.687**	0.633**	0.654**	0.656**	1	
13	0.486**	0.467**	0.435**	0.694**	0.639**	0.655**	0.650**	0.634**	1

\* p<0.05 \*\* p<0.01

Hypothesis H2 proposed that emotional arousal positively influences consumers' cognitive assessment of products during live streaming sessions. The empirical analysis drew on Pearson correlation metrics to assess the relationships between emotional responses elicited by visual stimuli and the cognitive evaluations made by viewers.

The findings, detailed in Table 3, support Hypothesis H2 by demonstrating significant positive correlations between measures of emotional arousal and cognitive assessments. Key results include:

High correlation coefficients between indicators of emotional arousal and positive cognitive assessments. For instance, the correlation between satisfaction derived from visual stimuli (Indicator 8) and comprehensive product information understanding (Indicator 15) was 0.715 (p<0.01).

Similarly, the perception of product features through live streaming demonstrations (Indicator 16) showed a robust correlation of 0.704 with the overall satisfaction index (Indicator 8), reinforcing the link between detailed product demonstrations and enhanced cognitive assessments.

Hypothesis H2 posited that consumer emotional arousal would positively affect their cognitive assessment of live streaming products. The results confirmed this relationship, indicating that heightened emotional arousal leads to a more favorable cognitive evaluation of the products showcased during live streaming sessions .

Hypothesis H3 Analysis:

**Table 4.** Correlation analysis between cognitive assessment and impulse purchase intention

	14	15	16	17	18	19
14	1					
15	0.715**	1				
16	0.704**	0.669**	1			
17	0.464**	0.450**	0.435**	1		
18	0.414**	0.412**	0.404**	0.694**	1	
19	0.446**	0.407**	0.401**	0.690**	0.680**	1

\* p<0.05 \*\* p<0.01

Hypothesis H3 examined the influence of cognitive assessment on impulse buying behavior, positing that a detailed and positive cognitive evaluation of products during live streaming would significantly enhance impulse buying tendencies. The Pearson correlation analysis conducted to test this hypothesis utilized data presented in Table 4, which demonstrated significant positive correlations between cognitive assessments and impulse buying intentions.

Key observations from the analysis include:

A robust correlation between the thorough understanding of product information (Indicator 14) and the immediate desire to own the product upon viewing (Indicator 17), with a coefficient of 0.464 ( $p < 0.01$ ).

The clarity with which products were presented and understood (Indicator 15) also showed a strong positive correlation with the stimulation of purchase desire (Indicator 18), evidenced by a correlation coefficient of 0.412 ( $p < 0.01$ ).

Additionally, the comprehensive demonstration of product features (Indicator 16) correlated positively with spontaneous purchasing inclinations, even when those purchases were not pre-planned (Indicator 19), with a coefficient of 0.401 ( $p < 0.01$ ).

The third hypothesis, H3, stated that the consumer's cognitive assessment would positively impact their impulse buying behavior. This hypothesis was also supported, as the analysis revealed significant positive effects of cognitive assessment on impulse buying intentions. These findings underscore the importance of providing detailed product information and engaging presentations to enhance consumer purchase intentions .

Hypothesis H4 Analysis:

**Table 5.** Analysis of the total mediating effect of consumer emotion stimulation

	Impulse Buying Intention					Consumer Psychological Process					Impulse Buying Intention				
	B	Standard Error	t	p	$\beta$	B	Standard Error	t	p	$\beta$	B	Standard Error	t	p	$\beta$
Constant	1.753**	0.117	14.975	0.000	-	1.689**	0.103	16.320	0.000	-	1.068**	0.118	9.012	0.000	-
Visual Marketing	0.616**	0.023	26.553	0.000	0.562	0.636**	0.020	31.020	0.000	0.622	0.358**	0.028	12.936	0.000	0.327
Consumer Psychological Process											0.406**	0.027	15.010	0.000	0.379
R2			0.316					0.387					0.404		
Adjusted R <sup>2</sup>			0.316					0.386					0.403		
F Value		F (1,1526)=705.038,p=0.000					F (1,1526)=962.227,p=0.000					F (2,1525)=516.982,p=0.000			
	* p<0.05 ** p<0.01														

Hypothesis H4 was premised on the mediating role of consumer emotional arousal in the transmission of the effects of visual marketing elements on impulse buying behavior. The mediation analysis, conducted with a sample size of 1528 participants, provided insights into the complex dynamics at play.

The analysis confirmed that emotional arousal partially mediates the relationship between visual marketing elements and impulse buying. The findings indicated that visual marketing, through the mechanism of emotional arousal, has a significant positive influence on impulse buying intentions. Specifically, the standardized regression coefficient for visual marketing was substantial ( $B=0.616$ ,  $p < 0.01$ ), reinforcing the assumption that enhancements in visual marketing are correlated with

increases in impulse buying intentions.

According to the analysis results of intermediary effects shown in the above table, the regression equations of the following three models can be obtained:

1. Impulse purchase intention model:

$$\text{Impulse purchase intention} = 1.753 + 0.616 * \text{Visual marketing}$$

This model shows that visual marketing elements have a significant positive impact on impulse purchase intention, where the regression coefficient 0.616 indicates that there is a positive correlation between the increase of visual marketing and the increase of impulse purchase intention.

2. Consumer psychological process model:

$$\text{Consumer psychological process} = 1.689 + 0.636 * \text{Visual marketing}$$

In this model, visual marketing elements also have a significant positive impact on consumer psychological process, and the regression coefficient 0.636 emphasizes the role of visual marketing in shaping consumer psychological process.

3. Complete model of impulse purchase intention (including mediating variables) :

$$\text{Impulse purchase intention} = 1.068 + 0.358 * \text{Visual marketing} + 0.406 * \text{Consumer psychological process}$$

This model considers the combined influence of visual marketing elements and consumer psychological process on impulse purchase intention. Among them, the regression coefficient of visual marketing is 0.358, indicating that visual marketing elements still have a significant impact on impulse purchase intention even after controlling for consumer psychological processes. At the same time, the regression coefficient of consumer psychological process is 0.406, which confirms the mediating role of consumer psychological process between visual marketing elements and impulse purchase intention.

H4 hypothesized that consumer emotional arousal mediates the relationship between visual marketing elements and impulse buying behavior. The mediation analysis indicated that emotional arousal does play a partial mediating role, suggesting that enhancing visual marketing elements can effectively boost consumer emotional responses, which in turn can lead to increased impulse buying .

Hypothesis H5 Analysis:

Hypothesis H5 posited that cognitive assessment would moderate the effect of emotional arousal on impulse buying behavior. This hypothesis was examined through moderation analyses, which included variables representing the clarity of product information and its presentation during Douyin live streams.

Tables 6, 7, and 8 display the results of these moderation analyses, with separate models reflecting the nuanced roles that different aspects of cognitive assessment play as moderating variables. In each table, 'B' denotes the unstandardized regression coefficients, 'Standard Error' the associated standard errors, 't' the t-statistics, 'p' the p-values indicating the significance levels, and 'β' the standardized regression coefficients. The constants listed across the models represent the baseline values of the dependent variable, impulse buying intention, when predictors are at zero.

Each model considered the interaction between emotional arousal (as measured by the consumer psychological process) and cognitive assessment (as indicated by the thoroughness of product information, clarity of product understanding, and product demonstration comprehension).

When "I think the product information displayed in Tiktok live is exhaustive." As a regulating variable

**Table 6.** Analysis of the moderating effects of cognitive assessment I

	Module 1					Module 2					Module 3				
	B	Standard Error	t	p	$\beta$	B	Standard Error	t	p	$\beta$	B	Standard Error	t	p	$\beta$
Constant	4.763	0.029	165.422	0.000**	-	4.763	0.028	170.308	0.000**	-	4.683	0.032	147.640	0.000**	-
Consumer psychological process	0.623	0.022	27.954	0.000**	0.582	0.476	0.027	17.906	0.000**	0.444	0.500	0.027	18.680	0.000**	0.466
I think the product information displayed in Tiktok live broadcast is exhaustive						0.217	0.023	9.617	0.000**	0.238	0.235	0.023	10.376	0.000**	0.258
Consumer psychological process* I think the product information displayed in Tiktok live broadcast is exhaustive											0.070	0.014	5.174	0.000**	0.110
R 2			0.339					0.376					0.387		
Adjusted R <sup>2</sup>			0.338					0.376					0.386		
F Value			F (1,1526)=781.453,p=0.000					F (2,1525)=460.390,p=0.000					F (3,1524)=321.037,p=0.000		
$\Delta$ R 2			0.339					0.038					0.011		
$\Delta$ F Value			F (1,1526)=781.453,p=0.000					F (1,1525)=92.481,p=0.000					F (1,1524)=26.772,p=0.000		
Dependent variable: impulse purchase intention															
* p<0.05 ** p<0.01															

The model revealed that the thoroughness of product information significantly moderated the relationship between emotional arousal and impulse buying intention. The interaction term between emotional arousal and the thoroughness of product information was significant, indicating a stronger impact on impulse buying when consumers perceived product information as comprehensive.

When "I can clearly understand the features and advantages of the product through Tiktok live streaming." As a regulating variable



**Table 7.** Analysis of the moderating effects of cognitive assessment2

<b>Results of mediation analysis (n=1528)</b>															
	Module 1					Module 2					Module 3				
	B	Standard Error	t	p	β	B	Standard Error	t	p	β	B	Standard Error	t	p	β
Constant	4.763	0.029	165.422	0.000**	-	4.763	0.028	169.601	0.000**	-	4.711	0.032	148.801	0.000**	-
Consumer psychological process	0.623	0.022	27.954	0.000**	0.582	0.493	0.026	18.791	0.000**	0.460	0.505	0.026	19.154	0.000**	0.472
I can clearly understand the features and advantages of the product through Tiktok live broadcast.						0.190	0.021	8.893	0.000**	0.218	0.203	0.022	9.379	0.000**	0.232
Consumer psychological process * I can clearly understand the features and advantages of products through Tiktok live broadcast.											0.045	0.013	3.457	0.001**	0.074
R 2			0.339					0.371					0.376		
Adjusted R <sup>2</sup>			0.338					0.370					0.375		
F Value		F (1,1526)=781.453,p=0.000					F (2,1525)=450.261,p=0.000					F (3,1524)=306.311,p=0.000			
△ R 2			0.339					0.033					0.005		
△ F Value		F (1,1526)=781.453,p=0.000					F (1,1525)=79.083,p=0.000					F (1,1524)=11.948,p=0.001			
Dependent variable: impulse purchase intention															
* p<0.05 ** p<0.01															

The clarity of consumers' understanding of product features and advantages also moderated the effect of emotional arousal on impulse buying. The interaction term was significant, underscoring that clear and understandable product presentations strengthen the impact of emotional arousal on the likelihood of making an impulse purchase.

When "the product demo provided by Tiktok Live gave me a full understanding of the performance of the product." As a regulating variable

**Table 8.** Analysis of the moderating effects of cognitive assessment3

	Module 1					Module 2					Module 3				
	B	Standard Error	t	p	$\beta$	B	Standard Error	t	p	$\beta$	B	Standard Error	t	p	$\beta$
Constant	4.763	0.029	165.422	0.000**	-	4.763	0.028	169.805	0.000**	-	4.698	0.031	150.689	0.000**	-
Consumer psychological process	0.623	0.022	27.954	0.000**	0.582	0.500	0.026	19.554	0.000**	0.467	0.516	0.026	20.126	0.000**	0.482
The product demonstration provided by Tiktok Live broadcast gave me a full understanding of the performance of the product.						0.196	0.021	9.107	0.000**	0.218	0.211	0.022	9.757	0.000**	0.234
Consumer psychological process * The product demonstration provided by Tiktok Live has given me a full understanding of the performance of the product.											0.062	0.013	4.635	0.000**	0.097
R 2			0.339					0.373					0.381		
Adjusted R <sup>2</sup>			0.338					0.372					0.380		
F Value			F (1,1526)=781.453,p=0.000					F (2,1525)=453.178,p=0.000					F (3,1524)=313.338,p=0.000		
$\Delta$ R 2			0.339					0.034					0.009		
$\Delta$ F Value			F (1,1526)=781.453,p=0.000					F (1,1525)=82.941,p=0.000					F (1,1524)=21.485,p=0.000		
Dependent variable: impulse purchase intention															
* p<0.05 ** p<0.01															

Finally, the extent to which product demonstrations facilitated a full understanding of product performance significantly moderated the influence of emotional arousal on impulse buying. Again, the interaction term's significance suggested that when demonstrations effectively convey product attributes, the emotional arousal's effect on impulse buying is amplified.

The results across these tables consistently supported Hypothesis H5, confirming the moderating role of cognitive assessment in the pathway from emotional arousal to impulse buying behavior. The findings underscore the importance of delivering clear and comprehensive product information through live streaming to enhance consumer purchase intentions.

## V . Discussion

This study delves into the intricate relationship between visual marketing elements and consumer impulse buying behavior within the context of e-commerce live streaming. Drawing upon the Stimulus-Organism-Response (S-O-R) model, our research provides a nuanced understanding of the psychological processes that underpin this dynamic interaction.

The mediating role of emotional arousal was substantiated, showcasing its critical position in the pathway from visual stimuli to consumer cognitive assessment, and ultimately, to impulse buying. The findings reveal that visual marketing elements such as layout, color, and influencer interaction, significantly bolster emotional arousal, which in turn, enhances the cognitive assessment of the products. This cognitive reassessment, influenced by heightened emotional arousal, manifests in an increased propensity for impulse buying. Such an effect emphasizes the need for marketers to design live streaming sessions that strategically deploy visual cues to cultivate an emotionally charged shopping environment.

Furthermore, the moderating effect of cognitive assessment was also confirmed, suggesting that when consumers have a clear and comprehensive understanding of the product, the influence of emotional arousal on impulse buying behavior is potentiated. This result points to the importance of providing detailed product demonstrations and information during live streams, which not only inform the consumer but also catalyze the emotional drive towards making a purchase.

The study's outcomes underscore the efficacy of visual marketing strategies in live streaming and the importance of crafting experiences that align with consumers' cognitive and emotional faculties. The implications for marketers in e-commerce platforms are clear: by harnessing the interplay of visual stimuli and consumer psychology, they can significantly influence buying behaviors.

While the results are compelling, limitations exist, such as the potential for self-selection bias and the specificity of the consumer sample to the Douyin platform. Future research could extend to cross-platform studies and explore additional variables that may influence impulse buying in live streaming contexts.

In conclusion, the research enriches the discourse on visual marketing in live streaming by evidencing the psychological undercurrents that drive consumer behavior. It lays a foundation for future explorations and practical applications in digital marketing strategies, tailored for the immediacy and interactivity that define live streaming commerce.

## VI . Conclusion

The conclusion of the research encapsulates the profound influence of visual marketing in live e-commerce streaming on consumer impulse buying behavior. Utilizing a robust Stimulus-Organism-Response (S-O-R) framework, the study dissects the complex interplay between visual cues and the psychological processes that culminate in purchasing decisions.

Central to the study's findings is the pivotal role of emotional arousal as a mediator, which amplifies the impact of visual stimuli on consumers' cognitive assessments and, consequently, on their impulsive purchasing tendencies. The data indicates that dynamic and engaging visual marketing can successfully translate into heightened emotional responses, which in turn foster favorable cognitive evaluations and spur impulse buying.

Moreover, cognitive assessment's moderating role is equally significant, revealing that the clarity and comprehensiveness of product information can magnify the effects of emotional arousal, enhancing the likelihood of impulse purchases. This insight underscores the importance of live streams delivering detailed and transparent product demonstrations to potentiate consumers' emotional impulses towards making purchases.

The study's implications for e-commerce platforms are clear: leveraging the synergetic effects of visual stimuli and consumer psychology can dramatically sway buying behaviors. For digital marketers, the message is to strategize visual

marketing that taps into the immediacy and interactivity unique to live streaming, aligning with the consumers' cognitive processes and emotional states to drive sales.

Despite the compelling findings, the study acknowledges its limitations, including potential self-selection bias and the specific consumer demographics associated with the Douyin platform. Future research directions may include a broader cross-platform approach and the exploration of additional factors influencing impulse buying in the realm of live streaming.

In sum, this research contributes valuable insights into the strategic use of visual marketing within live e-commerce streaming, providing a framework for future academic and practical endeavors in the evolving landscape of digital consumerism. It underscores the burgeoning significance of crafting interactive, visually stimulating experiences that align with consumer psychology to foster impulsive buying in the digital era.

## APPENDIX

Number	Items	Source
1	Douyin Live offers a wide variety of products	Kurniawan & Nugroho 2024
2	Comprehensive product information is provided during Douyin Live	Huo et al. 2023
3	Douyin Live advertisements have sparked my interest in the merchant and advertised products	Huang & Suo 2021
4	Discount promotions in Douyin Live easily stimulate my desire to buy	Liu 2023
5	I like the visual experience and design of Douyin Live	Huang & Suo 2021
6	The way products are displayed in Douyin Live is attractive	Huo et al. 2023
7	The interface design of the Douyin Live room has good visual effects	Liu 2023
8	The visual stimuli in Douyin Live make me feel satisfied	Huang & Suo 2021
9	The visual stimuli in Douyin Live make me feel happy	Liu 2023
10	The visual stimuli in Douyin Live give me a homely feeling	Refasa et al. 2023
11	The visual stimuli in Douyin Live make me feel excited	Kurniawan & Nugroho 2024
12	The visual stimuli in Douyin Live make me feel excited	Huo et al. 2023
13	The visual stimuli in Douyin Live make me feel excited	Widyastuti 2023
14	I think the product information displayed in Douyin Live is exhaustive	Yiqi Yu et al. 2022
15	I can clearly understand the features and advantages of products through Douyin Live	N. Zhang et al. 2023
16	The product demonstrations provided by Douyin Live gave me a full understanding of the product's performance	Xingyang Lv et al. 2022
17	As soon as I see items on the Douyin booth, I immediately want to own them	Huang & Suo 2021
18	When I see this product in the Douyin studio, it stimulates my desire to buy	Liu 2023
19	When I see certain items in the Douyin studio, I want to buy them, even if they are not in my buying plan	Refasa et al. 2023

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# An Empirical Study on the Development of New Energy Vehicle Technology and Consumer Car Purchase Behavior

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## Abstract

**Purpose** – The empirical study of the development of new energy vehicle technology on consumers' car purchasing behavior is an important and prospective topic. With the increasing awareness of environmental protection and the increasing importance of sustainable energy development, consumers' willingness to purchase new energy vehicles is gradually increasing. This study aims to explore the impact of the development of new energy vehicle technology on consumer behavior in choosing new energy vehicles, while considering the mediating effect of consumer product attitudes on car buying behavior. Under the concept of green and sustainable development, new energy vehicle technology, as an independent factor, has a direct impact on consumer behavior in choosing new energy vehicles.

**Design/Methodology/Approach** – Firstly, a comprehensive literature review is conducted on the development of new energy vehicle technology, product attitudes, and consumer purchasing behavior. Based on the evidence and logical chain of previous research, it provides a theoretical basis for proposing research hypotheses and models, and ensures that the research design is built on a solid foundation. Finally, a questionnaire survey was used to conduct empirical analysis on the collected and organized 232 valid data, and linear regression analysis was conducted using SPSS 27.0 to draw conclusions.

**Findings** – According to empirical research results, it is indicated that: The development of new energy vehicle technology has a positive impact on consumer car buying behavior; The development of new energy vehicle technology has a positive impact on consumer attitudes; Consumer attitudes play a mediating role between the development of new energy vehicle technology and consumer car buying behavior.

**Research Implications** – With the advancement of new energy vehicle technology, consumers need to make more detailed comparisons and evaluations between traditional fuel vehicles and new energy vehicles when purchasing cars. This is of great significance for understanding consumer decision-making processes and preferences, and also provides reference opinions for the development of new energy enterprises. In addition, the promotion and popularization of new energy vehicles will also be influenced by consumer purchasing behavior. Therefore, studying consumer acceptance and willingness to purchase new energy vehicles can provide important references for the development of the green industry.

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**Keywords:** New Energy Vehicle Technology, New Energy Technology, Product Attitudes, Consumer Purchasing Behavior, Empirical Study

**JEL Classifications:** Q41, L60, Q54, R41, D12

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## I . Introduction

As an important pillar industry of the national economy, the vehicle industry plays a crucial role in the development of the national economy. The rapid development of new energy vehicle technology has had a profound impact on the market share of the vehicle industry. With the global emphasis on sustainable development and the increasing awareness of environmental protection among consumers, new energy vehicles as substitutes for traditional fuel vehicles are gradually being favored by consumers. This article aims to explore the impact of the promotion of new energy vehicle technology on the market share of the vehicle industry through empirical research, in order to provide a basis and reference for relevant decision-making.

## II . Literature review

With the advancement of the "dual carbon" goal, new energy technologies have attracted much attention, such as the application of solar energy, wind energy, biomass energy, tidal energy, and geothermal energy technologies, which make important contributions to energy conservation and emission reduction. At the same time, it has also pointed out that new energy technologies still face some challenges, such as economic feasibility, investment return rate, energy storage technology, and energy conversion efficiency. (Li Qiong, Lv Ling, Qian Weiping, 2023).

New energy vehicle technology is a method of producing energy using renewable or clean resources. Especially within the framework of the concept of green and sustainable development, in order to achieve resource conservation and reduce environmental pollution in the process of industrial production development, promoting industrial integration and development has become a new trend in the industry's development (Yu Xiaoning, Yang Yanwei, 2023).

Wang Zhe (2024) believes that the Chinese government's support and investment in the new energy vehicle industry have promoted the rapid improvement of the technological level of domestic cars in the field of new energy vehicles. Through policy support and financial investment, Chinese new energy vehicle companies have made significant breakthroughs in the core areas of "three electric", such as battery technology, motor technology, and electronic control technology, which is improving the performance and competitiveness of the entire vehicle. These measures have laid a solid foundation for the development of China's new energy vehicle industry and injected more vitality into the global new energy vehicle market.

From the perspective of psychological perception, some scholars believe that attitude is an emotion obtained before making a decision, which is the evaluation feeling that an individual can maintain towards a specific object over a period of time (Schiffman L G, Kanuk L L, 2003).

And some scholars also have conducted research from an external perspective and believe that the media, social platforms, and reputation of enterprise products in the dissemination process have an impact on consumer attitudes (Du Weiqiang, Yu Chunling, Zhao Ping, 2011).

Liu Chunling, Sun Biao, and others (2023) believe that in the increasingly fierce market competition and diversified market demand, new energy vehicles not only face competition from traditional fuel vehicles, but also competition among new energy vehicle enterprises. Therefore, marketing strategies driven by consumer psychological behavior have become particularly important for new energy vehicles.

Product attitude refers to the evaluation and emotional inclination of consumers towards a specific product or service, which may be influenced by various factors such as product quality, function, price, brand image, etc. Consumer product attitude can affect their purchase intention and behavior. Therefore, research on product attitude is of great significance for marketing and consumer behavior in the new energy vehicle market. The meaning of product attitude in this article is the emotional inclination of consumers towards the choice of new energy vehicles.

Liu Chunling and Sun Biao et al. (2023) found in the optimal control decision of the new energy vehicle supply chain based on consumer purchasing behavior that the reference price effect has a positive impact on the technological innovation level, advertising promotion level, and consumer satisfaction of new energy vehicle manufacturers, and can improve the profits of the entire supply chain.

Tang Wendi and Yu Sitong et al. (2024) conducted a multiple linear regression analysis on the influencing factors of residents' willingness to purchase new energy vehicles in 16 prefecture level cities in Shandong Province, and found that the various influencing factors included in the two variables of attitude and behavioral intention have a direct positive impact on the willingness to purchase new energy vehicles.

Car buying behavior includes a series of behaviors such as evaluating, comparing, selecting, and making purchasing decisions for different car brands and types. Car buying behavior is influenced by various factors such as individual consumer needs, preferences, economic conditions, and social influences. Therefore, research on car buying behavior is of great significance for the vehicle industry and marketing. The definition of car buying behavior in this study is the behavior and decision-making process of consumers choosing new energy vehicles when purchasing a car.

### III .Theoretical models and research hypotheses

#### 1.Theoretical models

This study aims to explore the impact of the development of new energy vehicle technology on consumer behavior in choosing new energy vehicles(For the convenience of research, the behavior of consumers choosing new energy vehicles is referred to as car buying behavior.), while considering the mediating effect of consumer attitudes on car purchasing behavior. Under the concept of green and sustainable development, new energy vehicle technology can have a direct impact on consumer behavior in choosing new energy vehicles as an independent factor.

The theoretical model is as follows:

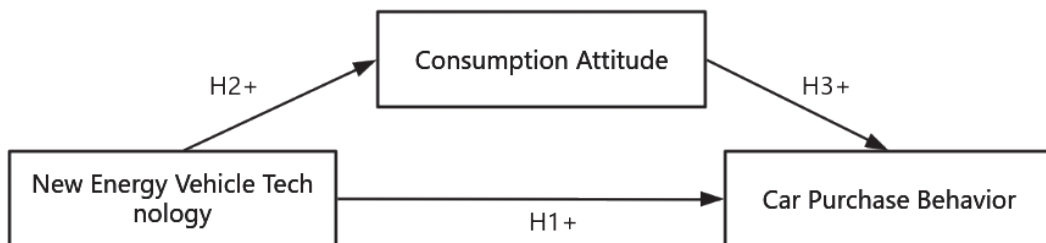


Figure 1. Theoretical Model

#### 2.Research hypotheses

According to the theoretical modeling framework, the following hypotheses are derived:

H1: The development of new energy vehicle technology has a positive influence on consumer car buying behavior.

H2: The development of new energy vehicle technology has a positive influence on consumer attitudes.

H3: Consumer attitudes play a mediating role between the development of new energy vehicle technology and consumer car buying behavior.

## **IV . Empirical research**

This article studies the relationship between the development of new energy vehicle technology, consumer attitudes, and consumer behavior intentions, therefore it is a correlation study. In a natural, non-artificial environment, the field research is conducted in the form of a questionnaire, and the analysis unit is the individual.

### **1.Definition and measurement of variables**

The development of new energy vehicle technology (dependent variable): With the rapid development of global new energy vehicle technology, several new energy vehicle technologies, including energy-saving vehicle technology, pure electric and plug-in hybrid vehicle technology, fuel cell vehicle technology, intelligent connected vehicle technology, power battery technology, lightweight technology, and vehicle manufacturing technology, were set up to seven question items. By setting each question in three aspects of the speed, scale, and innovation of the development of new energy vehicle technology, the detailed situation of each technology is reflected. This study tests the dependent variable of this dimension through seven question items.

Consumer attitude (mediating variable): By understanding new energy knowledge, four dimensions were selected, namely Cognitive Dimension, Affective Dimension, Behavioral Intention Dimension, and Behavioral Dimension, to explain green consumption attitude. There are a total of 10 mediating variables. Among them, there are 2 items in the cognitive dimension, 2 items in the emotional dimension, 3 items in the behavioral intention dimension, and 3 items in the behavioral dimension. Consumer perception of products or services, including product features, brand image, functionality, and performance.

Consumer car buying behavior is taken as the dependent variable. When conducting item analysis, three variables are selected from the aspects of consumer decision-making process, preference influencing factors, and actual actions taken: purchase intention intensity, brand preference, and actual purchase behavior.

### **2.Questionnaire design**

The survey questionnaire includes two aspects: first, the main part of the questionnaire, which includes understanding of the development of new energy vehicle technology, willingness to consume in the automotive industry, and attitudes towards consumption of new energy vehicles; the second is the basic sample demographic information. The questionnaire uses a Likert five component scale, with scores ranging from 1 to 5 for "strongly disagree", "strongly disagree", "uncertain", "somewhat agree", and "strongly agree". The lower the score, the lower the level of agreement for that item. On the contrary, the degree of agreement is higher.

Sampling method and sample description: the research environment is field research, and questionnaires are distributed through low intervention. The survey targets some employees of enterprises and community residents in Shandong, China, and the survey targets are representative.

A total of 250 questionnaires were distributed in this survey, and 232 valid questionnaires were received with an effective response rate of 92.8%. The basic demographic indicators are shown in Table 4.1.

From Table 4.1, it can be seen that the gender ratio distribution of the sample is uniform, and the age range is also between 19 and 40 years old, mostly younger. The educational background is also high school, college diploma, undergraduate or above, with a certain educational background and a high level of acceptance of new technologies. More than 90% of the total sample population have an income of over 3000 yuan. Therefore, the sample size of the questionnaire survey is reasonable and has certain representative significance for the research in this article.

At the same time, all valid questionnaires collected were numbered, and data analysis was conducted using SPSS 27.0 software.

**Table 1.** Basic sample demographic indicators (N=232)

Sample characteristics	Feature Description	frequency	Mode	percentage %
Gender	A. male	122	A	52.6
	B. female	110		47.4
Age	A. Under 18 years old	20	C	8.62
	B.19-25 years old	30		12.9
	C.26-30 years old	63		27.2
	D.31-40 years old	77		33.2
	E.41 years old and above	52		22.4
qualification	A.Junior high school and below	14	C	6
	B. High school, technical secondary school, vocational high school	86		37.1
	C. Undergraduate, associate, and vocational education	114		49.1
	D. Master's degree or above	18		7.8
monthly income	A. 1000 yuan and below	8	B	3.4
	B.1001—3000 yuan	32		13.7
	C.3001 —5000 yuan	56		24.1
	D.5001 -8000 yuan	44		19.0
	E.8001-10000 yuan	64		27.6
	F.10001 yuan and above	52		22.4
	total	232	-	100.0

## V . Data analysis

### 1.Validity testing

Using SPSS 27.0 software, factor analysis was conducted on the development of new energy vehicle technology and consumer attitudes towards products, as well as the willingness to purchase green energy vehicles. The KMO of green product information was  $0.836 > 0.8$ , and the Bartlett sphericity test value was significant ( $p < 0.05$ ), meeting the prerequisite conditions for factor analysis. A total of 2 common factors were extracted, with the first factor explaining 42.396% of the total variance of the original item, the second factor explaining 27.926% of the total variance of the original item, and the cumulative ratio of the two factors explaining 71.322% of the total variance of the original item. According to data analysis, the load of all items on the common factor of consumer attitude and willingness to purchase new energy vehicles exceeds 0.5, indicating that convergent validity has passed the test and that the measurement tool can effectively measure the concept to be measured; All measurement dimensions have loadings on different factors, indicating that the discriminant validity has also passed the test, indicating that the measurement dimensions can be well distinguished from each other.

### 2.Reliability Analysis

Using SPSS software to conduct reliability tests on the development of new energy vehicle technology, consumer attitudes, and willingness to purchase green energy vehicles. The data is shown in the table below:

**Table 2.** Reliability Analysis of Green Marketing

Variable Name	Number of question items	Cronbach $\alpha$ Alpha
Development of New Energy Technologies	7	0.860
Consumption Attitude	10	0.725
purchasing behavior	3	0.835

From the above table, it can be seen that the number of question items set for each variable dimension is calculated, and the results are as follows:

The coefficient of Cronbach's  $\alpha$  on the Development Dimension of New Energy Vehicle Technology is 0.860; the coefficient of Cronbach's  $\alpha$  on Consumer Attitude Dimensions is 0.725; the coefficient of Cronbach's  $\alpha$  on the dimensions of consumer car buying behavior is 0.835.

The coefficients of Cronbach's  $\alpha$  are all above 0.7, indicating good reliability of the variables. All measurement items of the scale meet the requirements, with good internal consistency and high reliability.

### 3. Regression analysis

Assumption 1:

H1: The development of new energy vehicle technology has a positive impact on consumer car buying behavior.

Firstly, the mean value of the development of new energy vehicle technology on consumer purchasing behavior was tested for normal distribution by using Nonparametric Test1-SampleK-S. The development of new energy vehicle technology  $P > 0.05$  followed a normal distribution, while consumer purchasing behavior  $P > 0.05$  followed a normal distribution. Therefore, Pearson correlation coefficient was used.

Conduct correlation analysis, and the results of correlation analysis are shown in Table 3. The correlation coefficient between the average development of new energy vehicle technology and consumer purchasing behavior Pearson is 0.464, and the P-values are all less than 0.001. In the analysis of variance table,  $F = 38.048$ , and a significance probability is reach to 0.000, which indicates a significant overall regression effect. The regression equation is: Consumer behavior =  $0.464 * \text{Development of new energy vehicle technology}$ , therefore hypothesis 1 is validated.

**Figure 3.** The linear regression analysis results of the development of new energy vehicle technology on consumer car purchasing behavior

	Unstandardized Coefficients		Standardized Coefficients	t	Sig	Collinearity Statistics	
	B	Std. Error	Beta			VIF	D—W
Constant	2.842	0.165	-	16.793	0.000	-	-
The average development of new energy vehicle technology	0.832	0.036	0.639	6.167	0.000	1.000	1.000
ANOVA							
Model	Sum of Squares		df	Mean Square	F	Sig	
Regression	5.296		1	5.306	38.048	0.000	
Residual	19.345		140	0.141	-	-	
Total	24.645		139	-	-	-	

Assumption 2:

H2: The development of new energy vehicle technology has a positive impact on consumer attitudes.

The regression analysis results of the development of new energy vehicle technology on consumer attitudes are shown in the table below: in the analysis of variance table,  $F = 37.135$ , and a significance probability of 0.000, which indicates a significant overall regression effect. The regression equation is: car purchasing behavior =  $0.47 * \text{development of new energy vehicle technology}$ , so hypothesis 2 is verified.

**Figure 3.** Linear regression analysis results of the development of new energy vehicle technology on consumer attitudes

	Unstandardized Coefficients		Standardized Coefficients	t	Sig	Collinearity Statistics	
	B	Std. Error	Beta			VIF	D—W
Constant	2.842	0.165	-	16.793	0.000	-	-
Product attitude	0.832	0.036	0.639	6.167	0.000	1.000	1.000

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	4.179	1	6.306	37.135	0.000
	Residual	15.298	132	0.141	-	-
	Total	14.735	137	-	-	-

Assumption 3:

H3: Consumer attitudes play a mediating role between the development of new energy vehicle technology and consumer car buying behavior. Regression analysis was conducted on the development of new energy vehicle technology and consumer product attitudes, and the results are shown in Table 4. From Table 4, it can be seen that

DW=1.806, close to 2, indicating that there are basically no related issues with the residual sequence in the model. In the analysis of variance table, F=33.708, and a significance probability is 0.000, which indicates a significant overall regression effect. From the table below, it can be seen that the overall regression effect is significant.

The regression equation is: behavioral intention=0.060 \* development of new energy vehicle technology+0.914 \* consumption attitude. Consumer attitudes towards products play a mediating role between the development of new energy vehicle technology and consumer purchasing behavior. Verified hypothesis 3 of this article

**Figure 4.** Linear regression analysis results on the mediating role of consumer attitudes between the development of new energy vehicle technology and consumer car buying behavior

	Unstandardized Coefficients		Standardized Coefficients	t	Sig	Collinearity Statistics	
	B	Std. Error	Beta			VIF	D—W
Constant	7.946	0.165	-	16.793	0.000	-	-
	0.832	0.036	0.639	6.167	0.000	1.000	1.806

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	5.296	1	5.306	38.048	0.000

## **VI . Research conclusions and countermeasure suggestions**

### **1.research conclusion**

Based on the above empirical research, the research conclusions of this article are as follows:

1.The development of new energy vehicle technology has a positive impact on consumer car buying behavior. This indicates that the development of new energy vehicle technology plays an important role in the formation of consumer purchase intention behavior.

2. The development of new energy vehicle technology has a positive impact on consumer attitudes. This indicates that consumers have a positive attitude towards the development of new energy vehicle technology, and they may be more willing to purchase new energy vehicles or use other new energy products. This positive impact may promote the market promotion and development of new energy vehicle technology, and help reduce dependence on traditional energy, thereby promoting environmental protection and sustainable development.

3. Consumer attitudes play a mediating role between the development of new energy vehicle technology and consumer car buying behavior. Consumers holding a positive attitude towards new energy vehicle technology may promote the market promotion and development of new energy products, and their purchasing behavior directly affects the sales and popularization of new energy vehicles. Therefore, consumer attitudes play a connecting and mediating role between the development of new energy vehicle technology and car purchasing behavior.

### **2.Suggestions for countermeasures**

Based on the conclusions of the empirical research mentioned above, the following are some suggestions and opinions:

#### **1. Combining technological innovation with market education**

Continuously increasing investment in new energy vehicle technology research and development, ensuring that the performance, range, convenience and safety of charging facilities of new energy vehicles can meet or even exceed consumer expectations, further enhancing consumer confidence. In response to the positive attitude of consumers towards new energy vehicle technology, extensive market education activities should be carried out to promote the advantages of new energy vehicles, including but not limited to energy conservation and emission reduction, cost-effectiveness, and national and local policy support, to strengthen consumer awareness and identification with new energy vehicles.

#### **2. Policy guidance and incentive measures**

The government should introduce more targeted support policies, such as extending or adding subsidies for purchasing new energy vehicles, reducing relevant taxes and fees, prioritizing the provision of license plate indicators, and investing in the construction of more public charging facilities, all of which can effectively stimulate consumers' willingness to purchase cars. The government can also formulate long-term development plans for the new energy industry, encourage the coordinated development of the upstream and downstream of the industrial chain, reduce the production cost and terminal selling price of new energy vehicles, and make them more competitive in the market.

#### **3. Brand shaping and word -of -mouth dissemination**

By utilizing the positive attitude of consumers towards new energy vehicle technology, car companies should strengthen their professional image in the field of new energy, create high-quality, high-performance, and high-tech new energy vehicle products, and accelerate word-of-mouth dissemination through successful cases and positive user evaluations to enhance consumer purchasing intentions.

#### **4. Personalized and differentiated services**



In response to the needs of different consumer groups, more differentiated and personalized new energy vehicle products and services should be provided, such as Vehicles with long driving range for household users and intelligent connectivity functions for young consumers, in order to meet diversified car purchasing needs and further stimulate market potential.

#### 5. Building a Good Consumption Environment

Strengthen the construction and improvement of the after-sales service system for new energy vehicles, provide convenient and efficient maintenance and battery recycling services, and dispel consumer concerns about the after-sales process of new energy vehicles. Promote the construction of a new energy ecosystem as a whole in society, including optimizing the layout of charging station networks, mechanisms for phasing out and updating old vehicles, etc., to make the entire lifecycle of new energy vehicles more green and environmentally friendly, reflecting their value in sustainable development.

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# Analysis of Factors Influencing the Profitability of Korean Commercial Banks

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## Abstract

**Purpose** – Based on the study of domestic and foreign literature, according to the actual situation of listed commercial banks in Korea, the profitability index of the explained variable takes the return on total assets as an alternative index, and selects the loan-deposit ratio, non-performing loan ratio, capital adequacy ratio, total assets and cost income as explanatory variables. A random effects model was built using data from 12 Korean commercial banks from 2015 to 2023.

**Design/Methodology/Approach** – Firstly, it makes a descriptive analysis of the current status and development trend of profitability index and its influencing factors. Then, the unit root test of the variable sequence is carried out by using EViews 7.2 software. After the indexes that failed the stationarity test were corrected, the most appropriate regression analysis model was selected by F-test and Hausman test. Based on the research of Chinese and foreign literatures and the actual situation of listed companies of Korean commercial banks, the profitability index of explained variables takes return on total assets as an alternative index, and selects loan-to-deposit ratio, non-performing loan ratio, capital adequacy ratio, total assets and cost income as explanatory variables. A random effects model was built using data from 12 commercial banks from 2015 to 2023.

**Findings** – The results show that operating efficiency, liquidity and capital adequacy ratio have a significant positive impact on the profitability of Korean commercial banks, which shows that the profitability of Korean commercial banks will increase with the improvement of operating efficiency, liquidity and capital adequacy ratio.

**Research Implications** – Therefore, in order to improve the profitability of commercial banks, the following aspects can be considered: In terms of operation efficiency, the operation efficiency and profitability of commercial banks can be improved by adjusting the organizational structure, strengthening the operation and management of employees, improving the assessment mechanism and strengthening the construction of the financial system of commercial banks. In terms of capital adequacy ratio, the asset adequacy ratio can be improved by increasing capital and reducing risk-weighted assets. The specific measures include expanding channels to raise capital, effectively controlling and handling non-performing assets, and establishing a sound risk management system to improve the profitability of commercial banks. In terms of liquidity, the establishment of professional risk management organization system and risk management organization system can have a positive impact on the profitability of commercial banks.

**Keywords:** Profitability, commercial banks, influencing factors

**JEL Classifications:** G2,G3,Z1

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## **I . introduction**

Korean commercial banks are special financial institutions in South Korea, whose main business is to operate currency. The quality of their operations will directly affect the economic development of the entire country. If the banking system is healthy, efficient, and has sustained profitability, commercial banks can use reasonable financial resource allocation to reduce the volatility of the entire economic system. Therefore, the operational management principles of commercial banks are safety, liquidity, and profitability, among which profitability is the most important nature. The improvement of profitability can not only enhance the bank's credit and capital, but also enhance the bank's ability to resist risks and enhance its competitiveness. In 1997, the banking industry in South Korea experienced a foreign exchange crisis. With the merger and expansion of bankrupt banks, the number of banks significantly decreased to improve competitiveness. Although the number of banks in South Korea is gradually decreasing, especially after the post crisis period of the International Monetary Fund, the number of bank branches is gradually increasing (Yoonsok Le, 2015) 。 As of the end of 2018, among OECD countries, only Japan, Greece, and France had bank group stocks with an average PBR lower than South Korea. (Byungho Suh and Heung Jin Kwon, 2020) 。 With the continuous promotion of interest rate marketization, commercial banks are facing huge challenges in their profit model, which mainly relies on interest income. In addition, the downward trend of benchmark interest rates will directly lead to a decrease in depositors of commercial banks, putting certain pressure on their profitability.(Junya Shi,2022.)。 Faced with the increasingly competitive financial environment, in order for commercial banks to survive and develop in the long term, they need to improve their profitability and enhance their competitiveness in the financial industry. Therefore, how to continuously improve profitability and enhance their competitiveness in the financial competition environment has become a key issue that Korean commercial banks need to pay attention to. The research on the influencing factors of the profitability of Korean commercial banks is urgent. Analyzing the degree to which the factors affecting the profitability of commercial banks affect their profitability and proposing corresponding countermeasures based on empirical results is of great significance for improving the profitability of Korean commercial banks, ensuring their stable development, and thus having a positive impact on the overall development of Korean commercial banks and the country's economic development.

Based on the research of domestic and foreign literature, and based on the actual situation of listed companies in Korean commercial banks, this article aims to establish econometric models to study the effects of various influencing factors on the profitability of Korean commercial banks. This can encourage operators to consider profitability issues from a more comprehensive perspective, ensure the scientificity of decision-making, eliminate the drawbacks of multi-objective evaluation of bank profitability, better evaluate the value creation ability of listed commercial banks, provide targeted suggestions for listed commercial banks in the implementation of business strategies, and help domestic listed commercial banks find effective ways to improve profitability.

## **II . Literature review**

### **1.A Study on the Factors Influencing the Profitability of Banks**

Commercial banks play an important role in the financial life of the national economy, and profitability is crucial for commercial banks. However, many micro, meso, and even macro factors can have different impacts on them (Jiang Yuhui, 2024). With the rise of technology-based financial enterprises, the continuous promotion of interest rate liberalization, the further expansion of the degree of financial market opening up, and the increased pressure of interbank competition, the

profitability of commercial banks is facing great challenges under this new situation (Wang Peidong, 2022). In order to expand financing scale and achieve their own development strategies, urban commercial banks have been listed in recent years. Faced with the continuous advancement of national economic system reform, how to improve the profitability of commercial banks has always been an important part of the financial strategy of urban commercial banks (Gao Fanglu, Yue Xuan, 2020). The factors that affect the profitability of commercial banks mainly include macro and micro aspects. The macro aspects include policies, economy, etc. The micro aspects include financial and non-financial factors. Financial factors include the liquidity level of banks, capital adequacy ratio, asset size, etc. Non-financial factors include business market share, financial innovation ability, etc. Among them, the main influencing factor is financial indicators, which have the most significant impact on profitability.

Kim Min-Jung (2019) found in the empirical results of Korean commercial banks that there is a positive correlation between return on assets (ROA) and total bank branches, capital adequacy ratio of the Bank for International Settlements, GDP (gross domestic product), CPI (consumer price index), and KOSPI (Korea Composite Stock Price Index), as well as a positive correlation between return on equity (ROE) and total loans, and a positive correlation between net interest margin (NIM) and GDP. Jiang Yuhui (2024) explored the factors affecting the profitability of commercial banks based on the relevant data of 13 listed commercial banks from 2016 to 2021. Huang Jinqiu et al. (2006) believed that internal operational efficiency, asset quality, bank size, capital adequacy ratio, liquidity status, and bank size all have an impact on bank profitability. Among them, capital adequacy ratio and bank ROA change in the same direction, while bank asset size and liquidity change in the opposite direction of profitability. Both GDP and inflation rate have a significant positive correlation with bank profitability. Wu Hongtao (2024) conducted an in-depth discussion on the factors affecting the profitability of small and medium-sized banks in the study of the impact of credit business for small and micro enterprises on the profitability of small and medium-sized banks, and found that credit business for small and micro enterprises is one of the important factors affecting the profitability of small and medium-sized banks.

## **2.A Study on the Selection of Research Methods for Factors Influencing the Profitability of Banks**

There are three main research methods for studying the factors affecting bank profitability. The first is to use DEA analysis to evaluate the efficiency of commercial banks and then study the factors affecting their profitability. The second is to establish econometric models using panel data to examine the relationship between bank profitability and various influencing factors over different periods. The third is to construct indicators that affect bank profitability for multivariate analysis.

### **(1) DEA analysis method**

Wang Zhihui (2024) evaluated and analyzed the competitiveness of China's regional listed commercial banks based on entropy method and DEA analysis; Park Seok-Kang (2011) studied the structure and management efficiency of banks in emerging economies based on DEA analysis, using DEA analysis and cluster analysis to analyze the efficiency of major banks in emerging economies (Thailand, Indonesia, Malaysia, and the Philippines), especially analyzing the technical efficiency of banking in emerging economies, and examining the differences in management structure between Korean banks and foreign banks in emerging economies, which had policy implications for the capital market, including financial regulation and bank access regulation in emerging economies. The analysis results showed that although foreign banks have difficulty entering, emerging economies have higher technical efficiency in banking and higher efficiency in the service industry.

### **(2) Multivariate analysis**

Li Hongchao (2023) used the CPV model and multiple linear regression analysis method to analyze the main factors

affecting commercial bank real estate credit risk from a macro level in the measurement and prediction of commercial bank real estate credit risk. He used the model to predict the future non-performing loan ratio of the commercial bank real estate industry. The research results showed that forward-looking indicators (comprehensive leading index, real estate development investment growth rate) and non-material indicators (actual total human capital) have a significant impact on real estate credit risk and exhibit a negative relationship, while the national housing boom index, which reflects the state of the real estate industry, has a positive relationship with real estate credit risk. Zhou Enbo and Jiang Xuemei (2023) selected 38 listed commercial banks from 2009 to 2019 from the perspective of listed commercial banks, and used Stata16.0 software to establish multiple linear regression analysis. In the group regression analysis, it was concluded that the impact of small and medium-sized commercial banks was significant, while the negative correlation between the capital adequacy ratio of large commercial banks and their profitability was not significant. Byungho Suh and Heung Jin Kwon (2020) conducted empirical analysis on the determinants of PBR in OECD countries' banking groups, and conducted regression analysis on the PBR of 391 listed banking groups in OECD countries from 2011 to 2018, identifying the fundamental reason for the undervaluation of Korean banking groups' share prices.

### (3) Establishing a measurement model

Qu Xin (2007) conducted a study on the financial data of Chinese commercial banks from 1999 to 2005 to analyze the profitability of Chinese commercial banks. He established a mixed-effects regression model based on the collected panel data to analyze the differences in profitability indicators between state-owned banks and joint-stock banks and the reasons for these differences. Baek Soo-hyun (2021) analyzed the determinants of liquidity risk in 79 savings banks in South Korea and conducted a panel regression analysis using unbalanced panel data. He found that when liquidity risk (measured using financing gap and loan-to-deposit ratio) increases, the structural profitability of savings banks increases; the greater the liquidity risk, the more positive the impact on profitability. Gu Zhengyang (2008) summarized the internal factors affecting Chinese commercial banks into three categories: risk variables, operational variables, and business variables. He used three indicators, namely return on assets, per capita profit, and operating income, as explanatory variables to establish a measurement model and conducted empirical analysis using a mixed-effects model to regress various relevant indicators affecting the profitability of Chinese commercial banks. He compared the differences in empirical results between the two types of banks, analyzed the causes of these differences, and proposed reasonable suggestions based on these causes.

In terms of research methods, fixed-effect and random-effect analysis methods have been widely used in recent years to study the impact of commercial bank profitability, and have been widely recognized. Therefore, based on relevant domestic and foreign literature, this article uses panel data models to construct econometric models to examine the impact of various relevant factors on the profitability of Korean commercial banks, based on mature theoretical systems on bank profitability and its influencing factors.

## 2. Research content

This article takes Korean commercial banks as the research object, and conducts research on the profitability of commercial banks based on relevant research results at home and abroad. In order to achieve the research objective, this article mainly uses literature research methods, descriptive analysis, and constructing econometric models. This article extensively consults literature on the factors affecting the profitability of commercial banks, as well as the literature on the PBR of the Bank of Korea, to understand the research methods and the construction of indicators for the factors affecting the profitability of Korean commercial banks. It describes and analyzes the current situation and development trend of indicators for the profitability of commercial banks and various influencing variables. Finally, based on the collection of literature, it conducts unit root tests on panel data, and after differentiating unstable sequences, it conducts F-tests and Hausman tests on

variables to select appropriate models for regression analysis, and analyzes the impact of various factors on the profitability of Korean commercial banks.

### **3. Bank profitability and influencing factors**

#### **3.1 Definition of Bank Profitability Concept**

The profitability of commercial banks not only refers to the ability of banks to earn profits, but also includes the ability of commercial banks to resist risks, reduce costs, and ensure asset quality. There are six profitability indicators for commercial banks, which generally include return on total assets, return on net assets, basic earnings per share, net profit growth rate, cost-income ratio, and non-performing loan ratio. Return on total assets is the most commonly used proxy indicator for bank profitability in domestic and international research.

The return on total assets is calculated by dividing the total return by the average total assets. It can show the ability of commercial banks to use all assets to generate profits. Therefore, the return on total assets can be used as an important indicator to measure the ability of commercial banks. The higher the return on total assets, the higher the efficiency of capital utilization and the higher the profitability of commercial banks. Therefore, there is a significant positive correlation between the return on total assets and the profitability of commercial banks.

#### **3.2 Factors affecting the profitability of banks**

Regarding the factors affecting the profitability of commercial banks, in addition to financial factors, the explanatory power of other factors only accounts for a small portion, and the relationship with the profitability of banks is unstable in different periods. Financial factors are the main influencing factors of commercial banks' profitability and have the strongest explanatory power. Therefore, this study mainly selects financial indicators to study the profitability of banks, mainly considering five aspects.

##### **(1) Asset quality**

The asset quality of commercial banks is closely related to their profitability. The most comprehensive performance of the operation of bank assets is profitability. High-quality assets can enable commercial banks to have good profitability, and the improvement of profitability can also improve asset quality. Therefore, it is believed that there is a significant positive correlation between the asset quality of commercial banks and their profitability. The non-performing loan ratio is the ratio of non-performing loans to total loan balances of commercial banks, which is usually used as a sign of the quality of bank assets and directly affects the profitability of commercial banks. Generally, the lower the non-performing loan ratio, the better the asset quality, and the stronger the profitability of commercial banks.

##### **(2) Bank size**

The asset size of commercial banks is mainly reflected in economies of scale. Larger banks can reduce average operating costs by increasing operating income. It is generally believed that the larger the scale, the stronger the profitability. Total assets can be used as an indicator to measure the size of a bank. The more total assets a bank has, the larger its scale, and the more disposable capital it has. Having sufficient funds to issue new loans is beneficial for bank profitability.

##### **(3) Bank liquidity**

The liquidity of commercial banks refers to their ability to repay in the short term. If a commercial bank has high liquidity, it can more effectively avoid liquidity crises, reduce losses, and benefit the bank's profitability. The loan-to-deposit ratio is one of the important indicators representing the liquidity of banks. It is the total deposits of a bank divided by the

total deposits. The lower the loan-to-deposit ratio, the lower the funds used for loans, the higher the liquidity, and the higher the profitability of commercial banks.

#### (4) Operational efficiency

The operational efficiency of commercial banks is also an important factor affecting their profitability, and the cost-income ratio is often used as a proxy variable. The cost-income ratio is the ratio of bank operating expenses to operating income. The lower the cost-income ratio, the lower the cost of bank income, the higher the operational efficiency, and the stronger the ability to generate income, which means the stronger the profitability.

#### (5) Capital adequacy ratio

Capital adequacy ratio is a necessary capital ratio to ensure the normal operation and development of commercial banks, and has a significant positive correlation with profitability. First, when raising funds through external channels, the external financing cost is relatively low. Second, generally speaking, a high capital adequacy ratio can ensure the stable operation of banks and high security, making it easier to attract customer resources and improve profitability. Third, capital has the ability to resist risks and absorb unexpected business losses. Since bank capital can be occupied stably for a long time, it meets the long-term demand for funds and reduces the possibility of bank runs.

### **III . research design**

#### **1. Data source**

This article selects a total of 12 commercial banks, including Shinhan Bank, Woori Bank, Hanwha Bank, Kookmin Bank, Busan Bank, Hanmi Bank, Hana Bank, and Korea Exchange Bank (KEB Hana Bank), as research samples from 2015 to 2023 based on the principles of data availability and representativeness. The reasons for choosing panel data to establish models in this article are as follows: firstly, panel data models can eliminate the autocorrelation phenomenon that exists in ordinary models; secondly, panel data models can avoid the possible multicollinearity problems that may occur in general models; finally, panel data is more suitable for studying dynamic changes. The research data comes from online databases and annual reports of various banks.

#### **2. Variable selection**

This chapter conducts an online survey among different age groups, educational backgrounds, and income levels, which is highly representative. A total of 423 questionnaires were collected in this study, and after excluding invalid questionnaires, a total of 386 valid questionnaires were collected, with a sample recovery rate of 91.3%.

##### **2.1 Selection of profitability indicators**

The indicators that can reflect the profitability of banks mainly include return on assets, return on net assets, net profit growth rate, basic earnings per share, cost-income ratio, and non-performing loan ratio.

Among them, return on assets (ROA) and return on equity (ROE) are the most commonly used indicators to measure the profitability of banks. ROE mainly reflects the profitability of bank shareholders, ignoring the profitability of the bank, while ROA mainly reflects the ability of the bank to obtain profits from all resources it operates, making it more suitable as a proxy variable for bank profitability. Therefore, this article chooses return on assets as the indicator to measure profitability.

## 2.2 Selection of influencing factors

The factors affecting profitability are mainly considered from liquidity, asset quality, capital adequacy ratio, operating efficiency, asset quality, asset size, and other aspects, and variable indicators are selected. The indicators such as loan-to-deposit ratio, non-performing loan ratio, capital adequacy ratio, total assets, and cost-income ratio are used as explanatory variables to explain the factors affecting the return on total assets. The explanatory variables are represented by CAR, CIR, NPL, LDP, LnTA, and other variables. The definitions, symbols, and calculation methods of all variables are shown in Table 1.

**Table 1.** Profitability of Commercial Banks and Variables Influencing Factors

Indicator type	Indicator Name	Symbolic representation	Account form
PROFITABILITY	rate of return on total assets	ROD	Total compensation/average total assets
mobility	Loan-to-deposit ratio	LDP	Total loan amount/total deposit amount
Asset adequacy ratio			
	capital adequacy ratio	CAR	Capital/Risk Assets
operating efficiency	Cost to income ratio	CIR	Operating expenses/revenue
Asset quality	Non-performing loan ratio	NPL	Non performing loans/various loans
Asset size	total assets	LnTA	The logarithm of total assets

## IV. empirical research

### 1. Descriptive analysis of bank profitability indicators and influencing factor indicators

#### 1.1 Total asset return rate

As shown in Figure 1, the average return on total assets of commercial banks has some volatility from 2015 to 2023, but overall it shows an upward trend. The specific reasons are as follows:

(1) Improved economic conditions: The upward trend in the return on total assets may reflect the overall improvement in the Korean economy, leading to higher returns for banks.

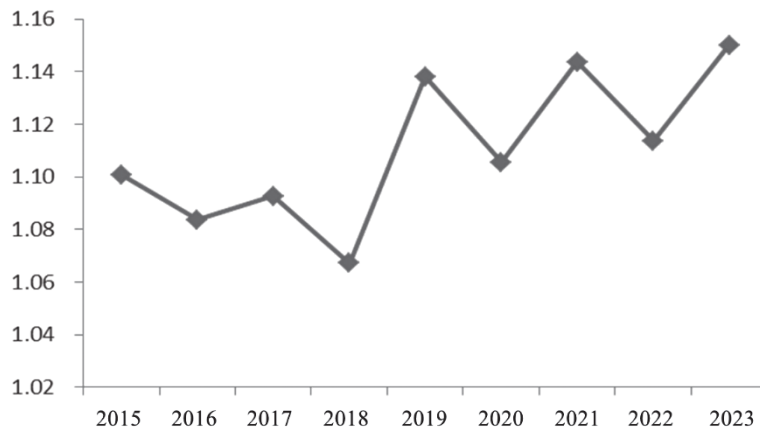
(2) Improvement of bank operational efficiency: Banks have improved their return on total assets by increasing operational efficiency, reducing costs, and optimizing asset allocation.

(3) Diversification of banking business: Banks have carried out more diversified businesses in different fields, such as investment banking and wealth management, thus improving the return on total assets.

(4) Profit growth: Banks have achieved higher profits during this period, thus improving the return on total assets.

The rising trend of the return on total assets of commercial banks in South Korea may reflect the positive performance of banks in economic and operational aspects, which is a positive signal.

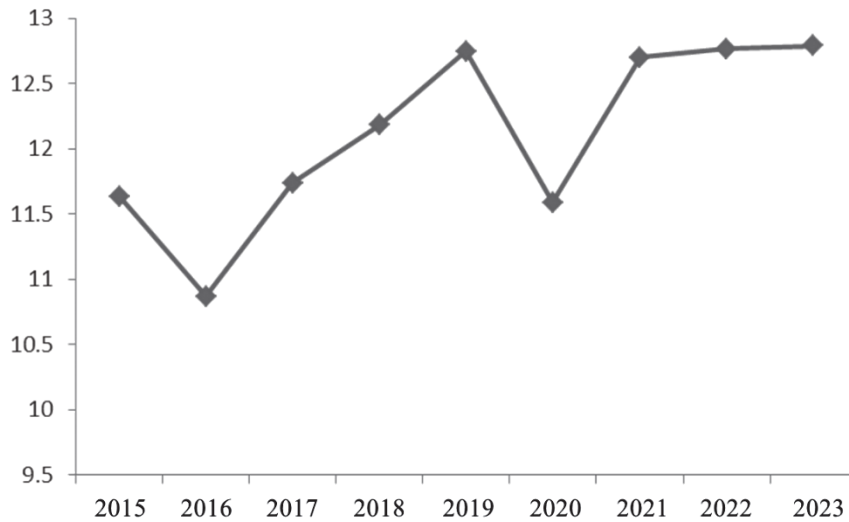




**Figure 1.** Average return on total assets of commercial banks

### 1.2 Asset adequacy ratio

As shown in Figure 2, the asset adequacy ratio declined in 2015 and 2020. This decline may be attributed to the significant impact of the 2015 Middle East Respiratory Syndrome (MERS) epidemic on the Korean market, the severe disruption of regional economies caused by the COVID-19 virus epidemic, and the impact on global economic growth. As a result, the Korean economy fell into recession in 2020. The impact of economic crises and overall economic changes has hindered economic development and led to a reduction in capital. However, during these nine years, the average asset adequacy ratio of Korean commercial banks has generally shown an upward trend, with an average level of over 10%.

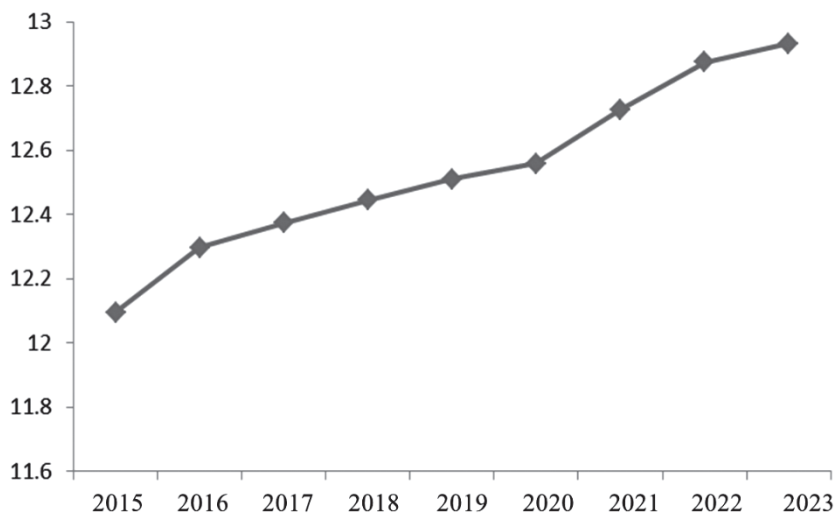


**Figure 2.** Average asset adequacy ratio of commercial banks

### 1.3 Total assets

Due to the relatively large value of total assets in commercial banks, taking logarithms does not change the nature and correlation of the data itself, but can reduce the absolute value of the variable. Therefore, logarithmic processing is applied to the data before descriptive analysis.

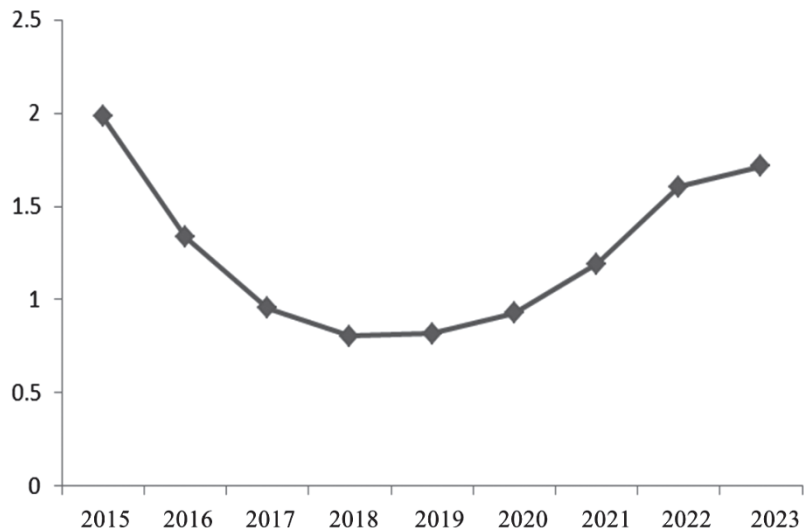
As shown in Figure 3, the average total assets of commercial banks have been steadily rising since 2015, indicating that banks have increased their own capital and have more funds available for loans. This trend is beneficial for improving the profitability of commercial banks.



**Figure 3:** Average total assets of commercial banks

### 1.4 Non performing loan ratio

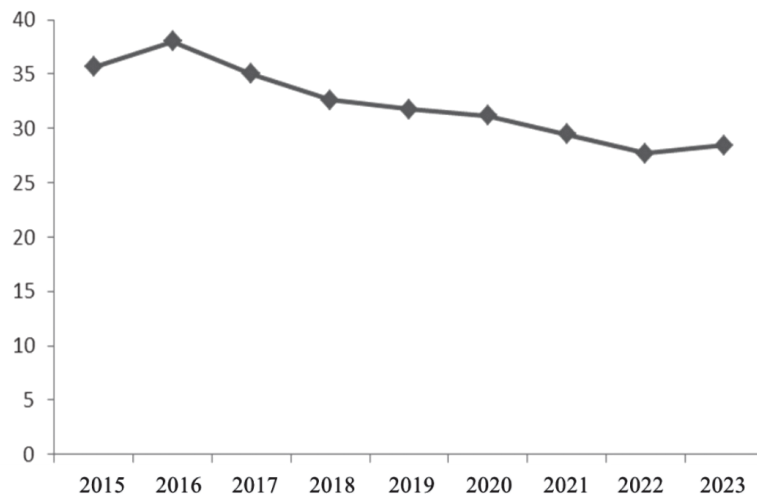
As shown in Figure 4, the average non-performing loan ratio of commercial banks in South Korea has experienced two phases of change. From 2015 to 2018, it showed a downward trend, and by 2018, the non-performing loan ratio was as low as below 1%, indicating that commercial banks have controlled the non-performing loan ratio at a relatively low level and maintained a relatively safe and stable operating state in the past few years. However, after 2018, the non-performing loan ratio began to show an upward trend, which may be due to the macro environment and increased competitiveness of the financial industry in South Korea. This trend is not conducive to the improvement of the profitability of South Korean commercial banks.



**Figure 4.** Average non-performing loan ratio of commercial banks

**1.5 Cost to income ratio**

As shown in Figure 5, the average cost-income ratio of Korean commercial banks showed an upward trend in 2015, but after 2016, it showed a steady downward trend. This may be due to the emergence of the Middle East Respiratory Syndrome (MERS) epidemic in 2015, which had a phased impact on the cost-income ratio of the macro economy. However, since 2016, Korean commercial banks have begun to adjust their cost management and exercise reasonable control over their cost expenditures, which has kept the cost-income ratio at a relatively stable and low level. This development trend is conducive to the improvement of commercial banks' profitability.



**Figure 5.** Average cost-income ratio of commercial banks

## 1.6 Deposit to Loan Ratio

The average loan to deposit ratio of South Korean commercial banks is over 66%. Although there have been fluctuations since 2016, the overall trend is on the rise, which is beneficial for improving the profitability of commercial banks.

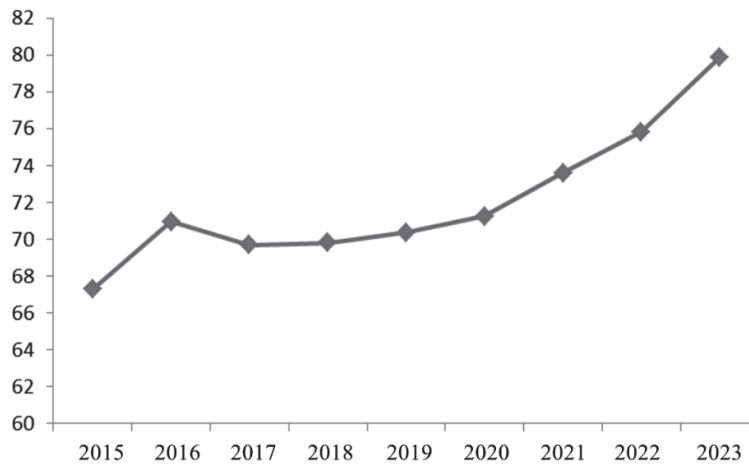


Figure 6. Average Deposit to Loan Ratio of Commercial bank

## 2. Unit root test

Before conducting regression analysis, it is necessary to conduct a unit root test on the variable data, as some non-stationary variable sequences may exhibit a common trend, resulting in a high degree of goodness of fit in the regression results. However, there may not be a direct correlation between these variables, and if regression analysis is conducted directly, spurious regression may occur. To ensure the accuracy of the regression results, we must conduct a stationarity test on the variable data, and the most commonly used method for stationarity testing is the unit root test.

Null hypothesis: the variable series has a unit root (the variable series is non-stationary)

Alternative hypothesis: The variable series does not have a unit root (the variable series is a stationary series)

Table 2. Unit Root Test Table for Variable Raw Data

Variable	LLC		ADF		IPS	
	T-value	p-value	T-value	P-value	T-value	P-value
ROA	-8.62	0.00	49.37	0.00	43.19	0.00
CAR	-6.59	0.00	52.76	0.00	70.85	0.00
CIR	-9.15	0.00	64.56	0.00	82.05	0.00
NPL	0.53	0.70	19.38	0.62	32.94	0.06
LDP	-3.37	0.00	22.84	0.41	25.21	0.29
LnTA	-9.54	0.00	76.55	0.00	100.07	0.00

From the results in the table above, it can be seen that regardless of the given significance levels of 1%, 5%, or 10%, ROA, CAR, LnTA, and CIR reject the null hypothesis under the three testing methods, indicating that the sequence does not have a unit root and is a stationary sequence. At a significance level of 10%, the p-values of the NPL sequence in the LLC test, ADF test, and IPS test are all greater than 0.1, indicating that the null hypothesis is accepted and that there is a unit root, indicating that the sequence is non-stationary; Under the LLC test, LDP rejects the null hypothesis and is a stationary sequence regardless of significance levels of 1%, 5%, or 10%. However, under the ADF and IPS tests, LDP accepts the null hypothesis and is a non-stationary sequence. Therefore, we consider LDP to be a non-stationary sequence. In summary, ROA, CAR, LnTA, and CIR are stationary sequences, while NPL and LDP are non-stationary sequences. Therefore, we perform first-order differencing on NPL and LDP sequences before conducting unit root tests.

**Table 3.** Unit Root Test Table for NPL and LDP First Order Difference Order

Variable	LLC		ADF		IPS	
	T-value	p-value	T-value	P-value	T-value	P-value
△ NPL	-8.78	0.00	39.46	0.01	73.19	0.00
△ LDP	-10.02	0.00	58.37	0.00	61.44	0.00

From the above table, it can be seen that at a significance level of 10% or 5%, the p-values of the first-order difference sequences of NPL and LDP are all less than 0.1 under the three test methods, rejecting the null hypothesis. Therefore, there is no unit root for the first-order difference sequences of NPL and LDP, and they are stationary sequences. In summary, ROA, CAR, CIR, and LnTA are 0-order stationary sequences, while NPL and LDP are 1-order stationary sequences. Therefore, perform differential processing on NPL and LDP data. Select ROA as the dependent variable, and CAR, CIR, LnTA, and the first-order difference of NPL and LDP as the explanatory variables for regression analysis.

### 3. Regression analysis

When establishing panel data models for regression analysis, mixed models or variable intercept models are mainly used, among which variable intercept models are further divided into fixed effects models and random effects models. To select a suitable model, we need to verify the panel data. The main testing methods include F-test and Hausman test. The F-test is used to choose whether to establish a variable intercept model or a mixed model. If the test result is to establish a variable intercept model, then the Hausman test is performed on the panel data to determine whether to choose a fixed effects model or a random effects model for the final panel data model.

#### 3.1 Ftest

Original hypothesis: Establish a mixed effects model.

Alternative hypothesis: Establish a variable intercept model.

$$F = \frac{(SSE_r - SSE_u) / (N - 1)}{SSE_r / (NT - N - 1)}$$

SSE<sub>r</sub> is the sum of squared residuals of the mixed model, and SSE<sub>u</sub> is the sum of squared residuals of the fixed effects model. NT represents the number of observations in the panel model, and N represents the number of commercial banks.

**Table 4.** Statistical Table of Mixed Effects Model

Statistic	Value
R squared	0.31
Residual Sum of Squares	2.99
F test	7.49
P value	0.00
DW	1.09

**Table 5.** Fixed Effects Model Statistics Table

Statistic	Value
R squared	0.60
Residual Sum of Squares	1.49
F test	6.93
P value	0.00
DW	1.83

From the mixed effects model statistic table 5, it can be seen that the sum of squared residuals (SSER) of the mixed effects model is 2.99. According to the fixed effects model statistic table, the sum of squared residuals (SSER) of the fixed effects model is 1.49, N is 11, and NT is 88. The F-value calculated using the formula is 3.81, which is greater than the critical value of the F-test and rejects the original hypothesis. Therefore, a variable intercept model is established.

### 3.2 Hausman test

The F-test results indicate that the panel data is suitable for the variable intercept model, so it is necessary to perform a Hausman test on the panel data to determine whether to choose a fixed effects model or a random effects model.

Original hypothesis: Establish a random effects regression model.

Alternative hypothesis: Establish a fixed effects regression model.

**Table 6 :**Hausman test

Random effects test			
Test	Chi square test statistical value	Chi square degree of freedom	P value
Random effects test	1.38	5	0.93

From the Hausman test, it can be seen that the statistical value of the chi square test is 1.38, and the p-value is 0.93, which is greater than 0.05. The null hypothesis is accepted at a significance level of 5%. Therefore, a random effects regression model should be established.

### 3.3 Establishing a random effects regression model

**Table 7.** Random Effects Regression Model Table

Variable	Coefficient	T-value	P-value 值
C	1.25	2.14	0.04
NPL	-0.05	-0.88	0.38
CIR	-0.02	-6.51	0.00
LDP	0.01	2.22	0.03
CAR	0.07	2.99	0.00
LnTA	-0.01	-0.30	0.77
R2		0.40	
F statistic		10.91	
P-value		0.00	
DW test		1.07	

From the regression results, it can be seen that the variables LnTA and NPL did not pass the significance test, while the variables CAR, CIR, LDP, and the constant C all passed the significance test, with the degree of significance ranging from strong to weak. Therefore, the final random effect model can be expressed as:

$$ROA=1.25+0.07*CAR-0.02*CIR +0.01*LDP$$

T-value (2.14) (3.00) (-6.51) (2.22)

R-squared: 0.40 DW test statistic: 1.07

F value: 10.91 P value corresponding to F value: 0.00

From the final random effect model, the p-value corresponding to the F-test statistic is 0.00, indicating that the model passes the significance test at a significance level of 5% and is valid.

The p-values of the capital adequacy ratio (CAR), operating efficiency (CIR), and liquidity (LDP) variables are 0.00, 0.00, and 0.03, respectively, all of which are less than 0.05, indicating that at a significance level of 5%, the variables of capital adequacy, operating efficiency, and asset size have a significant impact on the profitability of commercial banks. Among them, the capital adequacy ratio has the greatest impact on profitability. The coefficient value of variable CAR at a significance level of 5% is 0.07, indicating that the capital adequacy ratio has a positive impact on the profitability of commercial banks, which is manifested as the stronger the capital adequacy ability of commercial banks, the stronger the profitability. Operating efficiency also has a significant impact on the profitability of commercial banks, with a corresponding coefficient value of -0.02, indicating that there is a significant negative correlation between cost-income ratio and the profitability of commercial banks, that is, the lower the operating costs, the higher the operating income, and the stronger the profitability of commercial banks. This is consistent with common sense. The coefficient value of the loan-to-deposit ratio variable is 0.01, indicating that there is a positive correlation between the loan-to-deposit ratio and bank profitability, that is, the profitability of commercial banks increases with the enhancement of liquidity.

The scale variable LnTA shows a certain inverse relationship with the ROA of banks, but the corresponding p-value is 0.77, indicating that this scale variable did not pass the significance test at the 5% significance level. The scale effect of commercial banks is not obvious, and profitability does not increase with the expansion of scale. This is different from what we generally believe. We generally believe that the larger the bank size, the stronger the profitability of commercial banks.

This result may be due to the fact that if we blindly pursue the expansion of bank size, the coordination and communication costs of banks increase, and risks increase, which leads to a decrease in bank operating efficiency and profitability. The asset quality indicator NPL (non-performing loan ratio) is negatively correlated with ROA, but NPL did not pass the significance test at the 5% significance level, which means that the asset quality of commercial banks has no significant impact on the profitability of commercial banks. This is inconsistent with common sense, and it is likely that South Korea has a strict regulatory system for commercial banks. When banks have serious non-performing loan problems, the regulatory authorities will take measures to pressure commercial banks to control the non-performing loan ratio. Therefore, the lack of correlation between non-performing loan ratio and profitability is likely due to the influence of regulatory authorities controlling the non-performing loan ratio.

## **V . Conclusion and policy implications**

### **1. Reduce differences in consumption habits**

This article takes the total asset return rate, which measures the profitability of commercial banks, as the dependent variable, selects asset size, capital adequacy, asset quality, operational efficiency, and liquidity as explanatory variables to construct an empirical model. Using relevant data from Korean commercial banks from 2008 to 2016, an empirical analysis was conducted, and the following conclusions were drawn.

#### **1.1 There is a significant positive correlation between operational efficiency and the profitability of Korean commercial banks**

There is a significant negative correlation between the cost-income ratio and the operational efficiency of commercial banks. That is, the lower the cost-income ratio, the lower the operating expenses, and the higher the operating income. The higher the operational efficiency of commercial banks, the higher their profitability will be. Therefore, improving operational efficiency can enhance the profitability of Korean commercial banks. The main way to improve the operational efficiency of commercial banks is to strengthen their cost control. Specific suggestions should be considered from the following aspects:

##### **(1) Adjusting organizational structure**

Adjusting the organizational structure and developing the internal structure system of the bank towards scale and specialization, mainly by clarifying the responsibilities and division of labor of team members, improving the execution efficiency of bank employees, and establishing resource sharing mechanisms among various branches and branches to improve operational efficiency.

##### **(2) Strengthen employee management and improve assessment mechanisms**

The improvement of the work efficiency of bank employees also plays a crucial role in the operational efficiency of Korean commercial banks. Therefore, we need to enhance the management of bank employees, improve employee training mechanisms, improve their work efficiency and abilities, improve performance evaluation mechanisms, and grasp and assess the specific situation of employees. Employees who are not in an ideal situation can receive secondary training.

##### **(3) Control the scale of commercial banks**

In the past period of time, commercial banks have been blindly pursuing the expansion of scale to achieve profitability improvement and achieve the goal of obtaining more profits. Therefore, they have invested a large amount of funds to expand the number of branches. However, excessive expansion of scale has not brought more profits to commercial banks. Instead,



due to poor management of some branches, management expenses have increased and losses have occurred, affecting the overall profitability of the banking industry. Therefore, South Korean commercial banks need to control the scale of branch expansion, appropriately close branches with unfavorable business conditions, control the scale of commercial banks, and adjust the structure of specific businesses. For some tasks with heavy workload, such as risk management and internal audit, they should be adjusted to the head office or first level branches. Branch offices are mainly responsible for basic businesses such as deposits and loans, and work together at all levels to improve efficiency.

## **2. Capital adequacy ratio has a positive impact on the profitability of Korean commercial banks**

This article uses capital adequacy ratio as a variable to measure capital adequacy capability. The regression results show a positive correlation between capital adequacy ratio and the profitability of banks, indicating that improving capital adequacy capability is beneficial for enhancing the profitability of commercial banks.

There are two main ways to improve capital adequacy ratio: increasing capital and reducing risk weighted assets. Therefore, commercial banks can take the following measures:

### **(1) Expand channels to raise capital**

Supplementing bank capital through multiple channels, for commercial banks that have not yet been listed, they can absorb funds through shareholding reform and public listing through multiple channels; Change the equity structure to promote diversification. Increase the total capital to improve its capital adequacy ratio. At the same time, commercial banks should flexibly apply methods such as increasing new shares, rights issues, subordinated bonds, convertible bonds, and mixed capital instruments to expand their total capital and improve their capital adequacy ratio.

### **(2) Effectively managing non-performing loans**

Commercial banks can increase their capital adequacy ratio in order to effectively control and handle non-performing loans, which requires the reuse of non-performing loans. The main measures include asset transfer, restructuring, asset securitization, etc., and the reuse of non-performing loans to increase capital adequacy ratio.

### **(3) Establish a more comprehensive risk management system**

Commercial banks should improve their risk management system by constructing models or using advanced measurement methods to more accurately estimate and control the risks (including market and operational risks) that commercial banks face, achieving effective risk avoidance and reducing their capital use in risk management.

## **3. Liquidity has a positive impact on the profitability of Korean commercial banks**

This article uses the loan to deposit ratio as an indicator to measure the liquidity of bank resources. The regression results show a negative correlation between the loan to deposit ratio and the profitability of banks. The stronger the loan to deposit ratio, the weaker the liquidity of commercial bank resources, leading to a decrease in the profitability of commercial banks. Therefore, improving the liquidity of bank resources can enhance the profitability of banks.

### **3.1 Establish a dedicated risk management organizational system**

Establish a professional risk management department to control the liquidity of commercial banks. Hire experienced risk management personnel to conduct in-depth research on the liquidity of commercial banks, real-time grasp of internal fund raising and utilization, as well as liquidity demand and supply situation. Based on the specific liquidity situation of

commercial banks, make timely adjustments to prevent insufficient and excessive positions.

### 3.2 Expanding financing channels for commercial banks

To maintain good liquidity, commercial banks need to maintain a certain dynamic balance between assets and liabilities. When facing customer withdrawals of cash, commercial banks can monetize their short-term bonds to obtain liquid assets, or borrow funds from the capital market at a reasonable interest rate to solve customer withdrawal pressure and ensure the liquidity of commercial banks. If commercial banks have a large amount of liquid assets, they can invest the excess funds to gain profits. The government should also try its best to create conditions for commercial banks to maintain good liquidity. On the one hand, the government should develop marketization of securities investment, expand financing channels for commercial banks, and create market conditions to ensure liquidity. For example, it can increase varieties in the treasury bond market.

On the other hand, it is necessary to improve the management mechanisms of interbank lending and the bill market. For example, banks with mature management mechanisms can issue financial bonds in the capital market to improve their liquidity.

### 3.3 The impact of asset quality and scale on the profitability of banks needs to be investigated

In this study, total assets and non-performing loan ratio were used as variables to measure size and asset quality. In the regression analysis of this article, the variables did not pass the significance test, but this does not indicate that the asset quality and size of banks have no relationship with the profitability of commercial banks. The reason may be related to the inappropriate selection of indicators for the size and asset quality of commercial banks, which requires further investigation and research.

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# Strategy for Designing and Developing Preschool Education Software

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## Abstract

**Purpose** – The purpose of this paper is to explore the strategies for the design and development of preschool education software, and to provide guidelines for the developers of preschool education software to produce more effective and interactive educational software.

**Design/Methodology/Approach** – Based on the development suitability of preschool education and the principle of combining education and entertainment, this paper analyzed the complete software development process, from needs analysis to testing and evaluation, and put forward the implementation strategy.

**Findings** – This paper studies the key principles and processes in the design and development of preschool education software, and how to implement the software through appropriate strategies, so as to improve the practical application value and education effect of educational software.

**Research Implications** – Research significance: This study provides guidance and reference for the design and development of preschool education software. It has significance in helping developers better understand the characteristics and needs of preschool education so as to design software products that are more in line with children's developmental characteristics and educational goals, promoting technological innovation and updating of teaching methods in the field of preschool education.

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**Keywords:** Preschool education, Software design, Software development, Educational technology

**JEL Classifications:** L2,L8,O3

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## I . Introduction

With technological advancements, the field of preschool education increasingly relies on digital tools to support teaching and learning activities. Designing and developing efficient preschool education software is paramount for fostering the cognitive and social skills development of young children. Effective software design not only aligns with fundamental educational principles but also considers the developmental characteristics and learning needs of young children. This thesis thoroughly discusses the key principles and processes involved in these design and development phases, along with implementing the software through suitable strategies to enhance their practical application value and educational effectiveness.

## II . Design Principles of Preschool Education Software

### 1. Principle of Developmental Appropriateness

The principle of developmental appropriateness, rooted in educational theory, underscores the necessity for software design to align with preschoolers' developmental stages and cognitive abilities. This principle mandates that software developers thoroughly grasp the physiological and psychological developmental traits of preschoolers, ensuring educational content and interactive design cater to their age-specific characteristics and learning needs. When implementing this principle, careful consideration is given to children's attention spans, cognitive capacities, and the appropriateness of sensory stimuli. For instance, educational software targeted at 3 to 5-year-olds should feature straightforward, intuitive user interfaces and avoid complex navigation pathways. Additionally, tasks and challenges should be designed to be sufficiently simple, enabling preschoolers to operate independently with minimal adult intervention. Moreover, the principle emphasizes the practical application of educational content, fostering comprehensive development through specific, relevant learning activities. Activities and games within the software should ignite children's curiosity and innate desire for exploration while providing an optimal level of cognitive challenge to support growth across language, mathematics, social, and emotional domains. Achieving this principle necessitates close collaboration between developers and educational experts to strike the right balance between entertainment and education, as depicted in Table 1.

**Table 1.** Special Principles of Preschool Education Software Design

<b>Principles of Preschool Education</b>	
General Principles	Principle of Respecting Children's Personality, Dignity, and Legal Rights. Principle of Promoting Comprehensive Children Development. Principle of Inclusivity with Attention to Individual Differences. Principle of Maximizing Children, Family, and Social Resources. Principle of Developmental Appropriateness
Special Principles	Principle of Integrating Care with Education Principle of Play-Based Activities Principle of Educational Activity and Activity Diversity Principle of Leveraging the Overall Educational Function of Daily Activities

## **2. Principle of Integrating Education with Entertainment**

The principle of blending education with entertainment, often referred to as “edutainment,” stands as a cornerstone when crafting preschool education software. This principle holds that presenting educational material in an entertaining format can significantly boost children’s motivation to learn and engagement, fostering a natural and enjoyable learning experience. In practice, developers must devise captivating storylines and interactive games, framing educational goals as engaging activities rather than conventional learning. For instance, role-playing games can impart basic mathematical skills while virtual travel narratives can introduce children to and deepen their understanding of concepts in natural sciences. Furthermore, this principle underscores the importance of multisensory learning. By integrating visual, auditory, and tactile elements, software can effectively support children’s cognitive development and skill acquisition. Animations, sound effects, and interactive feedback should be designed to captivate children’s attention without overly distracting them, ensuring the seamless delivery of educational content. Successfully merging education with entertainment requires close collaboration among educational psychologists, curriculum developers, and game designers to ensure that the resulting software not only meets educational objectives but also offers significant entertainment value (Wang, wangfen, 2015).

## **III . Development Process of Preschool Education Software**

### **1. Requirement Analysis and Topic Selection**

In the development of preschool education software, requirement analysis encompasses not only a thorough understanding of educational content but also an investigation into the psychological and behavioral traits of young children. During this phase, the development team collaborates with educational experts, psychologists, and practicing teachers to gather data through observations and interviews, among other methods, in order to analyze children’s learning motivation, cognitive developmental stages, and learning preferences. Moreover, requirement analysis must consider regulatory requirements and technical feasibility to ensure that the software complies with relevant educational policies while also harnessing the latest technology to enhance teaching effectiveness. Identifying and defining key issues in early childhood education, such as language development, foundational mathematics, and social skills, is pivotal in this process, as it directly influences topic selection and subsequent design. Through systematic requirement analysis, the core functions and educational objectives of the software can be established, offering clear guidance for the development of educational content and learning activities.

### **2. Design of Teaching Content and Objectives**

The teaching objectives should be precise and specific, closely linked to the developmental stage of the young children, while also ensuring that the teaching activities comprehensively cover the key learning areas recommended in the curriculum. The design team needs to develop specific content that aligns with the teaching objectives, including teaching materials, activities, interactive games, etc. This content should be both highly educational and engaging to spark children’s interest in learning and enhance their sense of participation. During the development of teaching content, as outlined in Table 2, each teaching activity is clearly matched with its corresponding teaching objectives, ensuring that each component effectively meets the learning needs of the children. Table 1 illustrates the relationship between teaching content and objectives, enabling the development team to clearly grasp the design intent and expected outcomes of each teaching activity,

thereby ensuring that each activity effectively contributes to the achievement of teaching objectives. Furthermore, the design of teaching content should also incorporate assessment methods and feedback mechanisms, allowing teachers and parents to monitor children's learning progress and outcomes, thus facilitating necessary teaching adjustments and optimizations (Zhang, Binglin, 2014).

**Table 2.** Correspondence between Teaching Content and Objectives

Types of Teaching Activities	Specific Content	Teaching Objectives
Interactive Games	Number Matching Game	Improve children's numerical cognition abilities
Role-playing	Zoo Daily Management Simulation	Enhance children's understanding of animal species and sense of responsibility
Storytelling	Go Shopping: A Mathematical Adventure Story	Teach basic mathematical calculations and currency usage
Drawing Activities	Expressing Emotions through Color	Develop children's artistic expression and color recognition abilities
Music Interaction	Teaching Basic Knowledge of Music and Rhythm	Cultivate children's sense of musical rhythm and creativity

### 3. Interaction Design and User Experience Optimization

The process of interaction design encompasses several aspects, including user interface (UI) design, user experience (UX) design, usability testing, and adaptive adjustments. UI design involves attention to visual elements like color usage, icon design, and layout configuration to suit the visual and cognitive development levels of young children. For instance, vibrant colors and large icons can better capture children's attention, while simplified layouts aid in their comprehension and navigation. UX design delves into children's feelings and behavioral feedback during software usage, ensuring that the interaction logic aligns with their learning habits and psychological traits. This may involve streamlining complex commands via touchscreen operations and incorporating voice prompts and animated feedback to enhance learning motivation. Usability testing is a practical process for evaluating and refining user experience, typically through methods like prototype testing, user trials, and scenario simulations to identify and address design issues iteratively. These tests should be conducted in authentic usage environments with real user groups to gather precise usage data and feedback. Lastly, adaptive adjustments ensure a consistent user experience across different devices and operating systems, including responsive design and cross-platform support, catering to children's usage habits on various devices like tablets and smartphones.

### 4. Technical Implementation and Platform Selection

Technical implementation and platform selection involve software programming, architecture design, and the final deployment of the platform. During the technical implementation phase, the development team must choose the appropriate technology stack and development tools based on previous requirement analysis and design specifications. Common programming languages such as JavaScript and Python, along with development frameworks like React or Angular, are widely used in modern educational software development. Additionally, selecting the right database management system, such as MongoDB or MySQL, and backend services like Node.js, are crucial for ensuring software performance and

scalability. Platform selection entails deciding on which devices and operating systems the software will run, taking into account the device usage habits and access permissions of the target user group. For instance, if the target users primarily use iOS devices, releasing the app on Apple's App Store would be a priority, while Google Play and other Android app stores would be preferable if Android devices are more common among the user group. Furthermore, given the specific nature of preschool education software, the development team must also prioritize security and privacy protection to comply with relevant laws and regulations such as the Children's Online Privacy Protection Act (COPPA) and safeguard children's personal information. Through careful technical and platform choices, software can meet educational needs in terms of functionality, ensure stable and reliable performance, and adhere to legal requirements, thereby providing children with a safe, effective, and accessible learning environment (Zhang, Lilong, 2012).

## **5. Testing, Evaluation, and Iterative Optimization**

Testing, evaluation, and iterative optimization constitute the ultimate stage of the preschool education software development process. The primary purpose of this phase is to verify the software's functionality and performance through systematic testing, evaluate its teaching effectiveness, and make necessary iterative improvements based on feedback. In this stage, the primary task is to conduct thorough software testing, including functional testing, performance testing, security testing, and compatibility testing, to ensure stable operation on different devices and platforms and to check for any potential security vulnerabilities. Additionally, particular attention is paid to whether the educational content and interaction design of the software meet the predetermined teaching objectives and are suitable for the cognitive and operational abilities of children. The evaluation process often requires integrating quantitative and qualitative research methods, including surveys, interviews, observations, and user testing, to provide direct data on the software's teaching effectiveness and user experience. Based on this data, the development team can identify deficiencies and improvement potentials in the software, enabling iterative development to continuously optimize the teaching content, user interface, and technical implementation. Emphasizing the iterative optimization process is crucial for maintaining the software's long-term competitiveness and adapting to rapidly changing technological environments, ensuring that the software continues to meet the demands of the education market and emerging educational concepts. Furthermore, a continuous user feedback loop is a key driver of iterative optimization. By establishing effective feedback mechanisms, the development team can promptly obtain user opinions and suggestions, enabling the software product to be more refined and better serve educational objectives and children's learning development.

## **IV . Strategies for Improving the Quality of Preschool Education Software**

### **1.Resource Integration and Interdisciplinary Collaboration**

Resource integration and interdisciplinary collaboration involve sharing resources and exchanging expertise to enhance the educational quality and technological level of software. This strategy relies on the collaboration of experts from various fields, including educational psychologists, early childhood education specialists, software engineers, interface designers, and child development experts, who collectively participate in the design, development, and evaluation of the software. Resource integration first involves diversifying teaching content, which encompasses not only the transmission of academic knowledge but also areas such as music, art, and physical activity to promote the comprehensive development of children. Table 3 illustrates the main participants and their contributions to interdisciplinary collaboration. Through this collaborative



approach, educational software can meet children’s developmental needs on different levels while making educational activities more diverse and engaging. Additionally, collaboration extends beyond internal team experts to external educational institutions, research institutions, and families, forming a broad support network. Through regular seminars and feedback meetings, stakeholders can promptly exchange the latest research findings and educational concepts, inspiring each other and collectively driving innovation and progress in educational software (Wu, Aihong, 2010).

**Table 3.** Participants in Interdisciplinary Collaboration and Their Contributions

Professional Field	Participants	Contribution
Educational Psychology	Educational psychologists	Design teaching content that meets the developmental needs of young children.
Software Engineering	Programmers	Provide technical solutions to ensure stable software performance.
Interface Design	Designers	Develop user interfaces that are friendly and easy to use.
Child Development	Early childhood education specialists	Offer support for children’s growth and learning theories.
Arts and Music	Artists, musicians	Enrich teaching content, enhance interactivity, and fun.

## 2.Enhancing Children’s Engagement

Enhancing engagement in educational activities significantly increases children’s motivation and educational outcomes. To achieve this, software development incorporates elements that capture children’s attention and interest, including vivid visual effects, interactive game design, and teaching content tailored to their cognitive development stages. Implementing this strategy requires in-depth research into children’s interests and preferences to ensure software content is closely related to their daily lives and can stimulate their curiosity. For instance, integrating role-playing games, simulation activities, or interactive stories allows children to learn new knowledge while engaging in play. Additionally, software is designed to allow children to choose different learning paths based on their learning pace and interests, providing personalized learning experiences. This not only increases children’s sense of involvement but also promotes their active learning abilities through self-directed learning. Furthermore, educational software features high interactivity, utilizing touchscreen operations, voice feedback, and dynamic feedback to maintain children’s interest in learning. These interactive features help children achieve a sense of immediate accomplishment and satisfaction during operation, further enhancing their learning motivation. Effective engagement enhancement strategies are based on principles from child psychology and education, continuously adjusted through ongoing user testing and feedback, to continually optimize software design, ensuring it truly captivates and sustains children’s attention during actual use, achieving the desired educational outcomes.

## 3.Interaction Between Parents and Educators

The interaction between parents and educators not only enhances the application effectiveness of educational software but also optimizes the educational content and functionality of the software. In practical cases, a preschool education software named “Jia Yuan Qiao” exemplifies this well. The software allows educators to upload course content and students’ learning progress, while parents can receive this information in real-time and provide feedback or suggestions based on

their children's learning progress. Additionally, the software includes parent forums and a Q&A module, enabling parents to engage in in-depth communication with teachers regarding their children's educational issues. Through this approach, parents not only become witnesses to their children's learning process but also active participants and facilitators. Statistical data indicates that in schools using "Jia Yuan Qiao," parental involvement increases by an average of 30%, and with the collaborative efforts of educators and parents, the learning outcomes of preschool children generally improve. This model emphasizes the bidirectional communication and mutual involvement between parents and educators, effectively integrating home education with school education, optimizing the allocation and utilization of educational resources, and enhancing the quality of education.

#### **4.The Application of Implicit Learning and Gamified Education**

Implicit learning and gamified education involve integrating learning content into games, allowing children to naturally acquire knowledge and skills while having fun. This learning approach not only enhances the enjoyment of learning but also improves its effectiveness. For example, an educational software designed specifically for preschool children, called "Le Xue Yuan," teaches colors, numbers, and basic logic through various interactive games. Each game in the software is based on research in educational psychology, ensuring that the game design not only captures children's attention but also achieves educational objectives. In "Le Xue Yuan," children learn by solving puzzles, completing memory games, or participating in role-playing activities. These game designs take into account children's age characteristics and cognitive development stages, ensuring the suitability of educational content and the scientificity of teaching methods. Furthermore, the concept of implicit learning emphasizes learning in informal and non-coercive environments, allowing children to develop problem-solving abilities and innovative thinking unconsciously. This gamified learning approach has been proven to effectively enhance children's learning motivation and long-term learning outcomes, making it particularly important for fostering children's autonomy and creativity in learning (Yu, Linchong, 2000).

#### **5.Establishment of Continuous Updates and Feedback Mechanism**

In the design and development process of preschool education software, establishing a continuous update and feedback mechanism is crucial. This mechanism not only provides ongoing motivation for software improvement but also ensures the software remains adaptable to changing educational needs and technological advancements. Effective feedback mechanisms involve collecting data and opinions from users (children, parents, and educators) and using this information to guide the iterative updates of the software. For example, through regular online surveys, user behavior analysis, and direct user feedback collection, the development team can identify shortcomings in the software and promptly respond to specific user needs. Additionally, employing advanced data analysis techniques such as machine learning and pattern recognition enables automated analysis of user behavior, thereby gaining insights into usage patterns and potential issues. These analytical insights support the development team in precisely adjusting teaching content and interface design during version iterations to enhance user interaction and learning effectiveness.

### **V . Conclusion**

When designing and developing preschool education software, following principles of developmental appropriateness, combining entertainment with education, and establishing feedback mechanisms are crucial. Through these strategies, the software is not only supporting children's learning but also providing an environment that combines learning with fun.

Integrating interdisciplinary resources and promoting children's participation enhances the richness and interactivity of the learning experience. The continuous updating of the software and effective integration of user feedback ensure its long-term applicability and educational effectiveness. Therefore, meticulously designed preschool education software can significantly improve the quality of education and meet the needs of modern education.

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# Ethical Guidelines

## Chapter 1. General Rules

### Article 1 (Purpose)

The purpose of the following rules is to present the basic ethical principles and direction needed to ensure the research ethics of editorial board members, peer-reviewers, and authors who examine or submit articles to the Journal of Advanced Academic Research and Studies (JAARS). NLBA Eurasian Institute publishes these rules to present the procedure and actions for research misconduct.

### Article 2 (Object of the Study and Scope)

The research is subject to sanction, investigation and judgement to determine whether research ethics were followed when any of the following occurs:

- i. The study was submitted to the Journal of Advanced Academic Research and Studies,
- ii. The study was confirmed to be published in the Journal of Advanced Academic Research and Studies,
- iii. The study has already been published in the Journal of Advanced Academic Research and Studies.

## Chapter 2. Honesty and Social Responsibility of the Research

### Section 1. Honesty in the Research

#### Article 3 (Honesty of the Research)

- a. Researchers must conduct every research behavior (proposing research, researching, reporting and presenting research, investigating and judging) honestly and sincerely.
- b. Researchers must describe the content and the importance of the study clearly and objectively, and must not delete or add results arbitrarily.
- c. Researchers must carry out every study without any bias or prejudice.

#### Article 4 (Ethics for Researchers)

- a. Researchers must not commit research misconduct during any part of the research process.
- b. A study must not be submitted if it has been published in other journals, and researchers must not request review of the study to different journals at the same time. However, a thesis or a paper presented in a conference as a working paper shall be exceptions.

#### Article 5 (The Record, Storage, and Report of Research Data and its Disclosure)

- a. All research information must be clearly and precisely recorded, processed, and preserved so that it may be accurately analyzed and confirmed.
- b. Researchers shall use proper research methods and statistics, and those shall be available to the public if necessary.

## **Section 2. Fairness in Researchers' Contributions**

### **Article 6 (Collaborative Research)**

Researchers must make the roles and contributions of all contributors clear if they conduct a joint study with other researchers, and shall take full responsibility for establishing this. Prior to conducting research, mutual agreement and understanding shall be made with regard to property rights and ownership issues, research director selection, authorship and the standard of order. the data collection method. individual role in the study. and expectations and objectives of the study.

### **Article 7 (Responsibility and Duty, Order of Authors)**

- a. Researchers are responsible only for the study that they carry out or are involved in as an author, and are recognized for that achievement.
- b. Authors must accept requests for proof of their contributions.
- c. The order of authors must accurately reflect the academic contribution by each author to the research contents or results, regardless of the authors' relative positions.

### **Article 8 (Corresponding Author)**

- a. Corresponding authors shall take overall responsibility for the results of the study and proofs.
- b. Corresponding authors shall have the burden of proof with respect to the order of the author and co- author(s).

### **Article 9 (Affiliation of Author)**

When indicating the affiliation of author(s), the author's current status in principle shall be given. However, it is possible to follow the customs of the author's academic field if their field of affiliation follows a different custom.

## **Chapter 3. Research Misconduct and Unethical Research Conduct**

### **Section 1. Methods and Principles of Citation**

#### **Article 10 (Methods and Principles of Citation)**

- a. The author may cite a part of other researchers' studies in his/her research paper using their original text, or the translated version by introducing, referring to or making a comment on the original.
- b. The author shall take all possible measures to ensure the accuracy in stating sources and making the list of references. The author must confirm all elements of a citation (author's name, number/volume of the journal, page and published year) not depending on the secondary source but solely on the original work. However, when inevitable, the author can include with acknowledgment.
- c. The author must cite in a reasonable manner and use the good faith principle, so that uncited works can be clearly distinguished from cited works.
- d. The author must cite published works only. However, in the case of citing unpublished academic materials that have been acquired through personal contact, paper review or proposal review, the author must acquire consent from the relevant researcher(s).
- e. When the author introduces ideas or theories in his/her work that have been presented in another study, the source must be stated.

- f. The author must distinguish his/her own ideas from cited materials when borrowing substantive parts from one source, so readers can clearly recognize the author's work.
- g. If a reference has a significant impact on the direction of the research or can help the reader understand the contents, the author must include all such works on the list of references, except in such cases where the relevant research can theoretically and empirically be inferred.

**Article 11 (Method of General Knowledge Citation)**

- a. If the author uses someone else's idea or a fact provided by them, the source should be provided. However, general knowledge or material that general readers will already recognize shall be an exception.
- b. If the author is unsure whether any concept or fact qualifies as general knowledge, it is recommended to cite the original text.

**Section 2. Research Misconduct**

**Article 12 (Definition of Research Misconduct)**

“Research misconduct” refers to any instances of forgery, falsification, plagiarism, failure to give proper credit to co-authors or redundant publications that may emerge during the entire research process (research proposal, conduct of research, report and presentation of research, investigation and judgement).

- a. “Forgery” refers to the act of presenting non-existent data or research results.
- b. “Falsification” refers to the acts which artificially manipulate research processes, randomly modify, or delete data resulting in distorted research content or research results. (Here, “deletion” refers to the act of using only favorable data and intentionally excluding the data that might cause unexpected or undesired results.)
- c. “Fabrication” refers to the act of intentionally creating a document or record that does not exist.
- d. “Plagiarism” refers to the acts which pirate other's work, ideas or research, using ideas, hypotheses, theories, research contents, or research results without justifiable approvals, citation, or quotations, as if those were his/her own.
- i. “Idea Plagiarism” refers to the act of using someone else's ideas (explanations, theories, conclusions, hypothesis and metaphors) in full, substantial proportions or in a fragmented revised form without giving appropriate credit to the originator of the words and ideas. Authors have moral responsibility to indicate the source of ideas through a footnote or a reference. Authors must furthermore not steal other's ideas which are known through peer review of research proposals and submitted articles.
  - ii. “Text plagiarism” refers to the act of copying text from another's work without clarifying the original author.
  - iii. “Mosaic plagiarism” refers to the act of combining a part of a text with a few words added, inserted or replaced with synonyms, and others without clarifying the source or the original author.
- e. “Redundant Publication” refers to the act of publishing a paper that is identical or highly similar text to one that has already been published in the past in another academic journal without alerting the editors or readers of the fact that this work was previously published elsewhere. If the contents of the paper are almost the same as his/her previously published paper, the later paper is regarded as a redundant publication even if the text has a different point of view or perspective, or including a different analysis based on the same data that has been previously published. In the case in which the author would like to publish a paper using a previously published paper, he/she must acquire permission from the chairperson after providing the information about the publication and double-checking whether it is a redundant publication or duplication of a publication.

- f. “Self-plagiarism” refers to the act of using images, graphs or part of one’s own research already published without identifying the source, and it is regarded as redundant publication.
- g. “Failing to give proper credit to co-authors” refers to the act of failing to list those who have contributed academically to the research process or results as a co-author or conversely to the act of listing those who have not made any academic contribution as co-authors.

**Article 13 (Research Misconduct and Copyright Infringement)**

- a. Generally, the copyright of all papers and instances published through NLBA Eurasian Institute is assigned to the author. However, if they are utilized for public objects like education, NLBA Eurasian Institute owns the right of use.
- b. The full term of copyright is assigned to the academic journal publisher in all papers published in academic journals.
- c. It should be noted that “Redundant Publication” may cause copyright violation.
- d. It should be noted that the author should use proper quotation marks when widely citing text from copyrighted sources, and even if the text is properly cited, it could infringe copyright.

**Section 3. Inappropriate Writing**

**Article 14 (Inappropriate Writing)**

The following are regarded as inappropriate writing:

- i. Inappropriate citations
- ii. Distorting references
- iii. The act of depending on abstracts when citing the published paper
- iv. Citing papers that the author did not read or understand
- v. The act of partially citing despite intensively borrowing from a single source
- vi. The act of reusing text

**Article 15 (Prohibition of Distortion of References)**

- a. References must only include documents that are directly related to the article content. Unrelated references for the purpose of intentionally manipulating the citation index of the paper or academic journal should not be included.
- b. As a moral responsibility, the author should not only cite the references which will be favorable to his/her data or theory, but also cite references which may contrast with his/her point of view.

**Article 16 (Reuse of Text)**

- a. “Reuse of Text” refers to the act of re-using a part of the manuscript that he/she has used in a previous paper.
- b. Text reuse is an act contradictory to ethical writing, so the author must avoid re-using text already used. In case of unavoidable text re-use, the author should not violate copyright infringement by following standardized reference practices including the use of quotation marks or proper indication.

## **Chapter 4. Ethical Rule Enforcement**

### **Section 1. Research Ethics Committee**

#### **Article 17 (Ethical Rule Pledge)**

New members who have enrolled in the research pool of NLBA Eurasian Institute shall acquaint and pledge to abide by these research ethics when submitting to the “Journal of Advanced Academic Research and Studies” and conducting research. Current members shall be regarded as having pledged to abide by these research ethics when initiated.

#### **Article 18 (The Announcement of Violation of Ethical Rule)**

If a member learns that another member has violated any ethical rules, he/she should endeavor to correct the mistake by helping make him/her be aware of the rules. However, if he/she does not correct the violation or the ethical violation is obviously unveiled, the member must report to the committee immediately.

#### **Article 19 (Organization of the Research Ethics Committee)**

NLBA Eurasian Institute shall establish a Research Ethics Committee (hereinafter referred to as the “Committee” ) mandated to deliberate on matters falling under each of the following sub-paragraphs:

- a. Matters concerning establishment and revision of these rules.
- b. Matters concerning acceptance and handling of misconduct.
- c. Matters concerning beginning actual investigation and decision, approval, and re-deliberation of investigation results.
- d. Matters concerning protection of informant and examinee.
- e. Matters concerning investigation of research integrity, handling of investigation results and follow up measures.
- f. All the matters concerning operations of other committees.

#### **Article 20 (Organization of Research Ethics Committee)**

- a. The Committee shall consist of one chairperson and members of no less than five but no more than nine persons.
- b. The chairperson and the members shall be appointed by the chairman of NLBA Eurasian Institute.
- c. The members of this committee shall hold a one year term and they may be reappointed.
- d. The chairperson and the members of this committee shall maintain independence and confidentiality with respect to the details relating to deliberations and decisions.

#### **Article 21 (Organization of Research Ethics Committee)**

- a. The chairperson of the committee shall convene any meeting and preside over such meetings.
- b. The committee's meetings shall open with the attendance of a majority of the total members including the chairperson and resolve with the concurrent vote of a majority of those present.
- c. No meeting of the committee shall be open to the public. [The meeting shall not be open to the public in principle, but whenever deemed necessary, the committee can ask the related party and hear their opinions.]
- d. Whenever deemed necessary, the committee can ask the related party and hear their opinions.
- e. Any member who is involved in the research subject to an investigation will not be permitted to attend the concerned meeting due to a conflict of interest.



**Article 22 (Authorities and Responsibilities of the Committee)**

- a. The committee can summon for attendance and data submission any informants, examinees, witnesses and testifiers, in the process of an investigation.
- b. When the examinee refuses to attend the meeting or data submission without a justifiable reason, it could be presumed as an indication that he/she has acknowledged the allegations.
- c. The committee can take substantial measures to prevent any loss, damage, concealment or falsification of research records or evidence.
- d. The committee members should comply with confidentiality concerning deliberation-related matters.

**Section 2. Research Integrity Investigation**

**Article 23 (Reporting a Fraudulent Act)**

An informant can report a fraudulent act using any means available when reporting using their real name. However, when reporting anonymously, he/she must submit the title of the paper, and the evidence and detail of the misconduct in writing or by e-mail.

**Article 24 (Confidentiality and Protection of Rights of Examinee and Informant)**

- a. The committee should not reveal the personal information of the informant unless it is necessary.
- b. The committee must take action to protect the informant if the informant experiences illegitimate pressure or threats due to reporting the fraudulent act.
- c. Until the investigation of a fraudulent act is completed, the committee must be careful not to infringe upon the rights or reputation of the examinee. If the person turns out to be innocent, the committee must make efforts to recover the reputation of the person.
- d. The identity of the informant, investigators, testifiers, and consultants should not be disclosed.
- e. All facts relating to research ethics and authenticity investigations must remain confidential and the people involved in the investigation must not reveal any information obtained during the process. If there is a need to disclose related information, the committee can vote to make such a decision.

**Article 25 (Raising an Objection and Protection of Defense Right)**

- a. The committee must ensure the informant and examinee have equal rights and opportunities to state their opinions and objections. Such procedures must be informed to them beforehand.
- b. An examinee or informant may require the avoidance of deliberation and decision after explanation in case he/she expects an unfair decision.
- c. The research ethics committee must give the examinee a chance to submit their opinion and clarify any fact revealed during the first report or any additional report.

**Article 26 (Preliminary Investigation of Research Misconduct)**

- a. The committee must investigate the presence of misconduct if there is a considerable doubt about legitimate conduct or detailed information about misconduct.
- b. The chairperson can officially carry out the investigation (hereinafter referred to as the "preliminary investigation" ) which is a procedure to decide whether the suspected misconduct should be investigated after consultation with the chairman of NLBA Eurasian Institute.

- 
- c. The committee shall form the preliminary investigation committee consisting of no more than five members within 30 days of reporting.
  - d. The committee shall inform the informant and examinee of the formation of such a committee, and give the examinee a chance to clarify within 30 days.
  - e. A preliminary investigation is initiated within 30 days of the formation of the preliminary investigation committee and the investigation should be completed within 30 days of the start of the investigation except in unavoidable circumstances.
  - f. If it has been more than five years since a misconduct was committed, the reporting is not handled in principle even if the reporting is accepted.
  - g. Through preliminary investigation, the following is reviewed:
    - i. Whether the reported instance qualifies as research misconduct
    - ii. Whether the reporting is specific and clear enough to lead to an actual investigation
    - iii. Whether more than five years has passed since the reported misconduct was committed

**Article 27 (Report and Notice of the Preliminary Investigation Result)**

- a. The result of the preliminary investigation shall be notified to the informant and examinee within ten days of the committee's decision, and reported to the chairman of NLBA Eurasian Institute.
- b. The result report of the preliminary investigation must include the following:
  - i. Specific information regarding the alleged misconduct
  - ii. Facts regarding the alleged misconduct
  - iii. Grounding for decision on whether to conduct an actual investigation

**Article 28 (Raising an Objection and Protection of Right of Defense)**

- a. The committee must ensure that the informant and examinee have equal rights and opportunities of opinion statement and objection. Such procedure must be informed beforehand.
- b. The informant and examinee can make an objection within ten days from the day of being notified of the preliminary investigation.

**Article 29 (Beginning and Duration of an Actual Investigation)**

- a. The actual investigation begins within 30 days after a positive result from a preliminary investigation. During the period, the actual investigation committee consisting of no more than nine persons (including the preliminary investigation committee) must be formed to conduct an actual investigation.
- b. The actual investigation must be completed within 90 days from the beginning date.
- c. If the investigation committee decides that it cannot be completed within the specified period, it can explain the reason to the committee and request a 30 day extension (one time only).

**Article 30 (Formation of an Actual Investigation Committee)**

- a. An actual investigation committee is composed of no more than nine members.
- b. Formation and duration of an actual investigation committee is determined by the committee. The chairperson of the actual investigation committee is elected among the actual investigation members.
- c. The investigation committee shall include at least two members with specialized knowledge and experience in the relevant field.
- d. A person who has a stake in the investigated matter must not be included in the actual investigation committee.

**Article 31 (Request for Appearance and Document Submission)**

- a. The actual investigation committee can request the examinee, informant(S), and testifiers to appear for testimony and the examinee must comply.
- b. The actual investigation committee can ask the examinee for submission of a document, and retain and store the relative research materials about the person involved in the misconduct after the approval of the head of the research organization in order to preserve evidence relating to the investigation.

**Article 32 (Exclusion, Avoidance and Evasion)**

- a. The examinee or informant(s) can require exclusion by identifying the reason if there are reasons to believe that a committee member is unable to maintain fairness. When such request for exclusion is recognized, the member subjected to the request shall be excluded from the concerned investigation.
- b. If the committee member is directly related to the corresponding matter, he/she shall be excluded from all deliberation. decisions and investigation of the matter.
- c. The chairperson can suspend the qualification of a member who is related to the corresponding matter in connection with the corresponding investigation.

**Article 33 (Investigation Report Submission)**

The actual investigation committee must submit the result to the committee within the actual investigation period, and the result must include the following:

- i. Specific details of the alleged misconduct
- ii. Facts regarding the alleged misconduct
- iii. Evidence, witness list and affidavits
- iv. Investigation results
- v. Other data useful for decisions

**Article 34 (Decision)**

- a. The decision must be made within six months from the beginning of the preliminary investigation.
- b. The committee shall make the decision confirming that the examinee committed research misconduct after reviewing the result report.

**Section 3. Action after Investigation**

**Article 35 (Action in accordance with Investigation Result)**

When a decision is made confirming the research misconduct, the committee can sanction the author with applicable punishment to each of following, or impose corresponding retribution.

- i. The publication is postponed until the final decision of the research ethics committee is made even if the paper has been confirmed to the author that it will be published.
- ii. The publication of the paper to which the research misconduct is related is to be canceled and deleted from the article list of the journal even if the volume has already been published.
- iii. The author found to have committed such misconduct is prohibited from submitting papers to the journal for three years, and these facts are made public on the homepage of the journal (<http://www.nlbaei.org>).

- iv. If there is an author found to have committed plagiarism or redundant publication, the editorial board stores the relevant investigation details for five years.
- v. The chairperson of the organization with which the author(s) is affiliated is notified of the final decision.

**Article 36 (Investigation Result Notification)**

The chairperson of the committee shall immediately notify the related persons such as the informant and examinee of the committee's decision regarding the investigation result in writing.

**Article 37 (Investigation Result Notification)**

- a. If the informant or the examinee refuses the committee's decision, he/she must submit a re-deliberation request to the committee within 15 days from receipt of the result notice as prescribed in Article 37.
- b. The committee must decide whether re-deliberation is necessary within 10 days of the receipt of the re-deliberation request.
- c. The committee will decide there-deliberation procedure and method.

**Article 38 (Follow-ups such as Recovery of Author's Honor)**

If the results of the investigation confirm that no research misconduct has been identified, the committee must take follow-up steps to recover the reputation of the examinee.

**Article 39 (Storing the Record and Confidentiality)**

- a. All records regarding the preliminary and actual investigation are stored for five years from the date of the investigation's conclusion.
- b. All facts relating to research ethics and the investigation must remain confidential and the people involved in the investigation must not reveal any information obtained during the process. If there is a need to disclose investigation information, the committee can vote to make such decision.

**Article 40 (Etc.)**

Matters that are not determined by these rules are to be decided by the editorial board.

**Article 41 (Date of Effectiveness)**

These regulations shall be effective as of January 1, 2024.

## **Editorial Regulations**

Journal of Advanced Academic Research and Studies (JAARS)

### **Chapter 1. General Roles**

#### **Article 1 (Purpose)**

The purpose of the following rules is to prescribe matters regarding the editorial work and standards for the Journal of Advanced Academic Research and Studies (hereinafter referred to as “JAARS”) published by NLBA Eurasian Institute.

### **Chapter 2. Editorial Committee**

#### **Article 2 (Editorial Committee)**

The editorial committee (hereinafter referred to as “committee”) is established in order to accomplish the purpose of Article 1.

#### **Article 3 (Formation of Editorial Committee)**

- a. The editorial members shall be appointed by the chairman of NLBA Eurasian Institute, and the committee shall consist of no more than 50 members.
- b. The chief editor shall be appointed by the chairman of NLBA Eurasian Institute and is in charge of all editing.
- c. The editorial committee shall be composed of two chief editors, one editor, and one managing editor. The editors are appointed by the chairman of NLBA Eurasian Institute among editorial members.
- d. The term for the chief editor is three years, and the term for the editorial members is two years, and editorial members may be reappointed.
- e. This committee makes decisions with a majority attendance of the members and a majority agreement of the members present.

#### **Article 4 (Qualification of Editorial Members)**

The editorial members shall meet the following qualifications:

- i. Being at least an associate professor in a domestic/international university or a person equally qualified
- ii. Someone who studies in an area within the JAARS's specialty and who has published at least 3 articles in a journal (or 1 article in an SCI, SSCI and/or SCOPUS indexed journal) within the last three years

#### **Article 5 (Responsibilities and Obligations of Editorial Members)**

- a. Editorial members are fully responsible for the decision to publish JAARS-submitted papers, confirm their integrity during the deliberation process, and observe candidates during the editing process.
- b. Editorial members should respect the author's person and independence as a scholar, and make the process of the evaluation of the research paper public if there is a request.
- c. Editorial members should handle submitted papers only based on the quality and submission guidelines, not based on the author's gender, age, or affiliation.

- d. Editorial members should request a reviewer with specialized knowledge and fair evaluation ability in the relevant field to evaluate submitted papers. However, if evaluations of the same paper are remarkably different, editorial members can acquire advice from an expert in the relevant field.
- e. Editorial members should not disclose the matters of the author and the details of the paper until a decision is made pertaining to the publication of the submitted paper.

### **Chapter 3. Paper Submission and Peer Review Committee**

#### **Article 6 (Qualification of Submission and Submission)**

- a. All the paper submitters must be members registered with JAARS.
- b. All papers should be submitted through the JAARS's online submission system (<http://www.nlbaei.org/>) and Email: [edubscon@outlook.com](mailto:edubscon@outlook.com), and can be submitted at any time. English-language papers from authors outside of the United States of America may also be submitted using e-mail.

#### **Article 7 (Formation of Peer Review Committee)**

- a. Peer reviewers are appointed by the chief editor, and selected based on the field of the reviewer's expertise. (According to circumstances, a peer reviewer who is not a member of JAARS may be appointed.)
- b. Editorial members for each content subject such as international economy, international management, or practice of trade can also serve as peer reviewers.
- c. The chief editor represents editorial members, handles all the matters relating to review, and reports the results of peer review to the committee.
- d. The managing editor is in charge of the procedure relating to review.
- e. The classification and selection of submitted papers is decided by the chief editor and the managing editor, and they report it to the committee.

#### **Article 8 (Qualification of Peer Reviewers)**

Peer reviewers shall have the following qualifications:

- i. Being at least an associate professor in a domestic/international university, or a person who is as equally specialized as the person above.
- ii. Someone who studies an area within the JAARS's specialty and has published at least 3 articles in a journal (or 1 article in an SCI, SSCI and/or SCOPUS indexed journal) within the last three years.
- ii. Someone who presents a paper, chairs a session or serves as a discussant at an academic conference at the same level of the institution, or has served as a reviewer of a study which has been indexed in a domestic or international journal within the last three years.

#### **Article 9 (Responsibility and Duty of Peer Reviewers)**

- a. Peer reviewers should evaluate papers and report the results of the evaluation to the committee within the time period set by the committee. However, if he/she believes that they are not appropriately qualified to review the paper, they should notify the committee without delay.
- b. Peer reviewers should respect the author's person and independence as a scholar. Peer reviewers may request for revision of the paper with detailed explanations if needed in the evaluation of the research paper.

c. Papers are reviewed confidentially using a method in which the name and affiliation of the author is confidential to the public. Showing the paper and/or discussing the contents of the paper with a third party is not desirable unless a consultation is needed for purposes of review.

**Article 10 (Unethical Behavior in the Review Process)**

- a. Peer reviewers must not manipulate either directly or indirectly the related research-specific information contained in the research proposal or review process without the consent of the original author.
- b. Peer reviewers must be careful of the following since it could be regarded as unethical research practices in the review process:
  - i. The act of handing over a requested paper to students or a third party
  - ii. The act of discussing the details of a paper with colleagues
  - iii. The act of obtaining a copy of the requested material without shredding it after review
  - iv. The act of disgracing the honor of others or fabricating a personal attack in the review process
  - v. The act of reviewing and evaluating a research paper without reading it

**Article 11 (Personal and Intellectual Conflict)**

- a. Peer reviewers must fairly evaluate using an objective standard regardless of personal academic conviction.
- b. Peer reviewers must avoid personal prejudice when reviewing a paper. If there is a conflict of interest including personal conflict, it must be notified to the committee.
- c. Peer reviewers must not propose rejecting a paper due to a conflict in interpretation or with the point of view of the reviewer.

## **Chapter 4. Principle and Process of Paper Review**

**Article 12 (Papers for Peer-review)**

Review shall proceed based on the writing and submission guidelines. If the submitted paper substantially diverges from the writing and submission guidelines, the paper may not be reviewed.

**Article 13 (Request for Review and Review Fee)**

- a. The chief editor discusses the selection of reviewers with editorial members and selects two reviewers for each paper after submitted papers pass the eligibility test.
- b. The chief editor immediately requests the two selected reviewers to review the relevant submitted paper.
- c. Papers are reviewed by confidential method in which the name and affiliation of the author is confidential to the reviewer, the name of the reviewer is confidential to the author.
- d. The chief editor requests a review after deleting the name and the affiliation of the author from the submitted paper, so that the reviewer cannot obtain the identity of the author.
- e. A review fee shall be paid to the reviewer.

**Article 14 (Review of Paper and Decision)**

- a. Reviewers shall submit a decision report via the JAARS's online submission system (<http://www.nlbaeai.org/>) and Email: [edubscon@outlook.com](mailto:edubscon@outlook.com) within two weeks after they are asked to review a paper.

b. The reviewer shall decide whether the paper should be published based on the following standard. However, if the paper receives less than 30 points in the suitability and creativity of the topic, it will not be published.

- i. The suitability of the topic (20 points)
- ii. The creativity of the topic (20 points)
- iii. The validity of the research analysis (20 points)
- iv. The organization and logic development of the paper (20 points)
- v. The contribution of the result (10 points)
- vi. The expression of the sentence and the requirement of editing (10 points)

The reviewer must give one of the following four possible marks within the two week period: A (90~100 points, acceptance), B (80~89 points, acceptance after minor revisions), C (70~79 points, re-review after revision), F (Rejection), and write an overall review comment concerning the revision and supplementation of the paper.

c. In an instance where the reviewer does not finish the review within the two week period, the chief editor can nominate a new reviewer.

#### **Article 15 (Correction of Papers according to the Editing Guideline)**

a. Before holding an editorial committee meeting, the chief editor shall request editorial staff correct those papers that receive “acceptance” or “acceptance after minor revisions”, using the journal's paper editing guidelines. However, if there is a paper that receives “acceptance” after the editorial committee meeting, the chief editor will request the editorial staff to correct the paper after the meeting.

b. The chief editor shall notify each author of the result of his or her paper review after receiving the corrected version of the paper from the editorial staff. However, papers which receive a “rejection” shall not be notified of their result.

#### **Article 16 (Decision of Paper and Principle of Editing)**

a. The chief editor shall call an editorial board meeting and make publication decisions after receiving finished papers from reviewers.

b. The editorial board will make decisions to publish based on the following chart. The editorial board should respect

Results of 2 peer-reviews	Overall evaluation(average)	Decision to publish
AA	A	Acceptance
AB, AC, BB	B	Acceptance after minor revisions
AD, BC, BD, CC	C	Re-evaluation after revision
CD, DD	F	Rejection

reviewers' decisions on relevant papers, but can make decisions based on the editorial policy of the JAARS.

c. The paper that is awarded “acceptance” should receive a “B” or higher from reviewers or the level of overall evaluation (average) should be “B” or higher, and the paper that is awarded “acceptance after minor revisions” should have its satisfactory revisions and/or developments confirmed by the initial reviewer after re-submission.

d. The editorial board shall confirm that papers in consideration for publication are suitable to the writing and submission guideline of JAARS, look through detailed matters, and decide particular issue policies such as the number of papers and the order of them.



- e. In the case where a paper was presented or submitted for review previously, it cannot be published in JAARS.
- f. In the case where an author submits two or more papers for consideration, only one paper that receives “acceptance” shall be published in the same issue.

**Article 17 (Notification of the Result)**

- a. The chief editor shall notify an author of the review result after the initial evaluation or re-evaluation is finished, but can request the author to revise and develop the paper based on the evaluation report. If the editorial board makes a final decision on publication, the author should be notified.
- b. The author must be notified of the review result within one month from the day of receiving the paper or revised paper (or the deadline of submission). If it is impossible to notify the author within one month, the reason and the due date of notification must be notified to the author.
- c. Unless there is a specific reason, the author must submit a file including a response to the evaluation report, revision to and/or development of the paper to the chief editor after editing the paper within the period the editorial board suggests when he/she is asked to edit the paper. The changed details must be confirmed by the editorial board as well. In case the author does not submit the revision and development to the editorial board within the period, it shall be automatically postponed until this process is finished.
- d. A paper that receives a “C” in the overall evaluation (average) shall be re-evaluated after the chief editor sends the revised article and revision report to the initial reviewer(s).
- e. In cases where the evaluations of the same paper are remarkably different among reviewers, the chief editor can nominate a third reviewer and request a re-evaluation. In this case, the chief editor shall send the evaluation report to three different reviewers and have them submit the final evaluation report based on the details of the paper, and the paper can be published after revision only if the final mark awarded the revised paper is higher than a “B” in the overall evaluation.
- f. The chief editor will issue an acceptance letter for the papers confirmed to be published.

**Article 18 (Proofreading and Editing)**

- a. The chief editor shall request domestic/international members to proofread and edit papers confirmed to be published.
- b. Proofreading and editing members shall be recommended by the chief editor and appointed by the chairman of NLBA Eurasian Institute.
- c. The chief editor shall send the results of proofreading and editing to the original author and request the author to edit the paper appropriately.
- d. The author, unless there is a specific reason, must submit the revised paper and revision report to the chief editor after editing the paper within the period the editorial board suggests when he/she is asked to edit the paper. The changed details must be confirmed by the editorial board as well.
- e. Even if a paper is confirmed to be published, it will be rejected if it has not fulfilled the editing procedure following the result of proofreading and editing, or has been found to have committed research misconduct of any kind.
- f. If an editing member finds plagiarism, inadequate form, or low quality in the process of editing a paper that the journal has confirmed to be published, he/she must notify the chief editor and can suggest proper responses to the findings. g. The chief editor suggests whether to avoid publication of a paper or have the author re-submit the paper after revision and development according to the guidelines stipulated in Article 5. In the case of a paper requested to be revised and developed, publication can be postponed based on the degree of completion and the schedule of revision and development.

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## Chapter 5. Editing and Publication

### Article 19 (Editing and the Date of Publication)

JAARS is published twelve times a year in principle. However, if there is a reason such as the number of submitted papers, the committee can increase or decrease the number of issues.

### Article 20 (Notification of Editing)

- a. The chief editor shall acquire publication consent from the authors of the confirmed papers before printing.
- b. The chief editor shall report to the chairman of NLBA Eurasian Institute when the editorial process following editorial policy is completed, and shall further follow the outlined process for printing and editing.

### Article 21 (Sanction on Plagiarism and Redundant Publication)

If the ethics committee finds that a submitted paper or a published paper contains plagiarism or was published in another journal, the following sanctions will be taken:

- a. Distributing after deleting the relevant paper in the journal if the journal has not been distributed yet,
- b. Notification of paper deletion on the website if the related issue has already been distributed,
- c. Notification of the plagiarism or redundant publication of the relevant paper on the website,
- d. Banning the relevant author from submitting papers to all journals published by JAARS for two years from the date when plagiarism and redundant publication is found and from presenting in conference,
- e. Notifying the author's affiliated organization or institution of the fact of the plagiarism or the redundant publication, if necessary.

### Article 22 (Transfer of the Rights of Publication, Duplication, Public Transmission, and Distribution)

- a. The right of publication of the paper is owned by NLBA Eurasian Institute unless specified.
- b. The author(s) shall transfer the right of duplication, public transmission, and publication to NLBA Eurasian Institute. If they do not agree, the relevant paper cannot be published in JAARS.

### Article 23 (Notification of Paper on Homepage)

Papers published in JAARS shall be publicly notified on the JAARS homepage (<http://www.nlbaei.org/>)

### Article 24 (Etc.)

The matters that are not decided in these rules are either subject to the submission guidelines or decided by the editorial board.

### Article 25 (Date of Effectiveness)

These regulations shall be effective as of January 1, 2024.

## Author's Check List

Journal of Advanced Academic Research and Economics (JAARS)

Title of Manuscript: \_\_\_\_\_

Manuscript ID: \_\_\_\_\_

Please check  to confirm fulfillment of instructions below before submitting your manuscript.

### 1.General guidelines

- The submission contains an original manuscript, a checklist, and a copyright transfer agreement.
- The manuscript follows the journal template, using MS Word.
- The manuscript consists of a title page, abstract, keywords, JEL Classifications, acknowledgement (if any), main text, references, appendix (if any), tables and figures.
- The pages are numbered consecutively beginning with the title page.

### 2.Title page

- The manuscript consists of title, author(s)name(s), and affiliation(s).
- The lower area of the title page includes the name(s)of the author(s)and e-mail of the corresponding author only.

### 3.Abstract, Keywords and JEL classifications

- The Abstract is less than 250 words for an original article.
- Includes no more than six keywords.
- Includes no more than five JEL classifications.

### 4.Main text

- Subtitles are ordered according to the journal template.
- All figures and tables are cited in numerical order as they are first mentioned in the text.
- All figures and tables are referenced within the text.

### 5.Tables and figures

- The titles of figures and tables are set flush left above them, capitalizing the first letter of each word in these titles except for prepositions and articles.
- Vertical lines are avoided in tables.
- Pictures or photos are supplied in high resolution (minimum 300 dpi) .
- Pictures or photos are supplied at a reasonably legible size for printing if they may be affected by resizing in the printing process.

### 6.References

- References follow KITRI style.
- Each entry in the reference list is cited in the main text.
- All references are listed in alphabetical order followed by the year published.
- The title of books and journals is expressed in italics.
- Complete references are included with the full title of the article and up to six author names. Where there are seven or more authors,they are identified as “et al.”
- Journal articles have been double-checked as to whether the author name, (published year), title, journal name, volume (issue number) and pages are correct.
- Books have been double-checked as to whether the author name, (published year), title of book (editions, if any), place of publication, publisher’s name, and pages are correct.

## Copyright Transfer Agreement

NLBA Eurasian Institute

Title of Manuscript:

All Authors:

All authors of this manuscript must agree to the following:

- 1.All authors certify that the manuscript does not violate any copyright and confirm its originality.
- 2.All authors have made an actual and intellectual contribution to this manuscript and hold responsibility for its contents.
- 3.This manuscript has not been published or will not be submitted to another journal for publication.
- 4.The “Journal of Advanced Academic Research and Studies” has rights in legal action against the infringement of copyright of this manuscript without authors’permission.
- 5.All authors of this manuscript confirm the transfer of all copyrights in and relating to the above-named manuscript, in all forms and media, through the world, in all languages, to “Journal of Advanced Academic Research and Studies”.
- 6.If each author's signature does not appear below, the signing author(s)represent that they sign this Agreement as authorized agents for and on behalf of all the manuscript authors, and that this Agreement and authorization is made on behalf of all the authors.

In order for my manuscript to be accepted for publication in the Journal of Advanced Academic Research and Economics (JAARS), I hereby assign and transfer to the NLBA Eurasian Institute all rights, title, and interest in and the copyright in the manuscript, entitled.

Date:

Corresponding Author:

Signature:

\*Submission:You must submit a scanned file (file type: jpg, gif, or pdf) of this signed confirmation and final manuscript file (file type:MS Word) online after the manuscript has been accepted for publication.

## Call for Papers

Journal of Advanced Academic Research and Economics (JAARS)

The Journal of Advanced Academic Research and Economics (JAARS) is the official publication of the NLBA Eurasian Institute publishes manuscripts of significant interest that contribute to the theoretical and practical basis of business, economics, and international trade studies. JAARS's broad scope and editorial policies create accessible, thought-provoking content for the general academic community of business, economics, and international trade. The goal of JAARS is to publish insightful, innovative and impactful research on business, economics, and international trade. JAARS is multidisciplinary in scope and interdisciplinary in content and methodology.

### Subject Coverage

JAARS is an interdisciplinary journal that welcomes submissions from scholars in business, economics, and trade disciplines and from other disciplines (e.g. political science) if the manuscripts fall within the JAARS domain statement. Papers are especially welcome which combine and integrate theories and concepts that are taken from or that can be traced to origins in different disciplines.

JAARS is a methodologically pluralistic journal. Quantitative and qualitative research methodologies are both encouraged, as long as the studies are methodologically rigorous. Conceptual and theory-development papers, empirical hypothesis-testing papers, and case-based studies are all welcome. Mathematical modeling papers are welcome if the modeling is appropriate and the intuition explained carefully.

### Notes for Prospective Authors

Submitted papers should not have been previously published nor be currently under consideration for publication elsewhere. All papers are referred through a peer review process.

All manuscripts should follow the submission guidelines on the JAARS homepage (<http://www.nlbaei.org/>).

JAARS operates an on-line submission system. Manuscripts should be submitted to the on-line submission system at <http://www.nlbaei.org> following all prompts on the screen.

There is no firm submission deadline for papers and the submitted articles will be evaluated on a rolling basis. Any queries should be sent to the Editor of JAARS at the following address: [edubscon@outlook.com](mailto:edubscon@outlook.com)

## Guidelines for Authors (In Brief)

### [Journal of Advanced Academic Research and Studies (JAARS)]

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#### How to submit the paper

The authors submit their manuscripts (in MS Word Format) to the on-line submission system at <http://www.nlbaei.org>

#### Blind Review Policy

The journal follows double blind peer review policy. The paper is sent to two reviewers appropriately qualified experts in the field selected by the editor to review the paper in the light of journal's guidelines and features of a quality research paper. For papers which require changes, the same reviewers will be used to ensure that the quality of the revised paper is acceptable.

#### Manuscript Preparation Guidelines

The author(s) must follow the Manuscript Preparation Guidelines in preparing the manuscript before submission.

#### 1. Language

The language of the manuscript must be English (American English, e.g. "color" instead of "colour").

#### 2. Length of Paper

The length of the paper should not exceed 30 pages (Times New Roman, 12 Font) excluding tables, figures, references and appendices (if any). Articles should be typed in double-space (including footnotes and references) on one side of the paper only (preferably Letter size) with 1 inch margin. Authors are urged to write as concisely as possible, but not at the expense of clarity.

#### 3. Title Page

The title page should include: (i) A concise and informative title, (ii) The name(s) of the author(s), (iii) The affiliation(s) and address(es) of the author(s), and (iv) The e-mail address, telephone and fax numbers of the corresponding author.

#### 4. Abstract

Please provide an abstract of 200 to 250 words. The abstract should not contain any undefined

abbreviations or unspecified references. The content of abstract must include Purpose, Design/Methodology/Approach, Findings, and Research Implications.

#### 5. Keywords and JEL Classification Code

Please provide 4 to 6 keywords which can be used for indexing purposes.

#### 6. Acknowledgement

The author may use acknowledgement section in the title page of the paper (if any).

#### 7. Subdivision of the article

Divide your article into clearly defined and numbered sections. Sections should be numbered in Roman numerals (e.g., I, II). Subsections should be numbered using the decimal system (e.g., 1., 1.1., 1.1.1., 1.1.2., 1.2., ..., 2., 2.1.). The abstract is not included in section numbering.

#### 8. Table and Figure

Present tables and figures within the article, not at the end of the article. Please note that the article will be published in black and white (print), although online version will contain the colorful figures (if any). However, the color print will be available in extreme cases as per the request of the author.

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Author(s) should follow the latest edition of KITRI style in referencing. Please visit [www.nlbaei.org](http://www.nlbaei.org) to learn more about KITRI style.

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Please ensure that every reference cited in the text is also present in the reference list (and vice versa).

##### ■ Reference List

References should be arranged first alphabetically and then further sorted chronologically if necessary.

## Guidelines for Authors (In Brief)

### [Journal of Advanced Academic Research and Studies (JAARS)]

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#### ■ Examples:

##### Reference to a journal publication:

Wegener, D. T., J. F. Dollan and Soon-Hwan Jeon (2015), "Current Trends of Marketing Activities in Parallel Imports", *Journal of Asia Trade and Business*, 11(5), 55-57.

Hyun, Jun-Seog and Won-Joong Kim (2015), "A Study on the Effects of Export-Import Share and Exchange Rate", *Journal of International Trade & Commerce*, 11(1), 142-145. <http://dx.doi.org/10.16980/jitc.11.1.201502.139>

**NB:** For Oriental authors such as Korean, Chinese and Japanese authors, the first names are spelled out. Names shall be romanized according to their own preference. For Korean authors, the first and second syllables of first names shall be hyphenated.

##### Reference to a book:

Schmithoff, C. M. (2010), *Letter of Credit*, New York, NY: Pitman Press, 158.

Jeon, Soon-Hwan (2017), *International Trade Practices* (5th ed.), Seoul: Hanol, 156.

##### Reference to a chapter in an edited book:

Bomhoff, E. J. (1998), "Introduction". In E.

M. Rogers and S. Taylor (Eds.), *The Global Leadership Mindset* (2nd ed.), Oxford, UK: Oxford University Press, 12-25.

##### Reference to a web source:

Liu, Chengwei (2005), *Price Reduction for Non-conformity: Perspectives from the CISG*. Available from <http://www.cisg.law.pace.edu/cisg/biblio> (accessed January 11, 2016)

#### Manuscript Review Timeframe

Manuscripts will be initially reviewed by the Editor within two weeks from submission.

The Editor will contact the corresponding author with news of whether or not the submission will be advanced to the first round of blind reviews (or is being rejected as not suitable for publication in the journal).

Typically, the blind review process takes approximately six to eight weeks.

The JAARS does not process any submission that does not comply with complete requirements of submission guidelines.

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