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The Mediating Effect of the Perceived Value in the Relationship Between the Self-Paced Motivation of Purchase of Beauty Device and the Intent to Use Continuously for Middle-Aged Women BODILY

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Abstract

Purpose: *The purpose of this study is to examine whether the motivation of purchase of the self paced beauty device of middle-aged women's body has any effect on the perceived value and the intent to use continuously. In particular, since the expansion of the self-beauty management in the women's market and the cost-effectiveness due to the COVID-19 turned increasingly important, it is sought to analyze the motivation of purchase for the products and develop the products meeting the consumer needs of the middle-aged women to develop a differentiated marketing strategy for the self-beauty devices, and offer assistance for the basic data to improve the consumption value of the continuous use by the middle-aged women.*

Method: *The subjects of this study were middle-aged women aged 35 to 65 experienced in the self-paced beauty devices,, and to validate the research issue, 523 copies of online questionnaires were utilized for 17 cities and provinces across the nation by using the SPSS 25.0 and AMOS 25.0 programs, and in order to examine the validity of the observed variables forming the latent variables, the confirmatory factor analysis was performed to examine the convergent validity and the discriminant validity while the structural equation model was used to validate the inter-variable direct effect and indirect effect.*

Results**:** *As a result of the analysis performed, it turned out that effectiveness(β=.505, p<.001), reliability(β=.352, p<.001), and aesthetics(β=.072, p<.05) influenced the perceived value by the motivation of purchase, and it turned out that reliability(β=.438, p<.001) and effectiveness(β=.418, p<.001) influenced the intent to use continuously by the motivation of purchase. Based on the results of this study, it turned out that the higher the motivation of purchase and the larger the perceived value, the greater the intent to use continuously, and in particular, aesthetics, effectiveness, and reliability turned out to be important factors for the sub-factors of the motivation of purchase.*

Conclusion: *Based on the results of this study, it turned out that the higher the motivation of purchase and the larger the perceived value, the greater the intent to use continuously, it is evident that the functional value and psychological value of the perception granted to the products by the variable of the motivation of purchase are crucial in determining the intent to use continuously the self-paced beauty devices for the middle-aged women's body and maintaining the consumers. It is also meaningful in that, since the changes in the self-beauty management device market due to the COVID-19 is expected to further expand, it offers implications useful for the beauty device industry according to the motivation of purchase for the consumption value as a detailed sustainability strategy for providing the customized beauty device services satisfying the needs of the consumers.*

[Keywords] ***Middle-Aged Women, Beauty Device, Motivation of Purchase, Intent to Use Continuously, Perceived Value***

1. Introduction

1.1. Background of the study

Recently, since appearance is considered to be among the individual competitiveness, the people's interest in skin care is rising[1]. In particular, the popularity of home beauty devices is growing due to the trend of "self-beauty group" where the consumers seek to care for and by themselves, not by the experts, and the consumers valuing the convenience of receiving easy daily skin care are grabbing attention[2]. Further to which, the lifestyle in which people live at home due to the COVID-19 has also fueled changes in the consciousness and method of the self-beauty salon. Consumers are increasingly growing their interest in and demand for the beauty devices which are easy to use continuously without the time and space constraints, and while the consumer convenience is promoted, artificial intelligence technologies and the Internet of Things are integrated into the beauty devices, whereby the meaning of beauty care has evolved, and area of the beauty industry is further expanding[3].

Among the various demographic characteristics, middle-aged women are particularly interested in the skin care, and are also interested in how to delay and manage their skin aging[4]. The middle-aged women are viewed as an important customer segment by and for the beauty industry given their hormonal changes and the changes in their social position[1][5][6]. In middle age, the period and number of subjects are growing following the development of medical technologies and science[7], and relative to men, women are investing far much more effort in changing their appearance[8]. The middle-aged women experience anxiety and depression due to retirement and menopause, etc., and also tend to demonstrate behaviors of cosmetic management as a venue to address them. The behaviors of beauty management is among the non-pharmacological therapies which may help improve the psychological state, such as improving their self-efficacy, reducing depression, and relieving tension by improving the quality of life[9].

In the beauty industry, self-devices are released to reflect the needs of the middle-aged women and help manage their skin beauty without the time and space constraints. The self-devices clean and beautify their body, and also promote the penetration effect of cosmetics via the electrical and physical energies to cleanse and take care of dead skin cells, facilitate blood circulation and metabolism, and enhance the moisture and skin elasticity[10]. Among the various devices, self-paced devices use the ultrasound to remove the damaged epidermis to regenerate the new skin[11], or use the LED light sources to facilitate such effects as skin regeneration, treatment of inflammatory skin diseases, and skin whitening[12], or, depending on the product, perform various functions for the body, such as by cleaning the skin texture and removing cosmetics and wastes by using vibration[13]. This reflects the motivation of purchase according to the criteria and needs differentiated for and by the body of each individual among the middle-aged women.

Analyzing the motivation of purchase for the products becomes a crucial factor in maintaining the consumers by determining the perceived value which the consumers confer on the products[14]. By analyzing the motivation of purchase, it is possible to develop the products which satisfy the needs of the consumers, which in turn leads to the behavior of continuous use through their satisfaction with the products[15]. Many studies have been conducted across various fields including further classifying motivation[16], studying the relationship between the motivation and satisfaction[17], and studying the relationship between the value, satisfaction, and intent of action[18]. However, studies on the relationship between the perceived value and the intent to continuously use for the self-paced beauty devices of the middle-aged women's body with the motivation of purchase are yet inadequate.

Accordingly, this study seeks to examine the effect of the motivation of purchase of the self-beauty devices on the perceived value and the intent to use continuously. In particular, it is intended to shed light upon the perceived value of the middle-aged women, who are the primary target of the beauty device marketing in the modern society, where the consumer's expectation is rising as the market for women further expands and the cost-effectiveness has

become ever more crucial. Through which, it is intended to offer the basic data to devise detailed marketing strategies for the self-beauty device market, and help improve the consumption value for the middle-aged women.

1.2. Research issues

1. The motivation of purchase will have a positive effect on the perceived value and the intent to use continuously.
2. In the relationship between the motivation of purchase and the intent to use continuously, the perceived value will play a mediating role.

2. Research Method

2.1. Research subjects

The subjects of this study were the middle-aged women aged 35 to 65 experienced in the self-paced beauty devices[19]. To validate the research issue, an online survey was conducted from September 2, 2020 until September 20, 2020 targeting 17 cities and provinces across the nation, of which, 523 copies were selected and analyzed, excluding the 7 copies determined to be insincere responses.

2.2. Research tools

To analyze this research issue, a total of 40 questions including the 5 questions on general characteristics, 14 questions on the motivation of purchase[20], 11 questions on the perceived value[21], and 5 questions on the intent to use continuously[20] were structured with a Likert scale. The motivation of purchase was consisted of the 4 sub-factor of Aesthetics with 3 questions, Economy with 4 questions, Effectiveness with 4 questions, and Reliability with 3 questions, while the perceived value was consisted of the 2 sub-factors of Functional Value with 6 questions and Psychological Value with 5 questions. All of the reliability coefficients of the research tools turned out to be 0.6 or greater, with the reliability being determined to be good, as illustrated in <Table 1> below.

Table 1. Validity and reliability for each variable.

Variable		Number of questions	Cronbach's α
Purchase motivation for self-paced beauty device	Aesthetics	3	.615
	Economy	4	.633
	Effectiveness	4	.688
	Reliability	3	.644
	Total	14	.804
Perceived value	Functional value	6	.778
	Psychological value	5	.791
	Total	11	.874
Intention of continuous use		5	.898

2.3. Analytical method

The data of this study were statistically analyzed by using SPSS 25.0 and AMOS 25.0, whose details are as follows.

First, Cronbach's α was calculated for each scale used in the study.

Second, the descriptive statistical analysis was performed to confirm the normality of key variables.

Third, to examine the validity of the observed variables forming the latent variables, the convergent validity and the discriminant validity of the confirmatory factor analysis were examined.

Fourth, the inter-variable direct and indirect effects were examined via the structural equation model analysis.

In the statistical analysis above, the statistical significance was determined based on the level of significance of 5%.

3. Results

3.1. Descriptive statistics

Along with the mean and standard deviation of the key variables, skewness and kurtosis were calculated to determine whether the assumption of normality is satisfied. Skewness is determined to be close to the normal distribution when the absolute value is less than 3 and kurtosis is less than the absolute value of 10[22], and all variables turned out to satisfy the assumption of normality, as illustrated in <Table 2>.

Table 2. Validity and reliability for each variable.

Variable		Min.	Max.	M	SD	Skewness	Kurtosis
Purchase motivation for self-paced beauty device	Aesthetics	1.00	5.00	3.31	0.64	-0.35	0.48
	Economy	1.00	5.00	3.98	0.52	-0.73	2.92
	Effectiveness	1.75	5.00	3.54	0.54	-0.16	0.44
	Reliability	1.33	5.00	3.77	0.53	-0.48	1.35
	Total	1.29	4.86	3.67	0.40	-0.61	3.17
Perceived value	Functional value	1.17	4.83	3.46	0.52	-0.40	1.15
	Psychological value	1.60	5.00	3.54	0.57	-0.40	0.46
	Total	1.45	4.82	3.50	0.51	-0.39	0.96
Intention of continuous use		1.00	5.00	3.64	0.70	-0.94	1.44

3.2. Confirmatory factor analysis

Before proceeding with the structural model analysis, the conformity of the measurement model was examined via the confirmatory factor analysis as illustrated in <Table 3> to verify as to whether the observed variables explain the latent variables very well, and the maximum likelihood method was used to estimate the parameters of the measurement model. The motivation of purchase and the perceived value of the self-paced beauty devices for the observed variables as the item parceling based on the sub-factors[23], while the intent to continuously use formed the observed variables as the components. Examining the conformity's measurement model, the value of χ^2(df=41) was 183.307(p<.001), and since the value of χ^2 is influenced by the model and size of the sample, other conformity indices were verified[24]. Consequently, they were TLI=.946, CFI=.960, and RMSEA=.082, all of which were determined to be appropriate for the measurement model.

Table 3. Suitability of the measurement model.

Suitability index	χ2(p)	RMSEA	TLI	CFI
Measurement model	183.3 (p<.001)	.082	.946	.960
Recommended standard	p>.05	<.1	≧.90	≧.90

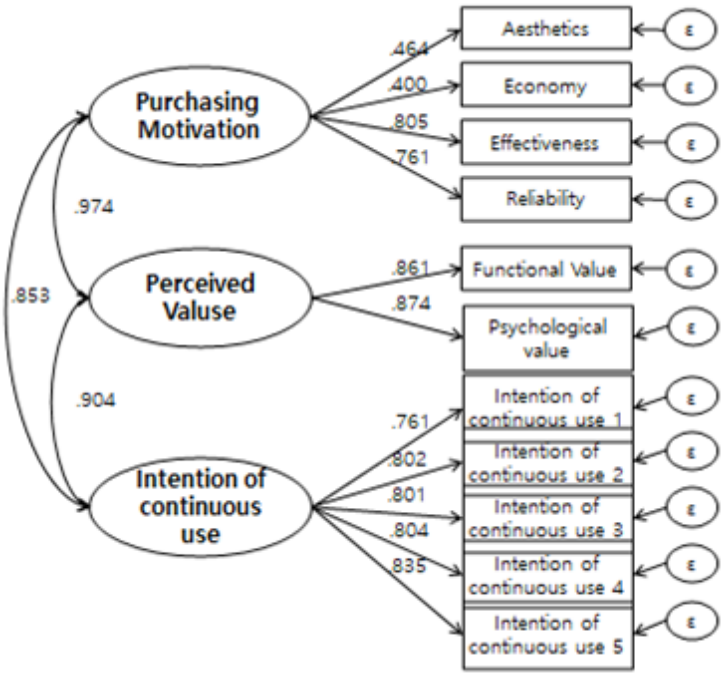
Next, as a result of verifying the factor loads of the observed variables to identify and understand the latent variables of each observed variable, all factor loads turned out to be significant as illustrated in <Table 4> and <Figure 1>, yielding the determination that the latent variables of the observed variables were reflected.

Table 4. Confirmatory factor analysis result.

Factor		B	SE	β	C.R.
Purchase motivation for self-paced beauty device	Aesthetics	1.000		.464	
	Economy	0.696	0.096	.400	7.252***
	Effectiveness	1.450	0.138	.805	10.513***
	Reliability	1.355	0.132	.761	10.301***
Perceived value	Functional value	1.000		.861	
	Psychological value	1.119	0.043	.874	26.179***
Intention of continuous use	Intention of continuous use 1	1.000		.761	
	Intention of continuous use2	0.989	0.052	.802	19.124***
	Intention of continuous use3	1.073	0.056	.801	19.090***
	Intention of continuous use4	0.981	0.051	.804	19.160***
	Intention of continuous use5	1.109	0.055	.835	20.046***

Note: ***p<.001.

Figure 1. Confirmatory factor analysis model.



3.3. Convergent validity

To examine the convergent validity, which validates the extent of consistency between multiple questions measuring the same concept, the Average Variance Extracted(AVE) and the Construct Reliability(CR) for each variable were calculated as illustrated in <Table 5>, and if and where the mean variance extraction value is .50 or greater and the conceptual reliability is .70 or greater, the convergent validity is determined to be good[25]. This model was determined to have a high convergent validity.

Table 5. Convergent validity.

Variable	CR	AVE
Purchase motivation	.886	.677
Perceived value	.953	.911
Intention of continuous use	.928	.720

3.4. Discriminant validity

As for the discriminant validity, the correlation coefficients between the latent variables and their confidence interval of 95% were calculated <Table 6>. If and where the confidence interval of 95% of the correlation coefficient does not contain 1 or -1, the discriminant validity is determined to be acceptable[26], and the correlative discriminant validity between all of the variables may be determined to be good.

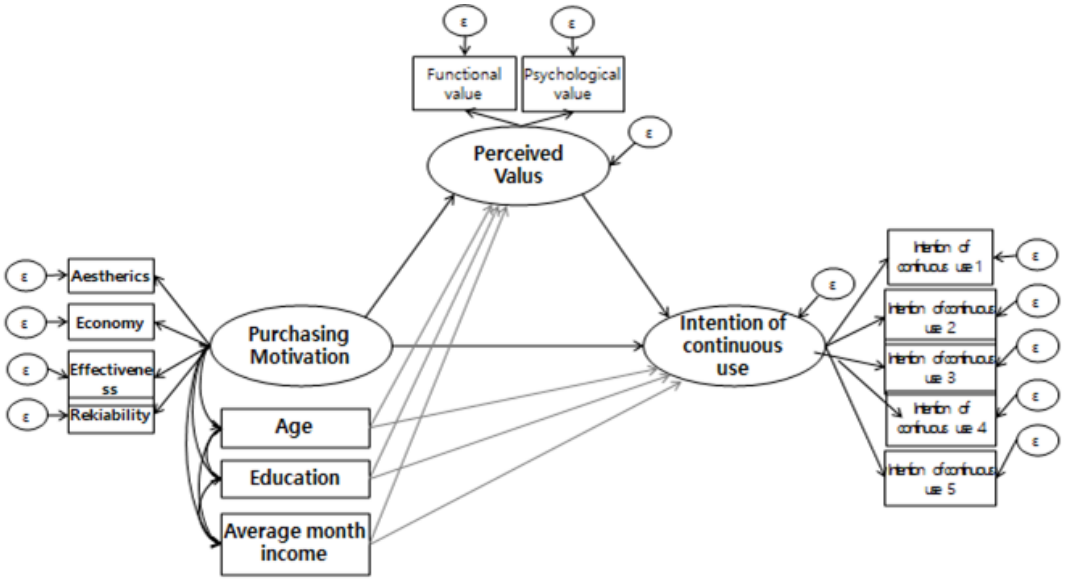
Table 6. Convergence validity.

Variable	Purchase motivation	Perceived value	Intention of continuous use
Purchase motivation	-	(.947~.974)	(.814~.853)
Perceived value	.974	-	(.863~.904)
Intention of continuous use	.853	.904	-

3.5. Structural model validation

By using the age, academic background, and the monthly average income as the control variables, it is intended to examine the effect of the self-paced beauty device's motivation of purchase on the perceived value, and the effect on the motivation of purchase, perceived value, and the intent to continuously use, and the following research model was constructed to validate the mediating effect of the perceived value in the relationship between the motivation of purchase and the intent to continuously use <Figure 2>.

Figure 2. Research model.



The conformity of the research model turned out to be TLI=.945, CFI=.961, and RMSEA=.065, yielding the determination that the research model is appropriate <Table 7>.

Table 7. Suitability of the research model.

Suitability index	χ^2(p)	RMSEA	TLI	CFI
Measurement model	206.568 (p<.001)	.065	.945	.961
Recommended standard	p>.05	<.1	≧.90	≧.90

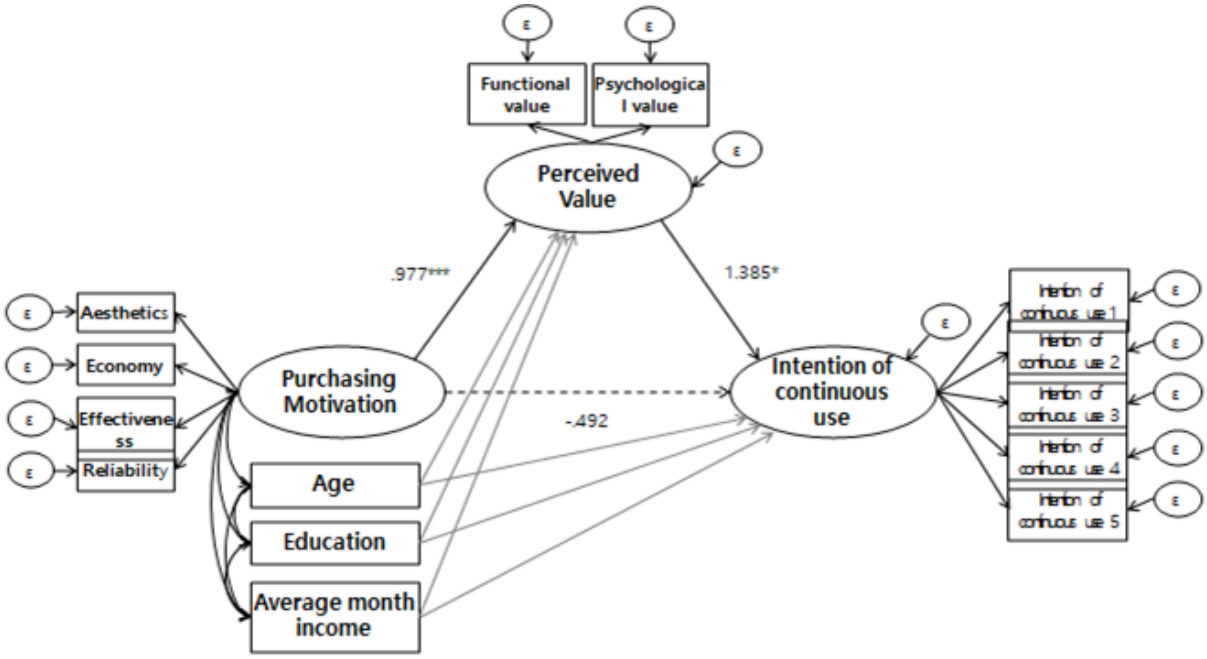
3.6. Path analysis

The path analysis of the structural model was performed to examine the relationship of influence between the latent variables, whose results are as illustrated in <Table 8> and <Figure 3>. The self-paced beauty device's motivation of purchase turned out to have a statistically significant positive(+) effect on the perceived value(β=.977, p<.001), and the perceived value turned out to have a significant positive(+) effect on the intent to use continuously(β=1.385, p<.05). It may be said that, the higher the self-paced beauty device's motivation of purchase, the higher the perceived value, and the higher the perceived value, the higher the intent to use continuously.

Table 8. Path analysis of the research model.

Path			B	S.E.	β	C.R.
Purchase motivation	→	Perceived value	1.466	0.139	0.977	10.528***
Purchase motivation	→	Intention of continuos use	-1.072	1.424	-0.492	-0.753
Perceived value	→	Intention of continuos use	2.01	0.949	1.385	2.117*

Figure 3. Path analysis results of the research model.



3.7. Validation of the mediating effect

The effect decomposition of the model was performed to examine in greater detail the indirect effect, direct effect, and the total effect from the structural model between the variables <Table 9>. Analyzing the indirect effect between the variables is to understand the structural relationship between the variables in greater detail and validate the significance of the mediating effect, and its significance was validated by calculating the size of the indirect effect, direct effect, and the total effect through bootstrap. The direct effect on the perceived value of the self-paced beauty device's motivation of purchase(β=.977, p<.001) and the direct effect on the intent to use continuously of the perceived value(β=.1.385, p<.05) turned out to be significant. Furthermore, as a result of performing the indirect effect analysis, the motivation of purchase turned out to have an indirect effect on the intent to use continuously by mediating the perceived value(β=1.354, p<.001).

Table 9. Analysis of the effect of structural model.

Path			Direct effect (β)	Indirect effect (β)	Total effect (β)
Purchase motivation	→	Perceived value	.977***		.977***
Purchase motivation	→	Intention of continuous use	-.492	1.354***	.861**
Perceived value	→	Intention of continuous use	1.385*		1.385*

4. Summary and Conclusion

The summary and conclusion of this study are as follows. First, it turned out that the independent variable of the self-paced beauty device's motivation of purchase has a positive effect

on the intent to use continuously through the perceived value. That is, it means that, the greater the motivation for purchasing the self-paced beauty devices, and the greater the perceived value, the greater the intent to use continuously. This is a result which is supportive of previous studies such that, the effect on the perceived value and the intent to continuously use[21] by the role of the perceived value[27] and the quality of cosmeceuticals in terms of the mobile SNS' intent to use continuously, and the greater the consumer's perceived value, the greater the intent to reuse and continuously use. Second, as a result of classifying and analyzing the sub-factors of the independent variables, it turned out that the perceived value has a significant effect on the perceived value in the order of effectiveness and reliability. Third, as for the intent to use continuously, it turned out to have an effect in the order of reliability and effectiveness. Such results are contrary to those of the previous studies which claimed that the economic accessibility has a positive effect on the purchase or use, and may also be viewed as a result where values may be placed more on the effectiveness or functionality than on the cost aspects. These results are similar to those of the studies on the behaviors of purchasing personal beauty devices and their satisfaction according to the self-beauty group affiliated women's sense of value claiming that the effectiveness and reliability increase the intent to purchase[20]. Hence, based on such results, if the past cost-effectiveness was given priority for the continuous use of the self-paced beauty devices by the middle-aged women, the rate of purchase is rising according to the perceived value, by prioritizing effectiveness and reliability in making purchases. Therefore, it is necessary to further classify the self-paced beauty devices based on their effectiveness and reliability to ensure that repurchases will be made in the future, and develop the products more strategically based on the consumer needs.

Gathering the results and discussions above, a number of recommendations may be made for marketing and follow-up studies. First, it was evident that motivation is a very crucial factor since the perceived value and the intent to use continuously may be increased when the motivation of purchase is strong, and among which, since aesthetics, effectiveness, and reliability turned out to be important factors rather than the economic feasibility, a marketing approach to promote and enhance such factors is needed. However, since the purpose of this study is to verify the factors influencing the intent to use continuously, it is necessary to investigate as to whether the independent variables may be increased by what factors in the follow-up studies. That is, various measures to address and studies to examine the applied effect of how can the self-paced beauty device's motivation of purchases of the middle-aged women increasing the perceived value or the intent to use continuously be increased are required.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	SS	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑
Corresponding Author*	EK	-Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Co-Author	HP	-Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑

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A Study on Group Performance of People with Cerebral Palsy in FIGURE SKATING Program

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Abstract

Purpose: *The purpose of this study is to investigate the successful improvement of figure skating techniques when applying them to people with cerebral palsy and present basic data to develop various figure skating programs suitable for the characteristics of people with cerebral palsy.*

Method: *This study conducted a structured experimental study as it investigates the technical changes of people with cerebral palsy in modified skating postures and performances with choreography. For this experimental study, five group performances were organized, and a total of 15 experimental procedures were conducted separately from the experimental group(with cerebral palsy) and the comparative group(non-disabled).*

Results: *Comparing the average scores of skating movements according to the measurement session by group, the difference in average scores in the first, second, third, and fourth sessions was statistically significant(p<.05).The BTS movements according to the measurement sessions have been gradually improved along with the implementation sessions. The average score of BTS movements in the experimental group was 12.36(2.72), which is 0.98 points higher than the average of comparative groups(11.38, 2.42). However, the collective scores of these BTS movements did not show statistically significant differences[F(16,4) =1.43, p>.05]. Comparing the average scores of connection movement by measurement session by group, the difference in average score was statistically significant[F(1, 4)=5.95, p<.05). The average score for the entire session of the experimental group was 6.30(1.83) and the average score for the comparative group was 4.81(1.35), indicating the overall average difference of 1.49.*

Conclusion: *The study showed that there was a change in ability through figure skating group performances of people with cerebral palsy. Based on this, it is believed that follow-up research should be conducted to develop efficient and applicable figure skating programs by modifying and supplementing the program.*

[Keywords] ***People with Cerebral Palsy, Figure Skating Program, Group Performance, Skating Program, Performance***

1. Introduction

Motor dysfunction in people with cerebral palsy, along with aging, creates rigidity, loss of balance, secondary disability, and restrictions on participation in social activities[1]. Motor skills are important and essential for people with disabilities too, and efficiency for people with cerebral palsy can be improved by exercise programs within limits[2].

Especially, people with cerebral palsy need to move their bodies in a variety of ways and allow them to experience a variety of physical experiences, and the repeatability of the movement can help develop flexibility, equilibrium, weight movement, and coordination[3][4]. Figure skating is a full-body exercise that builds flexibility and equilibrium and underlies all exercises. Although figure skating is a great sport for everyone, but most of the studies were on non-disabled,

intellectually disabled people, and few on people with cerebral palsy for balance and functional mobility were insufficient[2][5]. The purpose of this study is to investigate the successful improvement of figure skating techniques when applying them to people with cerebral palsy and present basic data to develop various figure skating programs suitable for the characteristics of people with cerebral palsy.

2. Research Method

2.1. Procedure

This study conducted a structured experimental study as it investigates the technological changes of people with cerebral palsy in modified skating postures and performances with choreography. For this experimental study, a group performance of five sessions was organized, and experimental procedures were conducted separately into experimental groups(with cerebral palsy) and comparative groups(non-disabled). Preliminary survey has examined the possibility of participation of people with cerebral palsy, the contents of modified skating movements and choreography, and the possibility of experimental procedures. The modifications of skating and choreography applied to the experimental group were performed in consideration of individual "performability" and "challenge." There were two dance practices and one skating practice for each session, with a total of 15 sessions. The experiment was conducted for 15 weeks(once a week, two hours each) from September to December 2019, with a total of five measurements including preliminary inspections.

2.2. Subjects

The subjects were students aged 18 to 24, including 11 disabled students(cerebral palsy) and 17 non-disabled students in the comparison group. Among the students with cerebral palsy included eight spastic CPs and three athetoid CPs. Subjects of the experimental group were able to self-walk. Five people(mono/diplegia) in the experimental group were able to walk normally, but there were some difficulties in using the upper arm. <Table 1> shows the characteristics of the subjects. The subjects had no experience in figure skating. The preliminary study conducted an evaluation of the practical functions of the subjects, and the skating moves the experimental group(n=11) and comparative group(n=17)[t=-4.06, p<.01] showed significant differences in significance at 0.05, but the BTS moves did not show significant differences[t(26) =.47, p>.05]. These results show that the difference in the physical ability for figure skating in the two groups is heterogeneous between them(p<.05), the performance of choreography and the ability to connect moves show no difference(p>.05). <Table 2> shows the results of a survey into the homogeneity of experimental and comparative groups.

Table 1. Characteristics of the subjects.

		Frequency	Percentage	Effective percentage	Cumulative percentage
Gender	Male	13	46.4	46.4	46.4
	Female	15	53.6	53.6	100
Disability	Spastic CP	8	28.6	28.6	28.6
	Athetoid CP	3	10.7	10.7	39.3
	Non-disabled	17	60.7	60.7	100
Part disabled	A/Di	5	17.9	17.9	17.9
	Para	2	7.1	7.1	25.0
	Hemi	4	14.3	14.3	39.3
	None	17	60.7	60.7	100

Degree of disability	2	2	7.1	7.1	7.1
	3	7	25.0	25.0	32.1
	4	1	3.6	3.6	35.7
	5	1	3.6	3.6	39.3
	None	17	60.7	60.7	100

Table 2. Results of a survey homogeneity verification of experimental and comparative groups.

Preliminary test	Group	n	Avg.	Standard deviation	t	Degrees of freedom	p	F	p
Skating movements	Exp.	11	6.63	1.50	-4.06**	26	.001	1.93	.179
	Comp.	17	9.29	1.79					
BTS movements	Exp.	11	10.18	2.52	.47	26	.640	.57	.456
	Comp.	17	9.76	2.10					

Note: **: p<.01, *: p<.05.

2.3. Properties of measuring tools

1) Characteristics and format of the skating motion scale

The skating move scale used in this study applied the International Skating Union's evaluation questions and scoring criteria[6]. Among the five components(PCS) of the program, only four items were used related to skating skills and transitions, rated at 0.25 to 10. The evaluation factors were edge(in, out), step(front, back), turn(move, stop), and level 4 evaluation criteria were applied. The scoring by factor was out of five, and two persons(para) who had difficulty walking both feet were allowed to do both turns and two-footed skating. In addition, disabled students were eliminated from scoring on speed acceleration, which increased the possibility of integration. The internal reliability(Cronbach-Alpha) of the scoring factors shown in the preliminary examination of this study was 0.779.

2) Characteristics and patterns of BTS movements

The BTS movements applied heel-up, heel-down, wave-hand, wave hip movements, and walking(front and back), which are used in Bangtan BOMB, dance practice(Halloween version), and 21st Century Girl. The jump required for the vertical movement was excluded, and only elements of horizontal movement and upper body movement were used in skating. Targets with hemiplegia measured only possible directional movements(heel-up/down, walking), and those with paraplegia evaluated only upper body movements(wave hand moves). Each move was scored at 5 points, based on "accurate delivery," "emotional style," and "clean move."[6]. The internal reliability of the BTS movements was 0.796.

3) Characteristics of connection movement

Connection Movement scale used in this study applied the International Skating Union's evaluation questions and scoring criteria[6]. Among the five components(PCS) of the program, only one items were used related to interpretation of music. The evaluation factors were easy movement, role performance, rhythm expression, music nuance, character, finesse and level 4 evaluation criteria were applied. The scoring by factor was out of five. The internal reliability(Cronbach-Alpha) of the scoring factors shown in the preliminary examination of this study was 0.684 in <Table 3>.

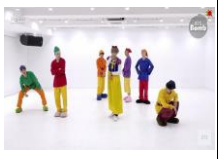
Table 3. Reliability test results.

Item	Description	Number	Cronbach-α (by item)	Cronbach-α(gross)
Skating movements	Edge(in), edge(out), step(front), step(back), turn(movement), turn(stop)	6	.779	.804
BTS movements	Heel-up/down, wave hands, wave waist, walking (front/back)	6	.796	
Connection movements	Easy movement, role performance, rhythm expression, music nuance, character, finesse	6	.684	

2.4. Modifying movements and proceeding with the program

The subjects were evaluated five times, including a preliminary survey. The assessment was conducted in Week 3 after two weeks of move acquisition. The subjects had five sessions in three weeks. In the first and second weeks of each session, BTS movements were practiced at a gymnastics arena and dance room, and the third week session was conducted at the Z ice rink. The subjects were divided into four groups(Group 1 = 7 people) and practiced <Table 4>.

Table 4. The progress and emphasis of the program by session.

Progression					Emphasis
Session	BTS movements	Skating movements	Week	Venue	
1st session			1	Gymnastics arena	BTS movements(individual competency assessment and possibility identification)
			2	Dance room	Possible parts wave(arm, hand, hip), walking(front/back)
			3	Ice link	Connecting walking(front/back) and waves
2nd session			1	Gymnastics arena	Wave(arm, hand, hip)+weight shift, walking(front/back)
			2	Dance room	Positioning disabled students weight shift + upper body wave
			3	Ice link	Weight shift(still/mobile), maintaining formation
3rd session			1	Gymnastics arena	Practicing waves, lifting one foot, assigning roles
			2	Dance room	Assigning team roles, lifting one foot+ waves
			3	Ice link	Skating by role, skating with one foot lift + waves(arms, neck)
4th session			1	Gymnastics arena	Lifting one foot(front/back), leaning upper body(front/back)
			2	Dance room	Practicing group dance(matching movements) Synchronizing rhythm and beat
			3	Ice link	Skating with one foot lifted(front/back) Leaning upper body(front/back)
5th session			1	Gymnastics arena	Practicing individual movements (synchronizing movements)
			2	Dance room	Practicing group dance(matching movements)

			3	Ice link	Positioning disabled students Matching movements + role practice

2.5. Analysis method

The dependent variables of this study are skating, BTS and connection movements, and independent variables are groups(experimental groups, comparative groups) and measurement sessions(five times). Although the targets are repeatedly measured, multivariate ANOVA was performed because the required movement types and roles were different depending on the session. Since post-validation is a group-specific measurement session, Scheffe verification was performed. In addition, independent t-validation was conducted for the difference in scores by group, as the abilities to perform skating, BTS movements of the two groups were different. Descriptive statistics and graph analysis were performed on variables indicating significant differences in the significance of 0.05.

3. Result

3.1. Score differences between measurement sessions and groups

The scores of skating and BTS movements in five group performances conducted on the subjects were analyzed according to the group(experiment, comparison) and the timing of measurement(5 times). Skating movements[$F(1,4) = 1.43$, $p>.05$] and BTS movements[$F(1,4) = 1.38$, $p>.05$] showed no statistically significant difference <Table 5>.

Table 5. Score differences of figure skating factors according to repeated measurements by group(multivariate ANOVA).

	Dependent variable	Type III SS	df	MS	F	p	Post-validation(p<.05) (scheffe)
Items	Skating movements	27.35	4	6.83	1.43	.225	Measurement session 5 > 1> 2 > 3 > 4
	BTS movements	20.58	4	5.17	1.38	.244	Measurement session 5 > 1> 2 > 3 > 4
	Connection movements	32.50	4	8.12	5.95**	.001	Measurement session 5 > 1> 2 > 3 > 4

Note: **: p<.01, *: p<.05.

3.2. Changes in skating movements with the measurement session

The scores of skating movements by the measurement session were high in comparison groups, with a gradual increase from the first to the fourth. In the post-validation(Scheffe), which was conducted to test the differences in scores by session, the average for five sessions was the highest, indicating statistically significant differences from the skating movement scores for other sessions(session 1–4)($p<0.05$). The mean for the entire session of the experimental group was 9.70(4.76) and the mean for the comparative group was 12.02(4.27), indicating the overall mean difference of 2.32. However, the mean of the experimental group shown in the fifth session was 18.45(2.20), and the mean of the comparative group was 19.00(2.47), showing a difference of 0.55 <Table 6>.

Table 6. The average score of a group by measurement session.

Group	Measuring session	Skating movements		BTS movements			
		M	SD	M	SD	M	SD
Experiment	1	6.63	1.50	10.18	2.52	4.18	.87
	2	6.90	1.13	10.90	2.25	6.18	1.32
	3	8.18	1.83	12.18	1.94	6.09	1.04
	4	8.36	1.80	13.81	1.94	7.81	2.31
	5	18.45	2.20	14.72	2.24	7.27	.78
Comparative	1	9.29	1.79	9.76	2.10	3.94	.96
	2	9.94	1.71	10.05	1.85	4.23	.97
	3	10.64	3.12	11.11	1.40	4.52	.94
	4	11.23	2.68	11.41	1.22	4.76	1.20
	5	19.00	2.47	14.58	1.97	6.58	.93

Comparing the mean of skating movements by measurement session by group, the difference in average scores between the first and second, third, and fourth periods was statistically significant($p<0.05$). The mean difference in the first session was –2.65, the mean difference in the second session was –3.03 and the mean difference in the third and fourth sessions was –3.03 and –2.87, respectively. However, the mean difference(-.54) for the fifth session was not statistically significant <Table 7>.

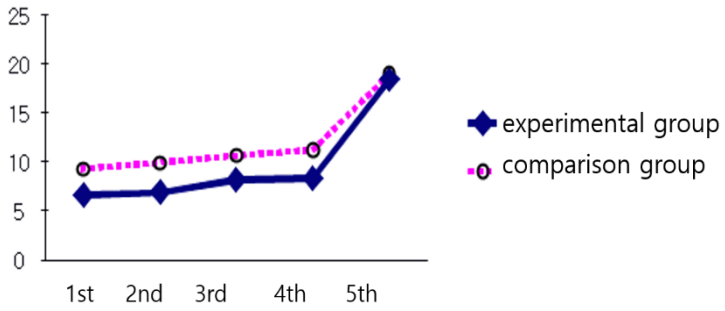
Table 7. Mean difference for each group of skating movements by measurement session(independent t-validation).

	Session	Mean difference	t	df	p
Experiment-comparative (skating movements)	1	-2.65	-4.06**	26	.001
	2	-3.03	-5.16**	26	.001
	3	-2.46	-2.36*	26	.026
	4	-2.87	-3.11**	26	.004
	5	-.54	-.59	26	.558

Note: **: p<.01, *: p<.05.

<Figure 1> show the mean change in Skating movements by measurement session.

Figure 1. Changes in skating movements by measurement session.



3.3. Changes in BTS movements by measurement session

The BTS movements by measurement session has been gradually improved along with the implementation session. The average score of BTS movements in the experimental group was 12.36(2.72), which is 0.98 higher than the average of comparative groups(11.38, 2.42). However, the collective

scores of these BTS movements did not show statistically significant differences[F(16,4) =1.43, p>.05]. The score of the BTS movements of the experimental group was higher in the overall sessions than in the comparative group.

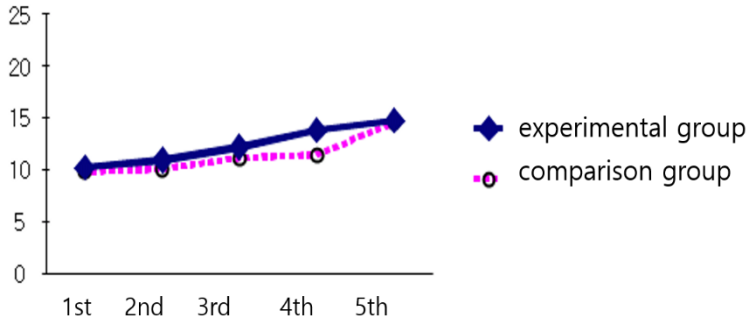
As the BTS movements were repeated in sessions, the difference between groups gradually increased. The BTS movements in the first session showed a difference of .41 between groups, but .85 in the second session and 1.06 and 2.40 in the third and fourth sessions, respectively. In particular, the BTS moves in the fourth session showed statistically significant differences(p<0.05). <Table 8> and <Figure 2> show the average change in BTS movements by measurement session.

Table 8. Difference in the mean of BTS movements by group by measurement session(independent t-validation).

	Session	Mean difference	t	df	p
Experiment-comparative (BTS movements)	1	.41	.47	26	.640
	2	.85	1.08	26	.286
	3	1.06	1.68	26	.104
	4	2.40	4.03**	26	.001
	5	.13	.173	26	.864

Note: **: p<.01, *: p<.05.

Figure 2. Changes in BTS movements by measurement session.



3.4. Changes in connection movements by measurement session

Comparing the mean of connection movement by measurement session by group, the difference in mean was statistically significant[F(1, 4)=5.95, p<.05). The mean for the entire session of the experimental group was 6.30(1.83) and the mean for the comparative group was 4.81(1.35), indicating the overall mean difference of 1.49.

Comparing the mean between the first and fourth and first and fifth periods was statistically significant(p<0.05). In particular, the connection movements in the second, third and fourth session showed statistically significant differences <Table 9>.

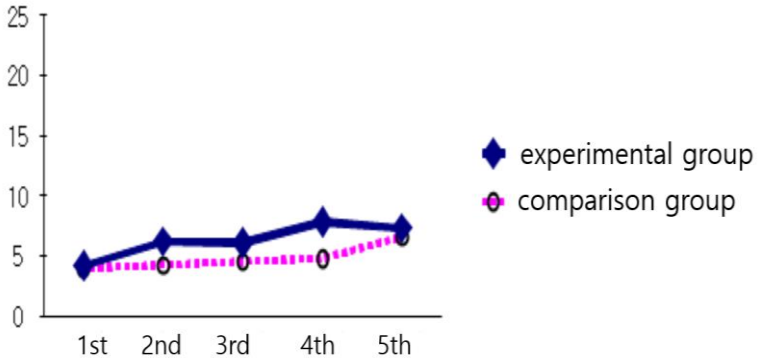
Table 8. Difference in the mean of connection movements by group by measurement session(independent t-validation).

	Session	Mean difference	t	df	p
Experiment-comparative (connection movements)	1	.24	.66	26	.510
	2	1.94	4.48**	26	.001
	3	1.56	4.10**	26	.001
	4	3.05	4.59**	26	.022
	5	.68	2.00	26	.056

The score of connection movements in the first session in experimental group was 4.18(.87) and 3.94(.96) in comparative group showed no significant differences(p>0.05). In the fourth session, the

score of connection movements was 7.81(2.31) in experimental group and 4.71(1.20) in experimental group, indicating the overall average difference of 3.50, showed s statistically significant differences(p>0.05) <Figure 3>.

Figure 3. Changes in connection movements by measurement session.



4. Discussion

The skating movements of disabled students in five group performances conducted on the subjects showed progressive improvements with repeated trials, and the last group performance showed abilities similar to that of non-disabled students[5][7]. This phenomenon is due to the construction of the skating movements mainly for the characteristics of the target[8]. This can be interpreted as a result of lowering the level of difficulty for subjects with cerebral palsy to perform successful skating[9][10]. Figure skating's high level of difficulty, jump, and rotation, were excluded from the evaluation and the exclusion of vertical mobility did not significantly improve non-disabled students' performance, indicating that it takes a lot of time to practice how to use the edge of figure skating or turn in a moving situation. Nevertheless, disabled students were able to implement clear edge use and turns because they did not require "speed." Most disabled students made edge changes in slow skating and performed turns in a large circle in progression[11]. Non-disabled students, however, had a high rate of failure due to edge changes and turns at high speeds, even though they did not require high speed[12].

There was no statistically significant difference between skating and BTS movements[13]. These results suggest that the basic movements required in the group performance of figure skating(e.g., step, turn, wave, heel-down, etc.) require a great deal of effort to acquire both disabled and non-disabled[13][14] with minimal variations, there is no difference in disability.

Scores of skating movements in accordance with the measurement session were high for non-disabled people, with a gradual increase from the first to the fourth[2][15][16][17].

The results of these experiments suggest that the skating movements imposed on the experimental group were highly difficult for the subjects and thus improved through gradual adaptation and practice[9][10]. In particular, in the fifth session of skating, which shows the slight difference between groups, the disabled students successfully performed in the group of figure skating[6][7].

Comparing the average scores of skating movement by measurement session by group, the average difference in the fifth period was not statistically significant. This means that as the sessions progressed, the difference in skating movements among groups decreased, suggesting that the group performance acquired in each session was successfully implemented[7]. The BTS movements have been increasingly different from group to group through sessions, which can be said to have a higher educational effect than comparative groups when applying modified BTS movements to disabled people[18][19][20].

Comparing the average scores of connection movement by measurement session by group, the difference in average score was statistically significant. The evaluation factors were role performance, rhythm expression, music nuance, character and this means that music expression, rhythm was not technical movement and experimental group has big progress during the program with showing their

feeling of the music[11]. These result match to result of study on balance and motor function of people with cerebral palsy in figure skating[2][6].

These results indicate that people with cerebral palsy have changed their abilities through figure skating group performance, and based on this, it is believed that further research should be conducted to develop efficient and applicable figure skating programs by modifying and supplementing the program.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Author	SK	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑ -Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑

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A Study on the Status and Recognition of SPORTS Welfare Using Big Data Analysis

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Abstract

Purpose: *To identify public Recognition and areas of interest in sports welfare through big data related analytical techniques, and to provide basic data required for establishing sports welfare policies.*

Method: *Keyword frequency analysis, sentiment analysis, semantic network analysis,, and CONCOR analysis were performed.*

Results: *The public was demonstrated the highest frequency and derived as a key keyword. As keywords related to the benefit from sports welfare support, health, physical strength, and happiness were derived, and words related to the welfare of athletes such as athletes, competitions, events, games, and leaders appeared. As a result of sentiment analysis, the positive rate(79.52%) was found to be very high. Third, as a result of the semantic network analysis, keywords such as the public, health, sports activities, support, and service are located in the center of the network, and are confirmed as major keywords. As a result of the CONCOR analysis, 'National Fitness 100', 'Sports participation Voucher', and 'Participation Policy of Sports for all ' were formed.*

Conclusion: *The public recognition and areas of interest in sports welfare were examined and Identified based on the results of this research. That could provide the basic data required for devising the sports welfare policies.*

[Keywords] ***Sports Welfare, Big Data, Text Mining, Sentiment Analysis, CONCOR Analysis***

1. Introduction

Sports welfare is a compound word for "sports" and "welfare," and it may be said to be welfare in the field of sports[1]. Hence, sports welfare may be defined as the "social service ensuring the guarantee for the right to participate in sports at the national level for the purposes of promoting the health for all citizens, enhancing the quality of life, and realizing a welfare society"[2].

Based on the basic principles of the Olympic ideology of the charter of "Sports for All" of the meeting of the ministers of sports of all countries of Europe and the charter of the International Olympic Committee(IOC), right to pursue happiness of Article 10 of the Korean Constitution, right to education of Article 31 Paragraph 1 of the Korean Constitution, right to livelihood of Article 34 Paragraph 1 of the Korean Constitution, right to health of Article 36 Paragraph 3 of the Korean Constitution, and the right to freedom of Article 37 Paragraph 1 of the Korean Constitution, the basic right to sports results in the sports welfare which is the "social service ensuring the guarantee for the right to participate in sports at the national level for the purposes of promoting the health for all citizens, enhancing the quality of life, and realizing a welfare society"[3].

The sports welfare policy of Korea has been implemented in the selective welfare context of providing support for the underprivileged's participation in sports activities. Recently, however, the sports welfare has been accepted as a basic right for the people and has also been extended to the universal welfare. Under the "2030 Sports Vision," which presented the sports policy and core tasks of the Moon Jae-In administration, policy directions were presented whereby all citizens would enjoy sports and lead a healthy life, while forming a happy community via the social spread of sports values, in tandem with the sports welfare related policies and projects under implementation. "People's Fitness 100," "Sports Lecture Voucher," "Sending Sports Goods for the Underprivileged," and "Happiness Sharing Sports Class," etc., are among the representative sports welfare projects in progress, and through which, support is extended for the people's participation in the sports activities.

The Innovation Committee of the Ministry of Culture, Sports and Tourism recommended that the "Framework Act on Sports" be enacted to legislate the "rights to sports." Furthermore, during the public perception survey[2] of the sports welfare related policies, the need for the sports welfare policies turned out to be very high at 73.5%, while the demand for the right to sports has arisen, among others. Hence, it is necessary to establish a sports welfare system which is capable of accommodating the needs of the people with the objective of participating in sports toward maintaining the people's health and enhancing the quality of life[4].

Many studies have been conducted in connection with the sports welfare. Development of the concept and policy directions for the sports welfare[2], priority calculation of the sports welfare policy related factors[3], and the sports welfare concept and model development for the underprivileged[5], etc., have been carried out. However, such studies have focused on the concept and policy operation and development, as well as the identification of the recognition of sports welfare via the questionnaire surveys, in-depth interviews, and the reference studies, etc., while almost no studies have been conducted in significant depth for analyzing the areas of interest and needs, etc., of the people. Accordingly, in this study, the perception and current status of the sports welfare using the big data related analytical techniques, and the areas of interest, etc., are sought to be identified.

Big data means the size of data which goes beyond the capacity of the existing databases to collect, store, manage, and analyze the data[6]. The trend analysis across the times can be performed via the big data analysis, and through which, it is also possible to respond to social changes taking place[7]. Furthermore, new latent variables may be derived while future predictions can be made, on top of the fact that it is an appropriate analytical method for identifying and grasping the understanding of various social phenomena[8][9][10]. Hence, the need for research using the big data in various fields has been called for[11][12][13][14]. Furthermore, multiple studies using the big data related analytical techniques have been conducted in the field of sports and physical education[15][16][17][18]. Such studies have derived new latent variables by analyzing unstructured data, which were difficult to formulate in the past[9], and have also presented the basic data required for the relevant issues.

Hence, this study seeks to identify the people's perception and areas of interest in the sports welfare, etc., via the big data related analytical techniques, and also provide the basic data required for devising the sports welfare policies.

2. Research Method

2.1. Research subject

This study has analyzed the blogs, news, cafe communities, and the knowledge section provided by Naver, one of the most representative portals in Korea. The keyword for the data collection was "sports welfare," while the data collection period was limited from March 1, 2018 to February 28, 2021, the last 3 years. The analytical data information is as illustrated in <Table 1>.

Table 1. Analysis data information.

Classification	Details
Scope of collection	Nave(blogs, news, cafe communities, and knowledge)
Period of collection	March 1, 2018 - February 28, 2021
Tool of collection	TEXTOM
Search word	Sports welfare
Analytical tool	Ucinet 6.0, NetDraw

2.2. Tools of measurement

2.2.1. Text mining

Text mining is a technique which uses the natural language processing technologies to derive useful words from the collected unstructured texts to determine their frequency, etc., and find their meanings at the level of the overall context[19]. In this study, stopwords were removed and refined from the data collected. Furthermore, the 50 high frequency words were selected, and the word Cloud was visualized.

2.2.2. Sentiment analysis

Sentiment analysis mean a technology which uses a pre-produced sentiment vocabulary dictionary to analyze the vocabulary distributed in the text, and converts it into the objective data by identifying and quantifying emotions, attitudes, and opinions, etc., expressed in the text[20]. In this study, the sentiment analysis was performed to examine and understand the opinions such as the positive and negative about the sports welfare, etc., and the related sentiment keywords.

2.2.3. Semantic network analysis

Semantic network analysis is a method which applies he social network analysis which stresses on the relationship between he actors when examining and understanding the structure of a social system to apply for the communication messages[21]. It also visualizes the frequency and importance of the keywords, etc., as a spatial structure via the network methodology to understand the meaning of the entire text. In this study, the connection structure between the related words extracted from the sports welfare related keywords, etc., was identified.

2.2.4. Convergence of iterated correlations(CONCOR) analysis

The CONCOR analysis is a method intended for classifying the groups of similarity at an appropriate level by repeatedly performing the correlation analysis[22]. In this study, the CONCOR analysis was performed to visually derive and group the connection relationship within the network, etc.

2.3. Data processing

For the data collection and analysis of this study, data were collected and refined through the Textom, which is a big data analysis solution, and the keyword frequency and the sentiment analysis were performed. Furthermore, by using Ucinet6 and Netdraw, the connection structure and the visualization between the words were carried out.

3. Research Results

3.1. Results of the data collection

During the total survey period, or from March 1, 2018 until February 28, 2021, a total of 3,419 documents were collected with the sports welfare related keywords. By section, news(1,643 cases),

blogs(1,189 cases), cafe communities(470 cases), and knowledge(117 cases) turned out in such order. The data collection results are as illustrated in <Table 2>.

Table 2. Analytical data information.

Classification	Section	Quantity of collection(cases)
Naver	Blogs	1,189
	News	1,643
	Cafe communities	470
	Knowledge	117
Total		3,419

3.2. Results of the keyword frequency analysis

Frequency analysis is basically used among the big data analytical methods, and the extent of interest in the subject matters is analyzed based on the total quantity of the document expression for each channel including the keywords of interest[16]. As the results of the sports welfare related keyword frequency analysis, public(588), support(487), health(471), national fitness(467), physical activity(424), disabled(417), physical strength(301), sports lecture voucher(300), service(300), and daily sports(278), etc., turned out in such order. <Table 3> and <Figure 1> illustrate the results of the sports welfare related keyword frequency analysis and the word Cloud visualization.

Table 3. Results of the keyword analysis.

Rank	Word	Frequency	Rank	Word	Frequency
1	Public	588	26	Blind spot	118
2	Support	487	27	Athlete	117
3	Health	471	28	Tourism	115
4	National fitness	467	29	School	112
5	Sports activity	424	30	Happiness	111
6	Disabled	417	31	Customization	103
7	Physical strength	301	32	Culture	99
8	Sports lecture voucher	300	33	Children	87
8	Service	300	34	Competition	86
10	Daily sports	278	35	Korean sport & olympic committee	86
11	Program	246	36	Event	86
12	National sports promotion corporation	232	37	Policy	82
13	Sports facilities	226	38	Soccer	79
14	Exercise	214	39	Social welfare	78
15	Sports club	210	40	Game	77

16	Participation	206	41	Leader	75
17	Senior citizens	204	42	Rating	68
18	Youth	193	43	Korea sports welfare promotion center	67
19	Student	192	44	Fitness center	65
20	University	163	45	Physical strength measurement	63
21	Leisure sports	158	46	Underprivileged	62
22	Low income	155	47	Basketball	57
23	Free of charge	152	48	Sports industry	55
24	Prescription of exercise	143	49	Education	53
25	Physical strength certification center	136	50	Safety	51

Figure 1. Word cloud.

3.3. Results of the sentiment analysis

Sentiment analysis is a method which may analyze public opinions on the relevant subject matters by identifying and examining the positive or negative sentiment among the texts collected from the documents online, etc[19]. As a result of the sentiment analysis performed on the sports welfare, the positive rate(79.52%) turned out to be higher than the negative rate(20.48%). As for the positive keywords, like(664), interest(495), and joy(329) turned out in such order. As for the negative keywords, the keywords of rejection(187) and sadness(129) were derived. The results of the sentiment analysis performed are as illustrated in <Table 4> and <Table 5>.

Table 4. Results of the keyword analysis.

Classification	Frequency	Ratio
Positive	1488	79.52%
Negative	375	20.48%

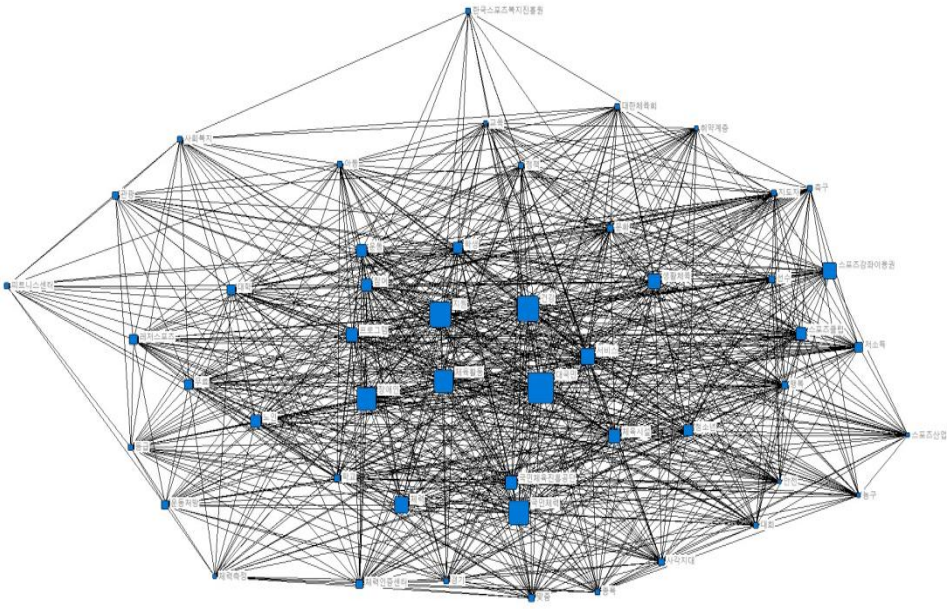
Table 5. Sentiment keywords.

Classification	Frequency
Like	664
Interest	495
Joy	329
Rejection	187
Sadness	129

3.4. Results of the semantic network analysis

Semantic network analysis was performed to examine and learn about the structure of the connections between the high frequency words derived from text mining. The larger the size of a node within the network, the higher the frequency of the occurrence of the corresponding words. As a result of the network visualization analysis of the sports welfare related keywords, it was confirmed that such keywords as public, health, physical activity, support, and service are located at the center of the network and form discussions. The results of the semantic network analysis are as illustrated in <Figure 2>.

Figure 2. Results of the semantic network analysis.

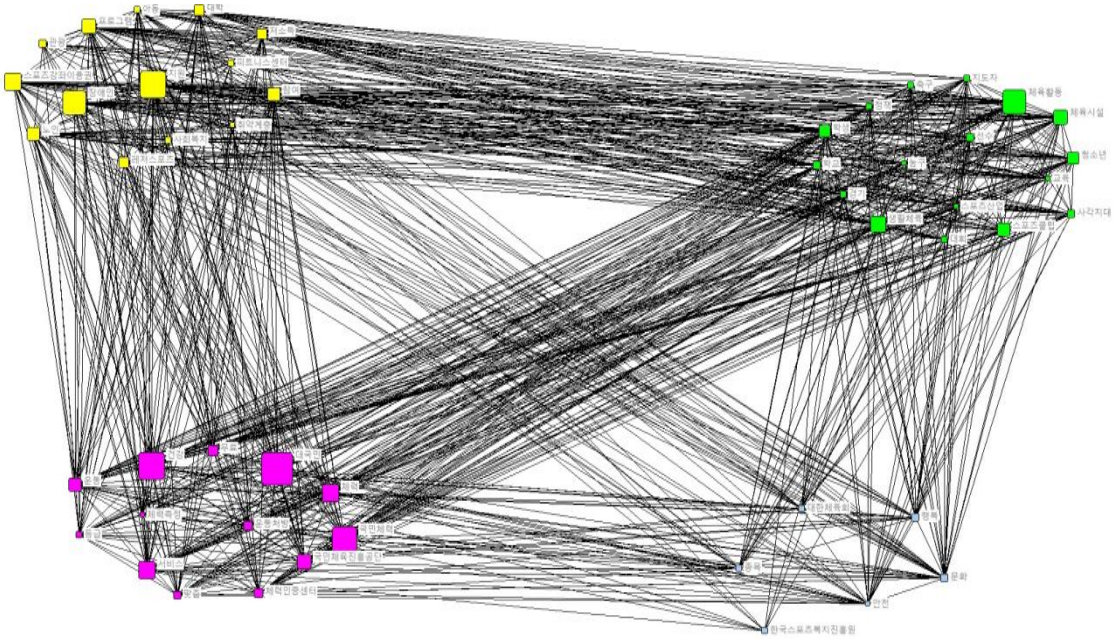


3.5. Results of the CONCOR analysis

The CONCOR analysis was performed to derive the similar groups between the keywords related to the sports welfare.

First, the development of such keywords as underprivileged, low income, sports lecture voucher, support, and social welfare, etc., were formed, and such groups were named the “sports lecture voucher.” Second, such words as public, physical strength certification center, physical strength measurement, national fitness, physical strength, and rating were formed into groups, which were named the “National Fitness 100.” Third, such keywords as daily life sports, sports activities, sports facilities, policies, and sports clubs were formed into groups, which were named the “Daily Sports Participation Policy.” The results of the CONCOR analysis of the sports welfare related keywords are as illustrated in <Figure 3>.

Figure 3. Results of the CONCOR analysis.



4. Discussion

In this study, text mining, sentiment analysis, and semantic network analysis were performed to examine and understand the perception and interest in the sports welfare by using the big data related analytical techniques. Based on the primary results of this study, it is sought to discuss as follows.

4.1. Results of the keyword analysis

As a result of analyzing the frequency of sports welfare related keywords, the general public demonstrated the highest frequency and was derived as a core keyword. In accordance with the National Sports Promotion Act enacted in 1962, Korea's sports welfare policy was limited to providing opportunities to participate in sports for the socially and economically underprivileged[2]. However, the “2030 Sports Vision,” which presented the sports policy and core tasks of the Moon Jae-In administration, presents that all citizens enjoy sports and lead a healthy life, and the formation of a happy community through the social spread of sports values as the policy direction, and specified sports to be a universal welfare. It is determined that in this study, the highest frequency of public keywords was influenced by the policy direction of the current administration, which accepts the right to sports as a basic right and promotes the expansion of sports welfare into a universal welfare for the people.

As for the keywords related to the effect of the sports welfare support, health, physical strength, and happiness were derived. The value of sports may include such physical values as health and physical strength improvement as well as such emotional values as stability and happiness[4]. As a result of the study conducted by Young-wook Kim and Soo-hak Oh[23], it turned out that the sports activities bring positive changes to the physical perception and contribute to the psychological happiness. Furthermore, as a result of the National Sports Survey[24], physical health maintenance(90.3%) and mental health maintenance(88.7) turned out to be high as a result of the participation in sports activities. In this study, the words related to the physical and emotional effects of the participation in sports activities were derived as the high frequency keywords, which suggests the expected effects of the sports welfare related policies and projects.

Furthermore, the keywords related to professional athletes such as athletes, competitions, events, games, and leaders were derived. Yong-goo Noh et al.[2] pointed out the issue of mixing the sports welfare and the professional sports welfare, and also presented the need to classify the areas for setting goals when implementing the relevant policies and projects. According to Article 2 of Chapter 1 of the National Sports Promotion Act, professional sports means the "athletic activities performed by athletes," and hence, professional athletes include athletes and coaches, etc. The welfare project for professional athletes is operated to provide support for national athletes, retired athletes, leaders, and sports scholarship related students, etc., in accordance with Article 14 "Protection and Development of Athletes, Etc." and Article 22 "Use of the Fund, Etc." of the National Sports Promotion Act. there is. In this study, the keywords related to professional athletes were derived as a result of mixing the sports welfare and the athlete welfare.

4.2. Results of the sentiment analysis

As a result of the sentiment analysis performed, the positive rate(79.52%) turned out to be very high, and such positive keywords as like, interest, and joy were derived. Based on such results, it was possible to confirm the overall positive perception of the sports welfare, and high expectations and demand for the related policies and projects were examined. This is in line with the research results[2] which demonstrated a high positive perception for the need of the sports welfare related policies.

However, the negative rate turned out to be 20.48%, and such negative keywords as rejection were derived. As a result of the survey performed on the extent of their own sports welfare benefits, it turned out that most of them were not taking advantage of them very well, and some even demonstrated a negative perception of the state budget deployment when promoting the sports welfare policies[2]. Hence, it is determined that the dissatisfaction with the benefits of sports welfare and some objections to the policy direction as a universal welfare have influenced the negative perception of the sports welfare.

4.3. Results of the semantic network analysis

As a result of the semantic network analysis performed, such keywords as public, health, physical activity, support, and service are located in the center of the network, and are confirmed as the major keywords. Through which, it was also confirmed that the sports welfare formed the discussion called "support and service for the promotion of public health." The subject of the sports welfare may be classified into a broad concept and a narrow concept[2]. The broad concept means the universal welfare for the general public, and the narrow concept means the selective welfare for the socially and economically underprivileged. In this study, it turned out that the keywords determined to be the broad concept form the discussion. Through which, it was evident that the sports participation related activities are deemed to be a basic right of the people, and the perception as the universal welfare was undergoing formation.

4.4. Results of the CONCOR analysis

As a result of the CONCOR analysis performed, "National Fitness 100," "Sports Lecture Voucher," and "Daily Sports Participation Policy" were formed into groups. Such results are determined to reflect the interest and demand of the currently implemented sports welfare related policies and projects.

4.4.1. National fitness 100

The National Fitness 100 Project is implemented in accordance with Article 16-2 “Daily Sports Activities and Physical Strength Certification” of the National Sports Promotion Act, and also provides for the exercise counseling and prescriptions via the scientific physical strength measurement and evaluation for the purposes of promoting the people's physical strength and health as a national sports welfare service[25]. This Project began with 4 physical strength certification centers in 2011, which expanded to 51 in 2019, and the number of participants also increased significantly from 4,583 in 2011 to 303,772 in 2019[26]. Furthermore, as a result of the Ministry of Culture, Sports and Tourism's survey on the importance of the major policies related to the physical strength, other policies demonstrated less than 15%, whereas the National Fitness 100 Project exceeded the highest figure of 25%, demonstrating the fact that it is positioned as a representative sports welfare project[27]. In this study, the formation of the “National Fitness 100” as a group implies the high demand and interest in the National Fitness 100 Project as a sports welfare policy.

4.4.2. Sports lecture voucher

The Sports Lecture Voucher Project is a welfare system which targets the children and young people as beneficiaries under the National Basic Living Security Act, and provides support for the sports lecture fees up to KRW 80,000 per month[16]. This Project began with the “sports voucher” in 2009 and was introduced into the field of sports as a social welfare service to help support the youth participation in sports activities and for the enjoyment of sports culture for the youth at low income households[28]. The number of beneficiaries has continuously expanded from 30,255 in 2012 to 40,826 in 2017, and the budget for the Project has also increased from KRW 10,542 million in 2012 to KRW 28,542 million in 2018, etc., demonstrating remarkable achievements[29]. Hence, in this study, it is determined that the “sports lecture voucher” group was formed given the increase of interest based on the performance of the Sports Lecture Voucher Project.

4.4.3. Daily sports participation policy

In Article 2 Paragraph 3 of the National Sports Promotion Act, daily sports are defined as the “voluntary and daily physical activities carried out to promote health and physical strength.” Hence, daily sports are a physical education or a sports activity which individuals engage voluntarily during their leisure time, with the aim to enhance the quality of life of the individuals via the physical, mental, and social health in the personal context, and build a welfare state in the social context([30]Ministry of Culture, Sports and Tourism, 2017). Accordingly, the National Sports Promotion Act provides that the national and local governments devise and implement the policies required for the promotion of daily sports[31]. The fact that the “Daily Life Participation Policy” was formed into a group in this study implies the extent of interest in the policy and project implementation for facilitating the participation in daily sports as a sports welfare.

5. Conclusion and Recommendation

In this study, the keyword frequency analysis, sentiment analysis, semantic network analysis, and the CONCOR analysis were performed via the big data collection with a view to examine and understand the sports welfare related perception and areas of interest. The conclusions derived from this study are as follows.

First, as a result of analyzing the frequency of the sports welfare related keywords, public demonstrated the highest frequency and was derived as a primary keyword. This is determined to have been influenced by the policy direction of the current administration, which accepted the right to sports as a basic right and which has promoted the expansion of the sports welfare into the universal welfare for the people. Furthermore, as the keywords related to the effect of the sports welfare support, health,

physical strength, and happiness were derived, and the words related to the welfare of professional athletes such as athletes, competitions, events, games, and leaders were turned out.

Second, as a result of the sentiment analysis performed, the positive rate(79.52%) turned out to be higher than the negative rate(20.48%), and the positive keywords such as like, interest, and joy were derived. Based on such results, it was possible to confirm the overall positive perception of the sports welfare as well as the high expectations and demand for the relevant policies and projects. However, the negative rate turned out to be 20.48%, and such negative keywords as rejection were derived. It is determined that the dissatisfaction with the benefits of the sports welfare and some of the objections to the policy direction as the universal welfare have influenced the negative perception of the sports welfare.

Third, as a result of the semantic network analysis performed, such keywords as public, health, sports activities, support, and service were located in the center of the network, and were also confirmed as the primary keywords. Through which, it was evident that the discussion called "sports welfare support and service for the promotion of public health" was undergoing formation.

Fourth, as a result of the CONCOR analysis performed, the groups of "National Fitness 100," "Sports Lecture Voucher," and "Daily Sports Participation Policy" were formed. This implies the extent of interest and demand for the sports welfare related policies and projects in progress.

This study has examined and learned about the overall status and perception of the sports welfare via the big data related analytical techniques, yet has failed to present a developmental plan for the relevant policies and projects. Hence, in the follow-up studies, it would be necessary to conduct the studies which present the directions and developmental plans for the sports welfare policy based on a research method which includes target group interviews consisted of the sports industry and social welfare professionals.

Furthermore, in this study, the keywords for the big data analysis were limited to "sports welfare." Hence, it is expected that the more detailed research results may be derived if various words related to the sports welfare are used in the future studies.

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7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Author	HO	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑ -Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑

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The Effect of the Sports Coaches' PROFESSIONALISM on Ethical Sensitivity and Guiding Belief

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Abstract

Purpose: *As it is the mission of coaches to appropriately guide their athletes on ethical and moral character, the role of sports coaches is crucial beyond anything, and it is also necessary to consider the guiding beliefs and methods which lead the students(or trainees) in the desired direction if sports coaching or guidance is more than merely an educational role to play. Hence, the purpose of this study is to examine and articulate the professionalism and ethical sensitivity of coaches, which have an important effect on the sports leagues as well as sports teams and athlete management, further to the effect on the guiding beliefs, thereby exploring an efficient operational method for managing and fostering sports teams and athletes.*

Method: *In this study, as of 2021, the coaches who were formerly professional sports athletes were used as the population, and as for the sampling method, 250 people were surveyed by the convenience sampling, while the survey was conducted by using the self-administration method, and among the collected questionnaires, those of 284 respondents were used as valid samples, excluding the data with insincere responses or omissions of some of the details of the survey.*

Results: *As a result of the factor analysis performed on professionalism, ethical sensitivity, and guiding belief, the professionalism was consisted of professionalism factor and technical requirement factor, while ethical sensitivity was consisted of one factor for the ethical sensitivity factor, and guiding belief factor was consisted of the 3 factors of behaviorism factor, interactionism factor, and maturationism factor, respectively. As for reliability, it turned out that professionalism factor was α=.795, technical requirement factor α=.692, ethical sensitivity factor α=.799, behaviorism factor α=.800, interactionism factor α=.835, and maturity factor was α=.697, respectively. As a result of the correlation analysis performed, it turned out that there was a positive(+) relationship between all of the factors, and it also turned out that the professionalism factor influenced the ethical sensitivity factor and the educational belief factor.*

Conclusion: *In order to achieve the purpose of this study, it is evident that the professionalism of sports coaches influences ethical sensitivity and guiding belief based on the results of the questionnaire. It is considered that it is necessary not only to explore the means to help improve the professionalism of sports coaches, which influences the ethical sensitivity and guiding beliefs of the sports coaches' education, but also create and form an overall environment for the self-development of the sports coaches.*

[Keywords] ***Sports, Coaches, Professionalism, Ethical Sensitivity, Guiding Belief***

1. Introduction

1.1. The needs and purpose of the study

While sports coaches play many roles, above and beyond anything, they influence the development of sports including the athletes, and even the future of a country's field of sports.

Coaches spend a lot of time with their athletes, and they play an important role in the athlete's overall life as well as in their training and gaming situations[1][2]. Consequently, the coaches' personal, direct and indirect, positive or negative factors such as their philosophy, beliefs, knowledge, character, temperament, sense of humor, experience, self-development, stress, and job insecurity are expressed and transmitted to and would influence the athletes[3][4][5][6]. In the field of physical education, as each individual athlete's characteristics and dispositions vary, coaches provide education in different ways, and given the relational specificity, coaches and athletes reach the common goal pursued through the smooth communication[7].

Smooth communication not only further enhances the positive perception and affection for the other person, but also helps increase the trust so that one may actively follow the other's opinions and actions[8]. Education in the field of sports is achieved through the correct interactions between coaches and athletes, at which time, the trust in coaches is very important. A positive effect may be expected if the trust is strong since athletes would trust and rely on their coaches and participate in training, no matter how poor the training conditions and circumstances[9].

In the case of such trust between coaches and athletes, communication is important, yet the basic qualities of coaches, such as their leadership skills and professionalism in the relevant field, are also very essential[10]. That is, the level of experience and knowledge of the coaches has a positive effect on the athletes' performance[11][12], and it is a reality that recognizing the importance of the professionalism of the coaches, the interest in the professionalism of the coaches is increasing among the measures to help improve the athletes' performance in games[13][14][15][16][17].

However, today's sports, which have been fostered as performance oriented elite sports and professional sports, focus only on winning and achievements through the performance improvement rather than character development or ethical values. The seriousness of the situation is highlighted because not only the character education and ethical education based on the ethical values of coaches are not being properly implemented, but also the athletes who have grown up in this manner become coaches and repeat the same training for the athletes[18].

As such, since it is the mission of coaches to appropriately guide ethical and morality based character for the athletes, the role of sports coaches is important beyond anything, and if sports coaching plays an educational role rather than simply improving athletic skills, anyone who educates ought to think about the guiding beliefs and methods which lead the students(or trainees) in the desirable directions[19]. Hence, the purpose of this study is to examine and articulate the effect of professionalism and ethical sensitivity of the coaches, which have an important influence on sports leagues, sports teams, and athlete management, on guiding beliefs, and further explore efficient operational methods for managing and fostering sports teams and athletes.

2. Research Methods

2.1. Subjects and sampling technique

In this study, as of 2021, the coaches who were formerly professional sports athletes were used as the population, and as for the sampling method, 250 people were surveyed by the convenience sampling, while the survey was conducted by using the self-administration method, and among the collected questionnaires, those of 284 respondents were used as valid samples, excluding the data with insincere responses or omissions of some of the details of the survey.

2.2. Measurement method

The measuring tool used for this study is a survey questionnaire, and the detailed method of constructing the questionnaire is as follows.

First, professionalism was structured by revising and supplementing the questionnaires used in the studies of Ye-jin Lee, Yong-soo Lee(2021), Jae-yong Myeong, Seong-taek Hong(2020), and Hye-rin Yoon, Ki-ho Kim, and Kyeong-ryeol Kim(2020) in line with the purposes of this study[20][21][22], and the Cronbach's α coefficient representing the reliability of the questionnaire turned out to be between .916 and .800 in the study of Hye-rin Yoon, Ki-ho Kim, Kyeong-ryeol Kim(2020), representing that the reliability of the factors were adequate.

Second, ethical sensitivity was structured by revising and supplementing the questionnaire used in the study of Min-soo Jeon, Ji-yong Lee, Hyo-joon Yoon(2020), Won-seob Lee and Ji-tae Kim(2012), and Hyo-min Seo and Kwang-soo Lee(2018) in line with the purposes of this study[23][24][25], and the Cronbach's α coefficient representing the reliability of the questionnaire turned out to be .710 in the study of Hyo-min Seo and Kwang-soo Lee(2018), representing that the reliability of the factors was adequate.

Fourth, guiding belief was structured by revising and supplementing the questionnaire used in the study of Chan-soo Yoon, Hyeon-shik Kim, Yong-guk Lee(2014), Ro-bin Kim and Dae-seon Koh(2011), and Tae-joon Jeon and Dong-ah Kim(2017) in line with the purposes of this study[26][27][28], and the Cronbach's α coefficient representing the reliability of the questionnaire turned out to be between .787 and .674 in the study of Tae-joon Jeon and Dong-ah Kim(2017), representing that the reliability of the factors was adequate.

2.3. Analysis of data

After distributing and recovering the questionnaire, the data processing for this study was conducted by excluding the data determined to lack reliability in the response contents, inputting the data which may be analyzed individually into the computer, and conducted the statistical validation as follows in line with the research hypothesis and the purposes of the data analysis with the SPSS 25.0 Program, a statistical package program.

First, the frequency analysis was performed to identify the general characteristics of the research subjects.

Second, the Cronbach's α coefficient was calculated to validate the reliability of the questionnaire used for the study.

Third, the factor analysis was performed to classify professionalism factors, ethical sensitivity factors, and educational belief factors.

Fourth, the correlation analysis was performed to examine the relationship between the variables.

Fifth, the multiple regression analysis was used to examine the effect of professionalism factors on ethical sensitivity factors and educational belief factors, and the statistical significance level was validated at a .05 level.

3. Results

3.1. Validity and reliability of the questionnaire, correlation

In this study, the validity of the content validity of the questionnaire was secured via the consultation with experts in the relevant fields, and the exploratory factor analysis was performed to validate the validity of the questionnaire. For the principal components analysis and factor rotation, the varimax method, which is an orthogonal rotation among the orthogonal rotation methods, was used. For the factor extraction, only the factors with an eigenvalue of 1.0 or higher were selected, and the factor loading indicating the extent of correlation between the variables and factors was limited to the questions with an eigenvalue of 0.5 or higher. Reliability is a concept related to stability, consistency, and predictability, etc., and it means that, when the same concept is measured by an independent measurement method, the results

ought to be similar. The reliability of the questionnaire to be used in this study was validated by calculating the Cronbach's α coefficient.

Through such method, the validity and reliability of this study are as follows.

First, professionalism was consisted of the 2 factors of professionalism factor and technical requirement factor, and the eigenvalue of each factor turned out to be the highest from 2.728 to 2.063, and the ratio of the 2 factors explaining the total variable turned out to be 43.551. As a result of the reliability validation, the professionalism factor turned out to be α=.795 and the technical requirement factor turned out to be α=.692, respectively.

Second, ethical sensitivity was consisted of 1 factor in the ethical sensitivity factor, and the eigenvalue of the factor turned out to be 3.431, and the ratio of factors explaining all variables turned out to be 34.3133. As a result of the reliability validation, the ethical sensitivity factor turned out to be α=.799, respectively.

Third, the guiding belief factor consisted of the 3 factors of behaviorism factor, interactionism factor, and maturationism factor, and the eigenvalue of each factor turned out to be the highest from 4.759 to 3.611, and the ratio of the 3 factors explaining the total variable turned out to be 43.638, respectively. As a result of the reliability validation performed, the reliability between the questions of each variable turned out to be such that behaviorism factor had α=.800, interactionism factor had α=.835, and maturity factor had α=.697, respectively.

Furthermore, in this study, the correlation analysis was performed to examine the relationship between each variable, and as a result, it turned out that there is a positive(+) relationship between all of the factors, and since it means that the influence of variables may be learned about through the regression analysis, and hence, in this study, the regression analysis was performed.

3.2. Effect of professionalism on ethical sensitivity

Table 1. Effect of professionalism on ethical sensitivity.

	Standardized regression coefficient		Non-standardized regression coefficient	t-value	Sig.
	b	*Std.E*	*β*		
Constant	.329	.072		4.569	.000
Professionalism	.718	.015	.875	46.934	.000
Technical requirements	.194	.015	.242	12.977	.000
R^2			.940		
F			46.085***		

Note: ***p<.001.

<Table 1> illustrates that the professionalism factor(β=.875) and the technical requirement factor(β=.242) of professionalism have a significant effect on ethical sensitivity, and it turned out that the coefficient of determination was R^2=.940, explaining 90.4%, respectively.

3.3. Effect of professionalism on guiding belief

Table 2. Effect of professionalism on behaviorism.

	Standardized regression coefficient		Non-standardized regression coefficient	t-value	Sig.
	b	*Std.E*	*β*		
Constant	2.137	.261		8.190	.000
Professionalism	.279	.056	.331	5.033	.000
Technical requirements	.250	.054	.303	4.604	.000
R^2			.256		
F			31.951***		

Note: ***p<.001.

<Table 2> illustrates that the professionalism factor(β=.331) and technical requirement factor(β=.303) of professionalism have a significant effect on behaviorism, and it turned out that the coefficient of determination was R^2=.256, explaining 25.6%, respectively.

Table 3. Effect of professionalism on interactionism.

	Standardized regression coefficient		Non-standardized regression coefficient	t-value	Sig.
	b	*Std.E*	*β*		
Constant	2.489	.261		9.523	.000
Professionalism	.298	.056	.365	5.361	.000
Technical requirements	.144	.054	.180	2.649	.009
R^2			.202		
F			23.493***		

Note: ***p<.001 **p<.01.

<Table 3> illustrates that the professionalism factor(β=.365) and technical requirement factor(β=.180) of professionalism have a significant effect on interactionism, and it turned out that the coefficient of determination was R^2=.202, explaining 20.2%, respectively.

Table 4. Effect of professionalism on maturationism.

	Standardized regression coefficient		Non-standardized regression coefficient	t-value	Sig.
	b	*Std.E*	*β*		
Constant	2.067	.347		5.953	.000
Professionalism	.372	.074	.355	5.038	.000
Technical requirements	.068	.072	.066	.939	.349
R^2			.143		

F			15.577***		

Note: ***p<.001.

<Table 4> illustrates that the professionalism factor of professionalism(β=.355) has a significant effect on maturationism, and it turned out that the coefficient of determination was R^2=.143, explaining 14.3%, respectively.

3.4. Effect of ethical sensitivity on guiding belief

Table 5. Effect of ethical sensitivity on behaviorism.

	Standardized regression coefficient		Non-standardized regression coefficient	t-value	Sig.
	b	*Std.E*	*β*		
Constant	2.341	.257		9.112	.000
Ethical sensitivity	.485	.066	.472	7.314	.000
R^2			.222		
F			53.499***		

Note: ***p<.001.

<Table 5> illustrates that the ethical sensitivity factor(β=.472) of ethical sensitivity has a significant effect on behaviorism, and it turned out that the coefficient of determination was R^2=.222 explaining 22.2%, respectively.

Table 6. Effect of ethical sensitivity on interactionism.

	Standardized regression coefficient		Non-standardized regression coefficient	t-value	Sig.
	b	*Std.E*	*β*		
Constant	2.494	.252		9.896	.000
Ethical sensitivity	.444	.065	.447	6.827	.000
R^2			.200		
F			46.608***		

Note: ***p<.001.

<Table 6> illustrates that the ethical sensitivity factor(β=.447) of ethical sensitivity has a significant effect on interactionism, and it turned out that the coefficient of determination was R^2=.200 explaining 20.0%, respectively.

Table 7. Effect of ethical sensitivity on maturism.

	Standardized regression coefficient		Non-standardized regression coefficient		
	b	*Std.E*	*β*	t-value	Sig.

Constant	1.911	.335		5.708	.000
Ethical sensitivity	.480	.086	.376	5.552	.000
R^2			.142		
F			30.826***		

Note: ***p<.001.

<Table 7> illustrates that the ethical sensitivity factor(β=.447) of ethical sensitivity has a significant effect on maturationism, and it turned out that the coefficient of determination was R^2=.142 explaining 14.2%, respectively.

4. Discussion

Ultimately, sports coaches ought to understand the physical and technical conditions of their athletes, and it is among their duties to analyze the social, behavioral and psychological conditions and help enhance the athletes' performance to the best thereby. In order to enhance the performance of sports coaches, the qualities of not only the athletes but also of the coaches themselves and consistent self-development are crucial, and hence, the importance of the role of sports coaches from various angles ought to be dealt with in great depth.

On top of the professionalism of the sports coaches, it is evident that, while the professionalism of coaches is an important factor for the educational quality according to the recognition of sports participants and athletes, there must be a correct guiding belief on the ethical basis[29]. In addition to various policy support which can improve the perception or prejudice of sports or elite sports and increase the work efficiency, the efforts of individual sports coaches must be made in tandem.

Furthermore, as for the sports coaches, various programs need to be developed for both the coaches and athletes for developing professionalism, improve leadership through the ethical or moral character formation, providing solutions to help address excessive winning centric guidance, and they need to improve negative problems caused by the validation of the coaches' qualifications or leadership skills. Various programs also need to be provided by institutions and associations in their efforts to provide an appropriate environment for sports coaches to feel psychologically stable[30]. Furthermore, the coaches with high professionalism or recognized for excellent coaching skills have high self-esteem and job satisfaction, as well as the coaches with high levels of competency and preparation for sports instruction, ethics, and morality, and hence, the sports coaches also need to conduct thorough self-management and make efforts to ensure that positive morality may be cultivated and instilled[31][32].

Since the vies of education or guiding beliefs based on the professionalism of coaches may gain the trust of participants, and through which, they can achieve their goals while improving their level, coaches ought to have a sense of professional mission based on a view of education which is revitalized in the times, and it is necessary for them to provide guidance based on professionalism such as by providing general knowledge and information about sports beyond offering simple guidance for performance through the improvement of practical skills[33]. Furthermore, the view of education and the guidance style based on the professionalism of coaches influence the educational effect[34], in particular, coaches should strive to develop personal character so that they can be respected morally or ethically by the participants, and such respect may gain their trust, and based on which, they ought help the participants improve their athletic functions through the development and operation of various teaching methods and programs with guiding beliefs[35].

The importance of continued mental support, and achieving social cohesion through it, has been emphasized, and according to the guiding belief, the cause of conflict between coaches and participants in the sports situation could be resolved or amplified, and furthermore, it was claimed that communication, continued sports participation, and sports performance competencies are also influenced[36][37][38]. This means that the coaches present a vision for the sports for the participants through an innovative teaching method along with a realistic view of education, and the actions they endeavor to change the participants' conditions through the sports build the mutual trust, that is, the trust with the participants, and the participants would trust the coaches on their view of education and coaching skills, thereby being helpful to the practice of the guiding belief[39][40].

5. Conclusion

The purpose of this study is to examine and articulate the effects of professionalism and ethical sensitivity of coaches, which have an important influence on sports leagues, sports teams, and athlete management, on guiding beliefs, and also explore the efficient operation methods for managing and fostering sports teams and athletes.

To achieve such purpose, in this study, as of 2021, the coaches who were formerly professional sports athletes were used as the population, and as for the sampling method, 250 people were surveyed by the convenience sampling, while the survey was conducted by using the self-administration method, and among the collected questionnaires, those of 284 respondents were used as valid samples, excluding the data with insincere responses or omissions of some of the details of the survey.

Following such research procedures and methods, the following conclusions were acquired.

First, in the analysis of the effect of professionalism on ethical sensitivity, it turned out that the professionalism and technical factors of professionalism have had an effect on ethical sensitivity.

Second, in the analysis of the effect of professionalism on guiding belief, the professionalism factor turned out to have the effect on behaviorism, interactionism, and maturationism, and the technical requirement factor turned out to have effect on behaviorism.

Third, in the analysis of the effect of ethical sensitivity on guiding belief, it turned out that ethical sensitivity factors have had a significant effect on behaviorism, interactionism, and maturationism.

Gathering which, it is evident that the professionalism and ethical sensitivity of sports coaches influence the guiding belief. It is considered that it is necessary not only to explore the venues to help improve the professionalism of sports coaches, which influences the ethical sensitivity and guiding beliefs of sports coaches, but also create and form an overall environment for the self-development of the sports coaches.

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7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Lead Author	HC	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑
Corresponding Author*	BK	-Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Co-Author	SJ	-Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑

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A Study on Analysis of the Status and Status of Sponsors of the Chinese E-SPORTS Events

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Abstract

Purpose: *The purpose of this research is to boost e-sports industries by conducting a comparative analysis on the current status of sponsor companies growing together with the Chinese professional e-sports competitions to understand the relationship between Chinese e-sports competitions and sponsor companies.*

Method: *Based on the League of Legends Pro League, China's most influential e-sports competition, we would like to examine the relationship between sponsor companies and e-sports industries through longitudinal and cross-sectional comparisons of sponsor status from 2014 to 2020.*

Results: *This resulted in the following: First, due to the accurate positioning of users, the first party competitions showed higher recognition or influence than the third party competitions. Based on the fact that mobile e-sports products can easily attract young users due to their low entry barriers, mobile e-sports products and competitions are important growth engines for the development of the e-sports industry. In addition, it has been shown that non-pro leagues support the development of professional leagues and that professional leagues are indispensable to interact, complement and promote the development of non-professional leagues. Second, according to an analysis of the sponsorship status of global e-sports events, computer and peripheral companies as computer and related fields were most actively sponsoring e-sports competitions, and the support of global companies was steadily increasing. Finally, after looking at the sponsorship status of e-sports competitions in China, it was found that e-sports sponsorship is a major source of income in the e-sports industry and is growing together with the participation of influential sponsor companies.*

Conclusion: *In the League of Legends event, China's most influential e-sports competition, teenagers and 30s were the main sources of income, with mostly male products-oriented sponsor companies. However, if women's participation is steadily increasing and men and women's competitions are held to attract sponsors and marketability, e-sports can grow together with the attraction and participation of global sponsor companies.*

[Keywords] ***Esports, China's E-Sports Events, Sponsors, Sponsorship, Growth***

1. Introduction

In the recent COVID-19 pandemic situation, 220,000 viewers watched the "2020 LCK Spring" finals on average, and 1.07 million viewers worldwide, reevaluating the possibility and potential of creating a new business in the e-sports market representing the "contactless" era[1][2]. The time when e-sports became active as sports was when they were adopted at the 2018 Asian Games in Jakarta, Indonesia, and business corporate sponsorship and sponsorship competitions were actively held. In particular, China showed its top performance by winning two gold medals and one silver medal at the 2018 Asian Games, creating an opportunity for full-fledged e-sports activation as the strongest country in e-sports. As an advanced IT country, Korea is currently actively, and successfully, hosting the LOL Cup competitions every year[1]. As such, at a time when the growth potential of the e-sports industry are highly

valued, global companies are investing huge amounts of capital into the e-sports industry to strengthen their marketing strategies and brands.

The e-sports market is largely divided into direct participation and spectator participation, usually hosted by producers and invested by sponsors to participate in e-sports clubs in each country. Competition sponsors, as investors, are creating powerful business synergies that deliver corporate products and images[3]. In particular, about 42% of the income of professional e-sports clubs in China, the powerhouse of e-sports, is generated from brand sponsorship[2][4]. In 2014, there was a case in which the competition was suspended when Samsung, a global company, canceled its investment at the most internationally influential WCG competition. This shows that the influence of corporate sponsorship plays an important role in e-sports competitions[5][6].

Sponsors marketing refers to overall marketing activities that facilitate the delivery of marketing messages directly and indirectly and naturally promote the image of the company and the desire to purchase goods compared to other media[5]. In particular, an enterprise's title sponsorship at a sporting event is a formal marketing tool that increases consumer and corporate membership by increasing consumer and corporate sales and image by reducing consumer resistance to exposure compared to existing advertising tools[7]. Unlike traditional sports industries where commercial businesses have been activated, e-sports have been activated lately due to IT development, but it is a field with high commercial value and ripple effect by forming a strong fandom around the world's 12~34-year-olds[1].

According to "2020 E-sports Business Report," a report released by Tencent, a global Chinese company, the 2020 e-sports competition has grown by 15.7%(about $1.1 billion) from 2019, and China's e-sports sponsor's share(35 percent, about $3.85 billion) is also improving[8]. Although Mercedes Benz, a global automobile company, and global brand companies are consistently sponsored at the S7 World Championships, League of Legends' mega competition, domestic and foreign brand companies in the e-sports industry are still very low compared to the traditional sports industry. Looking at the sponsorship status of the 2020 Tokyo Olympics, which is a mega sports event, the share of major sponsors is 9% and the share of sponsors in Japanese companies is 55%. It shows that sponsorship marketing is actively being used as a globalization strategy for domestic companies through international events[9]. Alibaba, a global Chinese company, is sponsoring $18 billion a year as an official Olympic sponsor for 10 years, which is relatively underfunded compared to the traditional sports industry, and it is time for global sponsor companies to pay attention and continuously participate.

According to the 2020 study on e-sports in China, research on e-sports events vitalization(87 cases, 71 .31%), e-sports industry(15 cases, 12.30%), and e-sports competition operations(20 cases, 16.39%) have been conducted continuously. However, research on sponsorship and support by global enterprises that account for a large range of e-sports industries is insufficient[1][10][11][12][13][14]. With international e-sports ratings higher than those of the U.S. Super Bowl American football, corporate participation should be actively carried out around the professional league. There should also be a diversified study of ways to segment competition events into electronic games and video games, as well as business strategies and activation of e-sports in the partnership between the e-sports industry and global enterprises[15].

Recently, the traditional sports industry has been hit by COVID-19, but the ripple effect of e-sports is building a more aggressive marketing strategy. There are still aspects of the negative perception of "online competition, electronic competition" and the development of China's e-sports industry, which leads the IT powerhouse. In line with the positive function of e-sports and the trend of the times, various policy approaches are needed to revitalize e-sports by providing positive training for sports activities online, fostering professionals, and providing the business environment of domestic and foreign global companies. Therefore, we are going to categorize the competition events and types of games based on China's professional e-sports competitions and analyze the sponsorship status of the competition based on League of Legends(LOL), the most active e-sports competition title.

2. E-Sports Competition Events and Current Conditions

2.1. E-sports competitions and the global e-sports industry

E-sports is the competition and incidental activities in which a person competes with a record or competition between players using a game title as a medium This includes the entire leisure activities of competing against each other by utilizing mental and physical abilities, including factors such as competition and enjoyment, in an electronic environment that is virtually established[16].

The concept of sports events evolved from sports competitions. In China, the concept of sports events and sports competitions is often used in combination, but in fact, sports events are interpreted as a narrow sense of sports competition. Specifically, a sports event is a competition between individuals or teams specifically organized and played for the purpose of winning under the jurisdiction of a referee within a particular place, and a sports competition is a process in which participating countries strive to compete and win in good faith in institutional regulations[17]. In addition, sports events are defined as regular activities that are accompanied by various functions such as politics, economy, culture, and society[18]. As such, sports events are not viewed as just a sporting activity, but as an activity that provides competitive products and related services. This is a means of providing positive market potential in various industries including sports experience and regional tourism, politics, economy, culture, and corporate promotion through sports competitions[15].

According to the Oxford dictionary, "event" is interpreted as "competition," but it is interpreted in a narrow sense. "Event" is "incident" as well, and a sports event means "sports incident." In China, "event" is interpreted as a combination of "sports" and "event." Sports competitions are interpreted as "competition events" and sports competitions are interpreted as "sports competition events." In conclusion, sports events are defined as "sports competitions" and "special events"[15]. As such, the concept of e-sports competitions has been similar to the development of traditional sports competitions in the development of e-sports competitions and has evolved from the concept of enjoyment and become e-sports today. The early e-sports competition started with a small PC room competition and lacked sports elements in terms of simple entertainment, but as IT and online activities became more active, e-sports competitions with sports strategies and tactics are recognized as online sports with both entertainment and competition[4].

In other words, "e-sports competition" is a sports activity that competes online with individual and team competitions based on rules and IT technologies that are institutionalized around competitions. This refers to sports activities that promote diverse synergies and developments in cultural, economic, and social areas related to the e-sports enthusiasts' desire to watch the games for the purpose of the competition product service provided by e-sports competitions[17][19].

2.2. Classification of e-sports competitions

2.2.1. Classification by organizers of e-sports competitions

Organizers of traditional sporting events typically include governments, businesses, social organizations, and associations. Traditional sports events may be held through the administrative permission of the government department without the need to host and approve traditional sports organizations other than the right to use and sponsorship brand licenses. However, e-sports competitions involve copyright issues in e-sports competitions. That is, copyright is owned by the game developer. Thus, e-sports competitions have copyright issues with developers of competitions and development companies with copyrights. The e-sports competition held by the developers or operators of e-sports competitions is "the first party competition" and the competition held by the media or other organizations is called "the third party competition" <Table 1>.

Table 1. Classification by organizers.

Events	Organizers	Period	Prize($)	Number of participants(year)

The first party events	League of legends world championship series(worlds)	League of legends	2011-present	$ 30 mil.	153(2020)
	The international, DOTA2 championships(TI)	Dota 2	2011-present	$ 50 mil.	108(2019)
The third party events	Electronic sport world cup(ESWC)	CS/WAR3/ Dota	2003-2012	$ 300K	700(2005)
	World cyber games(WCG)	Dota2/ Starcraft2/ FIFA12	2000-2013 2019-present	$ 610K	506(2019)
	Cyberathlete professional league(CPL)	Halo2/COD/CS	1997-2008	$ 200K	6,000(2004)

2.2.2. Classification by size of e-sports competitions

According to the size and influence of e-sports competitions, Chinese e-sports competitions are divided into international competitions, professional championships, championship cup competitions, high school competitions, and urban competitions.

2.2.3. Classification by the way e-sports competitions are played

There are two ways of e-sports competitions: using a PC or mobile. In addition to these two, a small number of console games also exist, but the main methods of e-sports competitions are currently divided into the two above <Table 2>.

Table 2. Classification by the way e-sports competitions are played.

Mode of competition	Events	Organizer	Period	Prize	Number of participants(year)
PC e-sports	PUBG global championship (PGC)	PUBG	2019-present	$ 3 mil.	219(2020)
Mobile e- sports	King pro league(KPL)	Arena of valor	2016-present	$ 5 mil.	136(2020)

2.2.4. Classification by number of events in e-sports competitions

As a classification of traditional sports competitions, e-sports competitions can be classified by the number of events in the competition and are divided into a single event and a comprehensive event. A single event refers to a competition involving only one e-sports event and a comprehensive competition refers to a competition involving more than one e-sports event.

2.2.5. Classification by participants

The participants of an e-sports competition are players or "athletes." According to the level of athletes' skills, the participants of e-sports competitions are divided into professional and amateur players, and accordingly, competitions are divided into professional and amateur competitions <Table 3>.

Table 3. Classification by participants.

Classification	Events	Organizer	Period	Prize	Number of participants (year)

Pro league	Progamer league(PGL)	CS:GO, WAR3, DOTA2	2006-present	$ 1.6 mil.	1,127(2016)
Amateur league	TGA crossfire cities league	Crossfire	2009-present	No data	150K(2009)

2.3. Types of e-sports events

Usually, e-sports competitions are divided into six types including motion, exploration, simulation, character play, entertainment, etc., which can be further subdivided according to the content and method of the competition to varying in size. A total of seven types of competitions including first person shooter, instant strategy, online tactic, fight, speed, sports simulation, and card games, consisting of rules of the competition and many players, exerting enormous influence on the e-sports industry.

2.3.1. First person shooters

Shooters are the most common type of e-sports events. It should possess four basic elements: subjects, competitors, shooting motion, and escape motion. The shooters are considered a motion based game and an independent event because there are a lot of participants and they are hugely popular.

Table 4. Classification as first person shooters.

Events	Organizer	Period	Prize	Number of participants(year)
Over watch league	Over watch	2018-present	$ 4.25 mil.	153(2020)
PUBG global championship(PGC)	PUBG	2019-present	$ 3 mil.	219(2020)
Call of duty league(CWL)	COD	2017-present	$ 2.4 mil	No data

2.3.2. Instant strategy

Instant strategy competition is one of the strategy-based competitions. Literally, the game is played instantly, but at the same time, it is a tactical and strategic game in which each team works together to compete. The emphasis is on the implementation of tactics and strategies, not specific actions <Table 5>.

Table 5. Classification as instant strategy.

Events	Organizer	Period	Prize	Number of participants (year)
Global starcraft Ⅱ league(GSL)	StarcraftⅡ	2010-present	$ 600K	32(2020)
World cyber games(WCG)	WAR3	2019-present	$ 500K	16(2019)

2.3.3. Online tactics

The origin of online tactic games is instant strategy games. This is a game in which one of the team's characters controls competing with the other and destroys the other's major structures with the help of Internet control units(small soldiers, carts, etc.). These Internet control units can only proceed with predetermined routes <Table 6>.

Table 6. Classification as online tactics.

Events	Organizer	Period	Prize	Number of participants(year)
League of legends world championship series (worlds)	League of legends	2011-present	$ 30 mil.	153(2020)
The international, DOTA2 championships(TI)	DOTA 2	2011-present	$ 50 mil.	108(2019)
King pro league(KPL)	Arena of valor	2016-present	$ 5 mil.	136(2020)

2.3.4. Fight

Fight games are a type of electronic-based game. The player controls the character on the screen and fights the opponent <Table 7>.

Table 7. Classification as fight games event.

Events	Organizer	Period	Prize	Number of participants (year)
Evolution championship series(EVO)	Street fighter V/tekken 7/ the king of fighters XIV	1996-present	No data	10K(2016)

2.3.5. Sports simulation

Sports simulations are also called mock sports or electronic sports<Table 8>. This is an electronic competition in which a player virtually participates in a professional sports event, either by using an instrument that imitates an existing sport or by using an application.

Table 8. Classification as sports simulation.

Events	Organizer	Period	Prize	Number of participants (year)
FIFA eWorld cup(FeWC)	FIFA 21	2004-present	$ 500K	32(2019)
NBA 2K league	NBA 2K 20	2018-present	No data	No data

2.3.6. Speed competitions

Speed-type competitions are a type of competition that is about speed, which was originally a branch of sporting competitions, but the rules of the competition are being organized and specifically completed as the number of speed-type competitions increases. Speed competitions are already recognized as an independent type of competition. These include real-time strategy(RTS), first-person shooters(FPS), racing, and fight games. Typical examples are Starcraft, Warcraft, and Kartrider.

3. Status of Chinese E-sports Sponsors

The COVID-19 situation, which has continued since last year, has hurt the development of the traditional sports industry. In comparison, the e-sports industry was not significantly affected based on its online characteristics, and the e-sports competition market was most active with the highest broadcasting ratings and sponsorship of competition sponsors ever. This study aims to provide basic data to

further boost the e-sports industry by analyzing the status of sponsorship for the League of Legends competition in China, which is suitable for various types of games in the e-sports industry and has the most active and high share in the Chinese market.

The method of analysis is to make longitudinal and cross-sectional comparisons. The cross-sectional analysis compares the sponsors of the League of Legends with the sponsors of the World Championships. The longitudinal comparison was based on the time axis based on the sponsors of the League of Legends China tournament.

Table 9. Status of sponsors for league of legends(12 organizations).

China(LPL)		Korea(LCK)		Europe(LEC)		Latin America (LLA)		North America(LCS)		Japan(LJL)	
Corporate sponsor	Sponsored product	Corporate sponsor	Sponsored product	Corporate sponsor	Sponsored product	Corporate sponsor	Sponsored product	Corporate sponsor	Sponsored product	Corporate sponsor	Sponsored product
Mercedes Benz	Automobiles	Woori Bank	Finances	Kia	Automobiles	AXE GAMING	Daily necessities	HONDA	Automobiles	Alienware	Computers
Nike	Sports wear	Electronic Communications	Communications	Alienware	Computers	Barracks.gg	Beverage	State Farm	Finances	Intel	Computers
Moslian	Dairy products	Logitech	Computers	Nestle	Snacks	COUGAR	Computers	Alienware	Computers	AKRACING	Computers
Harbin Beer	Alcohol	Sidiz	Furniture	Beko	Electronics	Crunchyroll	Finances	Secret lab	Computers	Colantotte	Foods
Chungyang	Daily necessities	TikTok	Audio platform	Logitech	Computers	Mastercard	Finances	Elago	Computers	DemaeCan	Food delivery platform
Wahaha	Water	Lotte Confectionery	Snacks	Secret lab	Computers	Spotify	Music platform	Mastercard	Finances	RIEDEL	Ornaments
Kentucky	Snacks	McDonald's	Snacks	RedBull	Beverage			RedBull	Beverage	Lipovitan	Beverage
Gunma	Beverage			Ersta Group Bank AG	Finances			Bud Light	Alcohol		
OPPO	Communications							Verizon Wireless	Communications		
Suningyigewu	E-product platform							Samsung SSD	Computers		
Fudong Bank Credit card	Finances							Buffalo Wild Wings	Snacks		

HP	Computers										
Autofull	Computers										
Intel	Computers										

CIS(LCL)		Brazil(CBLOL)		SE Asia(PSC)		Oceania(OPL)		Vietnam(VCS)		Turkey(TCL)	
Corporate sponsor	Sponsored product	Corporate sponsor	Spon-sored product	Corporate sponsor	Spon-sored product	Corpo-rate sponsor	Sponsored product	Corporate sponsor	Sponsored product	Corpo-rate sponsor	Sponsored product
JBL	Computers	Gillette	Daily necessi-ties	CTBC	Fi-nances	Neosurf	Finances	Nonolive	Competi-tion platform	Voda-Fone	Communi-cations
GIG.ME	Competi-tion related	RedBull	Bever-age	FunPlus	Compe-tition related	McDon-ald's	Snacks	VETV	Competi-tion platform	NIMO TV	Broadcast-ing platform
		Dell	Comput-ers	GARENA	Compe-tition plat-form	EPOS	Comput-ers			Maxi-mum	Finances
		Mastercard	Finances							OLIPS	Snacks
										Medi-aMarket	E-com-merce platform

3.1. Sponsor status of league of legends china and global competitions

<Table 9> and <Table 10> are the Chinese and world sponsors of League of Legends. League of Legends is one of the most popular games in the world and has a variety of players and viewers. The game has numerous influencers to watch professional players' game skills and strategies and is an online tactical competition title. The MOBA Association, which manages League of Legends, is similar to FIFA's World Cup organization, and if you look at the 2020 season record, it is an international e-sports association that has attracted 62 sponsors from 12 sectors around the world. Specifically, if you look at the Chinese e-sports market, there were only two LPL sponsors in 2014, and the sponsorship was very small. However, with the participation of the global company Coca-Cola in 2016 and Mercedes Benz as an official partner in 2017, the sponsorship has expanded with the marketing strategies of global and Chinese companies. The early sponsorship of Chinese e-sports marked a new heyday in the e-sports industry as sponsorship of computer and Internet-related companies, which are highly related to the e-sports sector, became active. On the other hand, more than 66 percent of large competitions were canceled in 2020 due to the seriousness of the global pandemic, but the online sports competition and broadcasting rights expanded the audience to secure many potential customers[16][20].

Table 10. Status of chinese sponsors for league of legends(2014-2020).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2015 (5)	Company	Wanger Internet café	Jija	Intel	RAC-CUA	Logitech									
	Product	Internet café franchise	Computers	Computers	Computers	Computers									
2016 (5)	Company	Coca-Cola	Lenovo	AutoFull	Intel	Philips	Logitech								
	Product	Soda	Computers	Computers	Computers	Computers	Computers								
2017 (8)	Company	Mercedes Benz	DX Racer	DAREU	Intel	Dairy products	L'Oréal	Logitech	Gunma						
	Product	Automobiles	Computers	Computers	Computers	Dairy products	Daily necessities	Computers	Beverage						
2018 (8)	Company	Mercedes Benz	HP	Dalidazu	Gunma	L'Oréal	Intel	DX Racer	Kentucky						
	Product	Automobiles	Computers	Snacks	Beverage	Daily necessities	Computers	Computers	Snacks						
2019 (10)	Company	Mercedes Benz	Kentucky	Gunma	Hufu	Alienware	Doritos	L'Oréal	DX Racer	Harbin Beer	HP				
	Product	Automobiles	Snacks	Beverage	Internet	Computers	Snacks	Daily necessities	Computers	Alcohol	Computers				
2020 (14)	Company	Mercedes Benz	Nike	Moslian	Harbin Beer	Chungyang	Wahaha	KFC	Gunma	OPPO	Suningyigewu	Fudong Bank	HP	Autofull	Intel
	Product	Automobiles	Sportswear	Dairy products	Alcohol	Daily necessities	Water	Snacks	Beverage	Communications	Online product platform	Finances	Computers	Computers	Computers

E-sports events, which takes place online, is closely related to the blue ocean field of the fourth industry in the future, and it is time for policy support and positive public attention. In particular, the rapid development of e-sports event sponsorship is largely attributed to the support of government policies and social and commercial awareness, and the mature business model of the event has been established and the consumption trends and influence of teenagers to those in their 30s have become a stronger foundation for e-sports competitions[1][4]. E-sports competitions will be further developed

based on positive images of e-sports among young consumers who are active online and corporate images due to sponsorship, emotional stress relief and communication, and sports competition and participation factors. Furthermore, the development of the Internet and IT technology will pay attention to the active participation of global companies in e-sports sponsorship and events by creating economic added value as online sports participation, leisure activities, and viewing sports. Although e-sports started late, it is still blue ocean because it develops and spreads quickly online, but we still do not know what form and scale it will develop in the future. But one thing we are sure of is that with advances in science and technology, e-sports is the first sport to be able to combine with new technologies, and the prospects for development are very bright. In particular, Table 10 shows that despite its short history, it is rapidly attracting vertical sponsor companies, most of which were Internet-related and computer-related companies, but recently, considering the characteristics of consumers, who are teenagers and in their 30s, related companies are participating[21].

4. Plan to Revitalize China's E-Sports Sponsorship

The purpose of this study is to analyze the status of Chinese e-sports sponsors and provide basic data to establish a future-oriented e-sports industry revitalization strategy. Accordingly, we would like to analyze the current status of e-sports sponsors and discuss as follows.

4.1. Classification analysis according to e-sports competitions

4.1.1. Strategies to actively revitalize and popularize the first party competitions

According to Table 1, the third party competitions have various events, but the current state of economic revitalization is that the first party competitions are growing more actively. Despite the recognition of the world's third-party competition, participation and interest were low. Looking at the first party competitions, both recognition and influence are higher than the third party competitions because the users of the first party competitions can be accurately positioned, the participants pay, which generate a lot of revenue for the game companies, and the game companies continue to spend money to host competitions, making a surplus. On the other hand, the third party competitions have similar functions, but the burden of users is not revealed by sponsors, and if there is no clear profitability, it is difficult to support expenses, so if there is no other sponsorship, the competition will have to be suspended or canceled. Therefore, it can be seen that the first party competition can promote corporate image and relative cost savings and promotional effects in terms of business, which can lead to aggressive marketing strategies and popularization in promoting competition and sponsorship.

4.1.2. Activation and popularization strategies for mobile e-sports competition products

Mobile e-sports products can easily attract young users due to their low entry barriers, fast tempo, and easy time utilization. In particular, mobile e-sports has the advantage of rapidly developing based on software if hardware settings such as mobile memory, CPU, and screen size evolve and 5G network internet network is upgraded in the future as well as 4G. Therefore, in order to further activate mobile e-sports, the system and network that the gaming environment can build will need to be developed step by step. Finally, compared to other forms of e-sports competitions, mobile e-sports will be a growth engine for the future mobile e-sports market as there are low requirements for places, technologies, and manpower, and a more flexible revenue-structuring approach will increase potential sponsors' tendency to invest in these events.

4.1.3. Establishment of mutual support system for development of professional and non-professional leagues

Professional leagues(professional players' leagues with registered players) are important, but the activation of non-pro league competitions and clubs should be a top priority. The non-pro league is not only the foundation of the professional league, but it is also an experience platform for both casual

and pro players, as well as a cradle of professional player training and growth. In other words, the development of a professional league cannot be separated from a non-pro league, so amateur e-sports must be developed and activated to naturally expand to a professional league. Furthermore, the professional league will enhance the authority and dignity of e-sports competitions, enhance the brand value of companies that can maximize corporate image and professionalism, and further promote corporate sponsorship and expansion of new markets due to the nature of the e-sports industry. Therefore, professional and non-pro leagues should be based on interconnection and complementary support, and a system should be established to enable the association's institutional approach, support, sponsorship, and strategic promotion to interact.

The development of industry and science requires the development and updating of new product content continuously to attract many companies and increase the number of users. In addition, the product's marketing model is the key to product success, and the e-sports content production industry is already full in terms of content output, but it is still highly likely to develop in terms of e-sports content production process and content distribution expansion. e-sports content production companies, which are the link of future 4th industries, should approach operation and development with greater diversity by looking at consumer characteristics and consider the following three aspects. First, advertising sales services should be added to the original business model, such as e-sports resource acquisition, channeling, and deployment. Second, in addition to increasing content production efficiency and expanding content marketing channels, it will need to further activate media effects such as variety shows and artist relay services by providing customer-led event content operations and e-sports influencer's entertainment content. Lastly, it is time for e-sports content producers to have a macro perspective with the possibility of developing a wide range of tourism based on e-sports story themes, game elements, and various theme parks and entertainment facilities.

4.2. Analysis of the current status of global e-sports sponsors

4.2.1. Continuous participation as a sponsor companies of computers and related facilities

Computer and peripheral companies have always played an important role in sponsoring e-sports competitions as a strong relevant area of e-sports projects. According to <Table 9>, most of the world's 12 League of Legends competitions are sponsored by computer and peripherals companies, actively sponsored, and account for about 30% of the sponsorship. As such, PC manufacturers' constant search for "strongest team" and "great players" is a stable and accurate brand marketing strategy, and e-sports equipment used by professional players has been able to highlight the best public relations strategy, corporate capabilities, and image. Looking at the dynamic game, great play, or professional players' performance through strategy and tactics, viewers can imprint the mouse, keyboard, headset, and other peripherals used in the game and the companies actively promote their products, making e-sports a perfect stage to take the lead in public relations and marketing. At a time when the number of participants in e-sports is steadily increasing, global companies aimed at teenagers and 30s should continue to expand to sponsor e-sports competitions, and corporate marketing strategies aimed at future consumers should be carried out together.

4.2.2. Traditional e-sports sponsors continue to participate

An analysis of the sponsors of the League of Legends global competitions in 2020 clearly shows that they are focusing on emerging e-sports industries rather than traditional sports industries. After Mercedes-Benz became a title sponsor for LPL, it established a brand image for young people, expanded the number of consumers in their 20s and 30s from middle-aged consumers, and expanded the age of consumers by building a young and sophisticated image. Since then, Kia and Honda have also been sponsoring LEC and LCS to promote their corporate image with active e-sports marketing strategies. Due to its exciting and fast e-sports characteristics, most automakers are strategically participating in sponsorship to secure the value and market of e-sports competitions, and at the same time, it can be seen that such sponsorship is leading to huge recognition and actual product purchase.

Also, looking at Chinese companies in the world e-sports industry, financial institutions such as

Shanghai Fudong Development Bank Credit Card, Woori Bank, and CTBC are sponsoring the local sectors, with two financial instruments including insurance and credit cards for LCK. Among them, MasterCard was sponsoring three sectors at the same time and is also a global official partner of League of Legends. They are expanding into the global market as a strategic approach to becoming a global financial company through e-sports.

Lastly, sports drinks are worth noting because they have a high leading correlation at the sports competition site. However, the participation of sports beverage product companies in the 2020 League of Legends event was limited to LPL and LCS sectors. In a similar vein to sponsors of the traditional sports industry, if global companies continue to participate to promote their products and brand value, the e-sports industry that grows with the company will become a more robust industry.

4.3. Analysis on the status of chinese e-sports sponsors

Next, looking at China's sponsor status(see Table 10), the only LPL sponsor in 2014 was a computer company that had strong relationship with the Chinese beverage brand, which was not enough to revitalize the e-sports competition. However, in 2020, the number of sponsor companies rose sharply compared to 2014, with world-class companies such as Mercedes Benz, Nike, and KFC participating as competition sponsors. Knowing the synergy effect of competition and sponsorship in the existing traditional sports industry, it can be seen that the potential and ripple effect of the online e-sports market is highly competitive in the company's global business strategy, making the quality of the competition better[20][22]. As an emerging industry in e-sports, LPL has the strongest growth potential. It promotes the competition through the platform of the title e-sports brand competitions, organizes clubs centered on e-sports influencers from around the world, and hosts various LPL competitions to imprint them on global companies. Currently, there are 16 clubs in the Chinese e-sports federation, of which about 50 percent are branded corporate clubs. These include two e-commerce-based clubs, Jingdong and Suning, BIG Club(bilibili), TES Club(gambling sports), LNG Club(Lining) and RW Club(Asus). Through various sponsor activities and partnerships with e-sports clubs and players run by companies, it implements player guarantee advertising and online/advertising promotion strategies, creating various added value through the company's image and global businesses[21]. China is a powerhouse in e-sports, and despite having many influencers, the sponsor market is still likely but not active compared to the revitalization of e-sports. In fact, according to the Gamma Research Institute's report in 2018, the size of the 2018 e-sports competition is about $10.9.5 billion, accounting for 1.2% of the total e-sports market. Compared to traditional sports competitions, the sponsorship rate for e-sports competitions remains low[23]. This is still the blue ocean sector in the area of quantitative growth and economic value added of subsidiaries in the e-sports industry, considering the global impact of e-sports[5][23][24].

Finally, the reason for the rapid development of sponsorship of e-sports competitions is mainly the support of government policy and the stability of the commercialization market. The established e-sports competition will expand its role as a cornerstone of the development of e-sports competitions and the future sports industry as the e-sports industry grows and the consumption capacity of the younger generation increases[4][25][26]. In particular, sports and competition styles that cater to the tastes of the younger generation who are taking the initiative in the future will lead to further progress[23][27][28], and as young people with this consumption ideology enter society, e-sports and its competition events will be noted. Thus, although e-sports started late, vertical development is expected. It is uncertain what form and scale they will develop in the future, but with the development of science and technology, e-sports are the first sports that can be combined with new technology[28][29][30][31].

5. Conclusion and Suggestions

5.1. Conclusion

This study compared the status of China's sponsor market and overseas sponsors through longitudinal and cross-sectional research at the League of Legends competition, which is the most active and has the highest market share among the e-sports industries in China. Based on this, the following conclusions were drawn.

First, due to the precise positioning of users, the first-party competition showed higher recognition and influence than the third-party competition. Mobile e-sports products can easily attract young users due to their low entry barriers, fast tempo, and easy time utilization, so mobile e-sports products and competitions are important growth engines for the development of the e-sports industry. In addition, it has been shown that the non-pro league supports the development of the professional league and that the professional league is indispensable for interaction, complement, and promotion in the development of the non-pro league.

Second, having analyzed the status of sponsorship of global e-sports events, computer and peripheral equipment companies are most actively sponsoring e-sports competitions as they are computer and related fields, and the sponsorship of global companies has been steadily increasing. In particular, due to the nature of e-sports, the sponsoring companies are building a product and brand image by expanding the young consumer base by establishing a sophisticated image considering the young consumer base. Third, looking at the status of sponsorship of e-sports competitions in China, it can be seen that e-sports sponsorship is a major source of income in the e-sports industry and an important channel for generating added value. In the early days, mostly computer-related companies sponsored e-sports competitions, but now the participation of global brand companies are steadily increasing. The participation of global companies such as Mercedes Benz, Nike, and KFC has been steadily increasing, and the economic value of e-sports is recognized by establishing a corporate promotion strategy for potential customers who watch real-time competition through global broadcasting channels. However, compared to the ripple effects of e-sports, the discovery and influx of various sponsors are still not active. Therefore, it is necessary to establish a virtuous ecosystem industry environment that promotes the economic ripple effects of e-sports and the global growth of Chinese companies by attracting sponsors of e-sports(online telecommunication companies, media companies, etc.).

Recently, e-sports sponsor companies focused on men's products such as Chungyang and Gillette have been participating, and they have been continuously conducting corporate sponsorship activities at competitions such as LPL, LEC, and CBLOL, respectively. According to the recent report on the 2020 e-sports competition industry research, the proportion of women among Chinese e-sports users has been steadily increasing(2018(19%) → 2019(24%) → 2020(36%)). Therefore, it would be necessary to actively induce the participation of sponsor companies in women's products. Finally, despite the vertical revitalization of the e-sports industry in 2018 when it was adopted as a sports event, there is still a negative perception of e-sports, which could be a hindrance to the development of e-sports. As a result, the government should preemptively provide leading e-sports awareness education, fostering future talent that can be integrated with IT, developing e-sports content that can be enjoyed by men and women of all ages, and actively supporting an environment for domestic and foreign sponsor companies to participate.

5.2. Suggestions

The study resulted from the longitudinal and cross-sectional study of the League of Legends competitions, which have the most mature marketization and the highest market share in China, and we would like to make the following suggestions.

First, to examine the current status of e-sports in China, data were collected on the literature research and website. As a result, it is somewhat difficult to generalize the entire sponsor companies in the e-sports industry. Second, the e-sports industry, competitions, and sponsors are still progressing steadily, and acceleration is very fast. As a result, various research should be conducted to create positive synergy and as a major source of income for the e-sports industry through sponsoring companies and sponsorship status in Korea, Europe, the United States, and China, where the e-sports industry has been activated. Finally, compared to other global economic sectors, China's economic sector sponsors are more famous and abundant in terms of corporate reputation or product type. However, the

enthusiasm for participation from areas that are highly relevant to e-sports, such as telecommunications and online video call companies, remains low. So we need to develop new sponsors to expand to the global industry(For example, a furniture company sponsoring LCK competition sectors would be a good example of new sponsorship in the e-sports community). It would also be necessary to establish a virtuous e-sports competition ecosystem and development that coexisted together by promoting good sponsorship.

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7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Lead Author	JR	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Corresponding Author*	SL	-Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑

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An Analysis of the Utilization of Offensive and Defensive Techniques According to the JUDO Athlete's Career

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Abstract

Purpose: *For a study related the utilization of various techniques for Judo athletes of middle schools, high schools, and colleges and universities in their process of growth, this study seeks to explore changes in the utilization of Judo techniques according to the winning careers of the Judo athletes of middle schools, high schools, and colleges and universities and their experience of being selected to represent their schools and organizations.*

Method: *To achieve the purpose of this study, the frequency analysis was performed to examine and understand the general characteristics of the research subjects, and the Cronbach's α coefficient was calculated to validate the reliability of the survey questionnaire. Furthermore, the one-way ANOVA was conducted to examine the differences between the offensive techniques and defensive techniques according to the athletes' career.*

Results: *As a result of the study, it turned out that there were significant differences across hand techniques, waist techniques, foot techniques, offensive techniques, and defensive techniques. Examining the techniques, it turned out that there were significant differences in offensive techniques among the hand techniques, pull and throw, throw or destroy with shoulder, and grab a single color and throw, and all techniques among the defensive techniques had significant differences.*

Conclusion: *As a result of this study, it turned out that the greater the career, the higher the utilization of hand techniques and foot techniques among the offensive techniques, and the less the experiences, the higher the utilization of waist techniques. As for the defensive techniques, the greater the career, the utilization of hand techniques, waist techniques, and foot techniques all turned out to be high. However, among the waist techniques, hold belt, lift and throw over with waist and counter attack using opponent's techniques turned out to be high, the less the career.*

[Keywords] ***Judo, Offensive Techniques, Defensive Techniques, Athletes' Career, Analysis of Utilization***

1. Introduction

Judo is a comprehensive sport which uses the entire body by using various technical systems such as hand, waist, and foot techniques, and is also a comprehensive martial art and sport which uses the opponent's strength reversely together with various technical systems[1]. Judo requires much time and effort since it applies various techniques, and is also a relative sport whose various strategies and countermeasures depend on the opponent's height, weight, key skills, and habits, etc.

During its inception, Judo had soft techniques and mental aspects emphasized, and given Judo's characteristics that it takes much time to master the techniques, access by the general public is lower than that for other martial arts and sports, yet in the modern time, it focused on fostering athletes as a representative elite sport, and has grown into a global sport which transcends territories and countries[2].

As such, Judo, among the sports representing elite sports, has emphasized the importance of the methods to effectively improve individual skills and the physical and psychological factors which directly impact the performance to win the games[3][4][5]. Hence, the studies on the physical factors which directly affect performance, such as muscular strength and endurance, and the studies on the appropriate training methods to improve performance have primarily been conducted[6][7][8][9]. Furthermore, in terms of the technical aspect, the studies on the techniques and effectiveness primarily used by measuring the frequency of Judo's hand techniques, foot techniques, and waist techniques during the games are in progress[10][11][12][13], and in addition to the studies on the frequency, speed, and violation of techniques among the athletes to discover the factors of defeat of the games[14][15], the studies on the positive effects in terms of the psychological and psychological aspects such as confidence, satisfaction, and efficacy are also in progress[16][17][18][19]. As such, based on the study results that skills, strength, and psychological state are important through the various studies, a scientific and systematic mechanism for fostering athletes is undergoing development via an intensive training[20].

However, most of the studies are focused on the elite athletes related to games and competitions, and there is a relative lack of the studies related to the utilization of various techniques for Judo athletes of middle schools, high schools, and colleges and universities who are in the process of growth. Hence, this study intends to explore changes in the utilization of Judo techniques according to the winning careers of the Ju-do athletes of middle schools, high schools, and colleges and universities and their experience of being selected to represent their schools and organizations.

2. Methods

2.1. Subject

To achieve the research purpose of this study, 200 people were selected as the population of Judo athletes in Daegu and Gyeongbuk region in 2020 by the convenience sampling, and a survey was conducted by using the self-administration method, and of the 200 collected questionnaires, 198 questionnaires were used as valid samples, except for the data in which the responses were insincere or some of whose contents were omitted.

Table 1. General characteristics of the research subjects.

	Classification	N(%)	Total
Gender	Male	119(60.1)	198
	Female	79(39.9)	
Grade	1st year in middle school	18(9.1)	198
	2nd year in middle school	20(10.1)	
	3rd year in middle school	22(11.1)	
	1st year in high school	17(8.6)	
	2nd year in high school	24(12.1)	
	3rd year in high school	22(11.1)	
	1st year in college or university	19(9.6)	

	2nd year in college or university	13(6.6)	
	3rd year in college or university	27(13.6)	
	4th year in college or university	16(8.1)	
Athletes' career	2 years or less	52(26.3)	198
	3 to 5 years or less	48(24.2)	
	6 years or longer	98(49.5)	
Whether one has won awards	Yes	148(74.7)	198
	No	50(25.3)	
Whether one has represented his or her schools or organizations	Yes	118(59.6)	198
	No	80(40.4)	

The general characteristics of the research subjects were classified into the 5 categories of gender, grade, athletes' career, whether they have won awards, and whether they have the experience of representing their schools or organizations. In terms of gender, there were more men than women. In terms of grade, the number of respondents was the largest in the order of colleges and universities, high schools, and middle schools, and it turned out in the order of 3rd year, 2nd year in high school, 3rd year in high school, 3rd year in middle school, 2nd year in middle school, 1st year in college or university, 1st year in middle school, 1st year in high school, 4th year in college or university, and 2nd year in college or university. As for the athletes' career, 6 years or longer turned out to be the largest in number, followed by 2 years or less, 3 years or longer and 5 years or less. As for whether they have won awards, most have responded positively, and as for whether they have represented their schools or organizations, they have responded more positively than negatively.

2.2. Survey tool

2.2.1. Structure of the survey questionnaire

A survey questionnaire was used as a survey tool to achieve the purpose of this study, and the structure of the questionnaire was drafted based on the Judo's gaming and competition rules, which were then discussed with coaches and athletes, and then were revised and supplemented to structure them with offensive techniques(hand techniques, waist techniques, and foot techniques) and the defensive techniques(hand techniques, waist techniques, and foot techniques), whose details are as follows.

Table 2. Structure of the survey questionnaire.

	Offensive techniques	Defensive techniques
Hand techniques	Throw over shoulder using both arms	Throw over shoulder using both arms and counter attack using opponent's techniques
	Throw over shoulder using a single arm	Throw over shoulder using a single arm and counter attack using opponent's techniques

	Pull and throw	Pull and throw and counter attack using opponent's techniques
	Throw or destroy with shoulder	Throw or destroy with shoulder and counter attack using opponent's techniques
	Grab a single color and throw	Grab a single color and throw and counter attack using opponent's techniques
Waist techniques	Throw with waist	Throw with waist and counter attack using opponent's techniques
	Throw over waist	Throw over waist and counter attack using opponent's techniques
	Pull and throw on waist	Pull and throw on waist and counter attack using opponent's techniques
	Lift and throw over with waist	Lift and throw over with waist and counter attack using opponent's techniques
	Hold belt, lift and throw over with waist	Hold belt, lift and throw over with waist and counter attack using opponent's techniques
Foot techniques	Lock opponent's leg	Lock opponent's leg and counter attack using opponent's techniques
	Lean towards a side and throw	Lean towards a side and throw and counter attack using opponent's techniques
	Lock opponent's leg and push and throw	Lock opponent's leg and push and throw and counter attack using opponent's techniques
	Tackle and apply foot techniques	Tackle and apply foot techniques and counter attack using opponent's techniques
	Invert and throw using foot techniques	Invert and throw using foot techniques and counter attack using opponent's techniques

2.2.2. Validity and reliability of the survey questionnaire

In this study, an appropriate method was chosen appropriately for each method of validation in order to enhance the content validity of the survey questionnaire and validate the construct validity. The validity of the content validity was secured via consultations with experts of the relevant field of research in order to adopt a survey questionnaire appropriate for the purpose of this study.

Reliability is the extent to which an individual's score appears consistently when the same test or a test of the same type is repeatedly conducted. Reliability is related to the stability and consistency in establishing a research method, and since it is one of the most important factors as it is a matter of whether the manipulated definition or indicator is measured consistently and reliably, in this study, reliability was validated based on the results of the survey questionnaire, and a result value of .930 was derived by using the Cronbach's α coefficient.

2.2.3. Data processing and the statistical method

The data processing of this study was conducted by using the SPSS 23.0 Program, which is a statistical package program, after recovering the distributed survey questionnaire, excluding the data determined to be incomplete or unreliable from the research subjects, and individually entering the data which may be analyzed into the computer, and performed the statistical validation as follows in line with the research hypothesis and the purpose of the data analysis.

First, the frequency analysis was performed to examine and understand the general characteristics by using the SPSS/PC+23.0 program.

Second, to validate the reliability of the survey questionnaire, the Cronbach's α coefficient was calculated.

Third, the one way ANOVA was conducted to examine and understand the differences between the offensive tech-niques and the defensive techniques according to the athletes' career.

3. Research Results

3.1. Offensive techniques

Table 3. Differences in the offensive hand techniques according to the athletes' career.

		N	M	SD	F	sig	post hot
Throw over shoulder using both arms	2 years or less	52	3.7308	1.50965	.980	.377	
	3 to 5 years or less	48	3.4167	1.48515			
	6 to 10 years or less	98	3.3878	1.46176			
Throw over shoulder using a single arm	2 years or less	52	3.8077	1.68078	.202	.818	
	3 to 5 years or less	48	3.6458	1.75632			
	6 to 10 years or less	98	3.8265	1.60557			
Pull and throw	2 years or less	52	1.1923	.44451	12.801	.000	C>A, C>B
	3 to 5 years or less	48	1.4583	.92157			
	6 to 10 years or less	98	2.1735	1.56657			
Throw or destroy with shoulder	2 years or less	52	1.0000	.00000	18.247	.000	C>A, C>B
	3 to 5 years or less	48	1.1667	.80776			
	6 to 10 years or less	98	2.1633	1.70925			
Grab a single color and throw	2 years or less	52	1.0000	.00000	31.820	.000	C>A, C>B
	3 to 5 years or less	48	1.1250	.63998			
	6 to 10 years or less	98	2.4286	1.65598			

Note: A: 2 years or less, B: 3 to 5 years or less, C: 6 to 10 years or less.

As a result of the differences in the offensive hand techniques according to the athletes' career of <Table 3>, it turned out that there were statistically significant differences for pull and throw, throw or destroy with shoulder, and grab a single color and throw. As for pull and throw, it turned out that 6 to 10 years were higher than 2 years and 3 to 5 years, while, as for throw or destroy with shoulder, 6 to 10 years were higher than 2 years or less and 3 to 5 years or less.. Furthermore, as for grab a single color and throw, it turned out that 6 years or longer and 10 years or less than were higher than 2 years and 3 years or longer to 5 years or less. However, it turned out that there was no statistically significant difference for throw over shoulder using both arms and throw over shoulder using a single arm.

Table 4. Differences in the offensive waist techniques according to the athletes' career.

		N	M	SD	F	sig	post hot
Throw with waist	2 years or less	52	1.6923	1.40780	2.700	.070	
	3 to 5 years or less	48	1.8542	1.52970			
	6 to 10 years or less	98	2.2653	1.60894			
Throw over waist	2 years or less	52	1.8462	1.24278	.177	.838	
	3 to 5 years or less	48	1.9792	1.36038			
	6 to 10 years or less	98	1.8673	1.14548			
Pull and throw on waist	2 years or less	52	1.8077	1.34366	3.219	.042	A>C
	3 to 5 years or less	48	1.6250	1.06441			
	6 to 10 years or less	98	1.4082	.51447			
Lift and throw over with waist	2 years or less	52	1.8269	1.29435	6.530	.002	A>C, B>C
	3 to 5 years or less	48	1.9375	1.35907			
	6 to 10 years or less	98	1.2959	.93289			
Hold belt, lift and throw over with waist	2 years or less	52	1.7115	1.36247	11.257	.000	A>C, B>C
	3 to 5 years or less	48	1.5000	1.07188			
	6 to 10 years or less	98	1.0306	.22494			

Note: A: 2 years or less, B: 3 to 5 years or less, C: 6 to 10 years or less.

As a result of the differences in the offensive waist techniques according to the athletes' career of <Table 4>, it turned out that there was a statistically significant difference for pull and throw on waist, lift and throw over with waist, hold belt, and lift and throw over with waist. As for pull and throw on waist, it turned out that 2 years or less were higher than 6 to 10 years or less, and as for lift and throw over with waist, it turned out that 2 years or less was higher than 6 to 10 years or less, and 3 to 5 years or less was higher than 6 years to 10 years or less. Furthermore, as for hold belt, lift and throw over with waist as well, it turned out that 2 years or less was higher than 6 to 10 years or less, while 3 to 5 years or less turned out to be higher than 6 to 10 years or less. However, it turned out that there was no statistically significant difference for throw with waist and throw over waist.

Table 5. Differences in the offensive foot techniques according to the athletes' career.

		N	M	SD	F	sig	post hot
Lock opponent's leg	2 years or less	52	2.1154	.85529	1.062	.348	
	3 to 5 years or less	48	2.4167	.94155			
	6 to 10 years or less	98	2.2449	1.15822			
Lean towards a side and throw	2 years or less	52	1.4615	.87361	1.306	.273	
	3 to 5 years or less	48	1.1875	.64102			
	6 to 10 years or less	98	1.3367	.91881			
Lock opponent's leg and push and throw	2 years or less	52	1.6346	.90811	4.688	.010	C>A, C>B
	3 to 5 years or less	48	1.6458	1.10106			
	6 to 10 years or less	98	2.2143	1.57461			
Tackle and apply foot techniques	2 years or less	52	1.1346	.34464	9.206	.000	C>A, C>B
	3 to 5 years or less	48	1.1458	.35667			

	6 to 10 years or less	98	1.6939	1.23862			
Invert and throw using foot techniques	2 years or less	52	1.0577	.23544	21.088	.000	C>A, C>B
	3 to 5 years or less	48	1.1875	.67339			
	6 to 10 years or less	98	2.0408	1.33098			

Note: A: 2 years or less, B: 3 to 5 years or less, C: 6 to 10 years or less.

As a result of the differences in the offensive foot techniques according to the athletes' career of <Table 5>, it turned out that there was a statistically significant difference for lock opponent's leg and push and throw, tackle and apply foot techniques, and invert and throw using foot techniques. As for lock opponent's leg and push and throw, it turned out that 6 to 10 years or less were higher than 2 years, as well as higher than 3 to 5 years or less, and as for tackle and apply foot techniques as well, 6 to 10 years or less turned out to be higher than 2 years or less, as well as higher than 3 to 5 years or less. Furthermore, as for invert and throw using foot techniques as well, it turned out that 6 to 10 years or less turned out to be higher than 2 years or less, and also higher than 3 to 5 years or less. However, it turned out that there was no statistically significant difference for lock opponent's leg and lean towards a side and throw.

3.2. Defensive techniques

Table 6. Differences in the defensive hand techniques according to the athletes' career.

		N	M	SD	F	sig	post hot
Throw over shoulder using both arms and counter attack using opponent's techniques	2 years or less	52	1.8269	1.09761	57.813	.000	C>B>A
Throw over shoulder using both arms and counter attack using opponent's techniques	3 to 5 years or less	48	2.7292	1.18033	57.813	.000	C>B>A
Throw over shoulder using both arms and counter attack using opponent's techniques	6 to 10 years or less	98	3.7755	1.01057	57.813	.000	C>B>A
Throw over shoulder using a single arm and counter attack using opponent's techniques	2 years or less	52	1.6346	1.20504	50.151	.000	C>B>A
Throw over shoulder using a single arm and counter attack using opponent's techniques	3 to 5 years or less	48	3.0833	1.72384	50.151	.000	C>B>A
Throw over shoulder using a single arm and counter attack using opponent's techniques	6 to 10 years or less	98	4.1122	1.41336	50.151	.000	C>B>A
Pull and throw and counter attack using opponent's techniques	2 years or less	52	1.3462	.86057	28.940	.000	C>A, C>B
pull and throw and counter attack using opponent's techniques	3 to 5 years or less	48	1.6458	1.10106	28.940	.000	C>A, C>B
pull and throw and counter attack using opponent's techniques	6 to 10 years or less	98	2.9082	1.59953	28.940	.000	C>A, C>B
Throw or destroy with shoulder and counter attack using opponent's techniques	2 years or less	52	1.0769	.26907	23.127	.000	C>A, C>B
Throw or destroy with shoulder and counter attack using opponent's techniques	3 to 5 years or less	48	1.1875	.70428	23.127	.000	C>A, C>B

Throw or destroy with shoulder and counter attack using opponent's techniques	6 to 10 years or less	98	2.3571	1.72459	23.127	.000	C>A, C>B
Grab a single color and throw and counter attack using opponent's techniques	2 years or less	52	1.1154	.58255	13.017	.000	C>A, C>B
Grab a single color and throw and counter attack using opponent's techniques	3 to 5 years or less	48	1.2292	.85650	13.017	.000	C>A, C>B
Grab a single color and throw and counter attack using opponent's techniques	6 to 10 years or less	98	2.1122	1.69829	13.017	.000	C>A, C>B

Note: A: 2 years or less, B: 3 to 5 years or less, C: 6 to 10 years or less.

As a result of the differences in the defensive hand techniques according to the athletes' career of <Table 6>, throw over shoulder using both arms and counter attack using opponent's techniques, throw over shoulder using a single arm and counter attack using opponent's techniques, pull and throw and counter attack using opponent's techniques, throw or destroy with shoulder and counter attack using opponent's techniques, and grab a single color and throw and counter attack using opponent's techniques turned out to have the statistically significant differences. As for throw over shoulder using both arms and counter attack using opponent's techniques, it turned out that they were high in the order of 6 to 10 years or longer, 3 to 5 years or less, and 2 years or less. As for throw over shoulder using a single arm and counter attack using opponent's techniques, it turned out that they were high in the order of 6 years to 10 years, 3 years to 5 years or less, and 2 years or less. As for pull and throw and counter attack using opponent's techniques, it turned out that 6 to 10 years or less were higher than 2 years or less, and also higher than 3 to 5 years or less. As for throw or destroy with shoulder and counter attack using opponent's techniques, it turned that 6 to 10 years or less were higher than 2 years or less, and also higher than 3 =to 5 years or less. As for grab a single color and throw and counter attack using opponent's techniques, it turned out that 6 to 10 years or less were higher than 2 years or less, and also higher than 3 to 5 years or less.

Table 7. Differences in the defensive waist techniques according to the athletes' career.

		N	M	SD	F	sig	post hot
Throw with waist and counter attack using opponent's techniques	2 years or less	52	1.3269	.64841	5.723	.004	C>A
	3 to 5 years or less	48	1.5417	1.18426			
	6 to 10 years or less	98	1.9184	1.17248			
Throw over waist and counter attack using opponent's techniques	2 years or less	52	1.3462	.59027	3.649	.028	C>A
	3 to 5 years or less	48	1.6667	.97486			
	6 to 10 years or less	98	1.7551	.97453			
Pull and throw on waist and counter attack using opponent's	2 years or less	52	1.3846	.79592	.945	.390	
	3 to 5 years or less	48	1.5000	.65233			

techniques	6 to 10 years or less	98	1.3469	.51975			
Lift and throw over with waist and counter attack using opponent's techniques	2 years or less	52	1.4808	.89641	2.038	.133	
	3 to 5 years or less	48	1.6458	1.13905			
	6 to 10 years or less	98	1.3163	.85671			
Hold belt, lift and throw over with waist and counter attack using opponent's techniques	2 years or less	52	1.4038	.91308	6.538	.002	A>C, B>C
	3 to 5 years or less	48	1.3125	.71923			
	6 to 10 years or less	98	1.0510	.26369			

Note: A: 2 years or less, B: 3 to 5 years or less, C: 6 to 10 years or less.

As a result of the differences in the defensive waist techniques according to the athletes' career of <Table 7>, throw with waist and counter attack using opponent's techniques, throw over waist and counter attack using opponent's techniques, and hold belt, lift and throw over with waist and counter attack using opponent's techniques turned out to have a statistically significant difference. As for throw with waist and counter attack using opponent's techniques, it turned out that 6 to 10 years or less were higher than 2 years or less, and as for throw over waist and counter attack using opponent's techniques, 6 to 10 years or less turned out to be higher than 2 years or less. As for hold belt, lift and throw over with waist and counter attack using opponent's techniques, it turned out that 2 years or less were higher than 6 to 10 years or less, and 3 to 5 years or less were higher than 6 to 10 years less. However, there was no statistically significant difference for pull and throw on waist and counter attack using opponent's techniques, and lift and throw over with waist and counter attack using opponent's techniques.

Table 8. Differences in the defensive foot techniques according to the athletes' career.

		N	M	SD	F	sig	post hot
Lock opponent's leg and counter attack using opponent's techniques	2 years or less	52	2.0962	.82271	1.212	.300	
	3 to 5 years or less	48	2.4167	.94155			
	6 to 10 years or less	98	2.2449	1.15822			
Lean towards a side and throw and counter attack using opponent's techniques	2 years or less	52	1.4231	.77576	1.329	.267	
	3 to 5 years or less	48	1.1667	.59549			
	6 to 10 years or less	98	1.3265	.88254			
Lock opponent's	2 years or less	52	1.5769	.84821	5.755	.004	C>A, C>B

leg and push and throw and counter attack using opponent's techniques	3 to 5 years or less	48	1.5000	.79894			
	6 to 10 years or less	98	2.0612	1.29882			
Tackle and apply foot techniques and counter attack using opponent's techniques	2 years or less	52	1.1346	.34464	9.209	.000	C>A, C>B
	3 to 5 years or less	48	1.1458	.35667			
	6 to 10 years or less	98	1.6429	1.11457			
Invert and throw using foot techniques and counter attack using opponent's techniques	2 years or less	52	1.0577	.23544	22.578	.000	C>A, C>B
	3 to 5 years or less	48	1.1667	.55862			
	6 to 10 years or less	98	2.0102	1.27218			

Note: A: 2 years or less, B: 3 to 5 years or less, C: 6 to 10 years or less.

As a result of the differences in the defensive foot techniques according to athletes' career of <Table 8>, lock opponent's leg and push and throw and counter attack using opponent's techniques, tackle and apply foot techniques and counter attack using opponent's techniques, and invert and throw using foot techniques and counter attack using opponent's techniques turned out to have a statistically significant difference. As for lock opponent's leg and push and throw and counter attack using opponent's techniques, it turned out that 6 to 10 years or less were higher than 2 years or less, and also higher than 3 to 5 years or less. As for tackle and apply foot techniques and counter attack using opponent's techniques, it turned out that 6 to 10 years or less were higher than 2 years or less, and also higher than 3 to 5 years or less. Furthermore, as for invert and throw using foot techniques and counter attack using opponent's techniques, it turned out that 6 to 10 years or less were higher than 2 years less, and also even higher than 3 to 5 years or less. However, there was no statistically significant difference for lock opponent's leg and counter attack using opponent's techniques, and lean towards a side and throw and counter attack using opponent's techniques.

4. Conclusion

In this study, the one-way ANOVA was conducted to validate the differences between the Judo's offensive and defensive techniques according to one's career.

As a result of the study, it turned out that there were significant differences across the attacks of hand techniques, waist techniques, and foot techniques, as well as defensive techniques. Examining with a focus on the techniques, it turned out that there is a significant difference in, as for the offensive techniques, pull and throw, throw or destroy with shoulder, and grab a single color and throw, and as for the defensive techniques, all techniques, respectively.

It turned out that, among the waist techniques, and as for the offensive techniques, there was a significant difference for pull and throw on waist, lift and throw over with waist, and hold belt and lift and throw over with waist, and as for the defensive techniques, there was a significant difference for throw with waist and counter attack using opponent's techniques, throw over waist and counter attack using opponent's techniques, hold belt, and lift and throw over with waist and counter attack using opponent's techniques, respectively.

It turned out that, among the foot techniques, and as for the offensive techniques, there was a significant difference for lock opponent's leg and push and throw, tackle and apply foot techniques, and invert and throw using foot techniques, and as for the defensive techniques, there was a significant difference for lock opponent's leg and push and throw and counter attack using opponent's techniques, tackle and apply foot techniques and counter attack using opponent's techniques, and invert and throw using foot techniques and counter attack using opponent's techniques, respectively.

Gathering which, it turned out that the greater the career, the higher the utilization of hand techniques and foot techniques among the offensive techniques, and the less the experiences, the higher the utilization of waist techniques. As for the defensive techniques, the greater the career, the utilization of hand techniques, waist techniques, and foot techniques all turned out to be high. However, among the waist techniques, hold belt, lift and throw over with waist and counter attack using opponent's techniques turned out to be high, the less the career.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	CL	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑
Corresponding Author*	BC	-Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Co-Author	SJ	-Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑

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Asia FOOTBALL Centrality Analysis Using Pass Information: Centered on the 2018 Russia World Cup

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Abstract

Purpose: *The core purpose of this study was to objectively evaluate the performance of Asian countries participating in the 2018 FIFA World Cup using social network analysis.*

Method: *The subject of study included 5 Asian countries participated in the 2018 FIFA World Cup in Russia, using pass data for each position based on official data provided by FIFA. The processed data are made into symmetric matrices and the research perform a centrality analysis using Ucinet6, a social network program.*

Results: *The results of the study are as follows. First, when the pass success rate was more than 80%, the ball possession rate was more than 50%, and the actual ball possession time was also confirmed to have 30 minutes. Second, the centrality analysis confirmed that players with high degree centrality also have a high closeness centrality, which can be information that can objectively evaluate major attack directions and key players.*

Conclusion: *The results of this study can be used as an objective indicator to identify key players and evaluate their performance through passes by players in team sports events. However, due to the nature of the World Cup games, it is difficult to secure a lot of match data by country, and it is a pity that players who have not participated in the games due to injury cannot be evaluated. Based on the results shown in this research, we hope that it will be used as a new evaluation method to identify key players and objectively analyze each country's game patterns in order to advance to the 2022 Qatar World Cup finals, and it can be used as an analysis method that can objectively evaluate not only soccer games but also other team sports games through social network analysis.*

[Keywords] ***Social Networking, Soccer, Pass, Degree Centrality, Network***

1. Introduction

1.1. Necessity of research

Football is one of the most popular sports in the world, with more than 200 national sports organizations[1][2], and numerous studies are being conducted in the analysis of matches to win the World Cup and international competitions[3][4]. As a result, a methodological approach to analyzing athletes' records has evolved since decades ago to apply academic approaches and to study scientifically[5][6]. In particular, a number of studies are being conducted to quantify game records as objective data[7] and infer satisfactory results for improving performance[8][9][10][11][12][13].

This led to the use of associated indicators to analyze factors closely related to performance, most of which utilize quantified competition data that are objective and capable of scientific analysis[14][15]. Based on the primary records generated in the pitches, raw materials are

processed to present quantitative indicators of secondary data[16]. In football, quantitative indicators include shooting, effective shooting, corner kick, free kick, penalty kick, foul, sending-off, offside, ball share, pass success rate[17], and pass timing, accuracy, type, success rate, and share are considered very important tactical factors[18][19].

Some say football is a "pass game." That's how much pass is one of the most important skills a footballer must master[20][21]. The importance of passing to maintain strategic tactics and high ball share and attack, defense, and scoring is becoming more prominent[22][23]. A recent study showed the highest pass success rate of 45.5% in teamwork among the priority items for evaluating the winning or losing of the South Korean national football team[24]. Spain's third consecutive major championship win confirmed the importance of various pass patterns and ball share, and these results demonstrated that rising ball share through short passes was a significant factor in the outcome of the game[25]. In addition, a number of studies have been conducted on passes using the official World Cup records provided by FIFA[26][27], reporting the importance of passes as a decisive factor in winning or losing[25]. Through this game analysis related to passes that positively affect the results of the game, research should be conducted to compare the frequency of passes, success rate, share, and ball occupancy time between South Korea and other countries.

The relevant prior studies are meaningful for improving football performance by presenting various measurement variables and statistical analysis results based on the result of victory or defeat of matches[26][27][28]. However, the above studies have been limited to descriptive statistics and analysis of indicators related to passes based on official records according to the outcomes of the win-loss and considering interactions with team players[27]. Kim[29] said that passes played an important role in football matches as to winning or losing by evaluating individuals and teams based on their positional interactions. Lee, Kim, and Park[30] defined football as the representative team sport of the game by forming a network of passes. Based on this theoretical background, it is necessary to evaluate individuals and teams to identify their positional interactions and use central analysis to efficiently analyze pass-related indicators[28][31][32][33][34] to analyze the differences between countries and individuals' positions[30].

Social network analysis has elements of network size, density, and centrality, and is used to identify the characteristic relationships that make up the network, and centrality is an indicator of how connected one actor is to another[31]. Among them, centrality is important to produce the results of the network, and it is possible to efficiently analyze passes between players in team sports[32].

Currently, South Korea has been qualified for nine consecutive FIFA World Cup games and is planning to extend it to the 10th. In order to participate in the 2022 Qatar World Cup games, the competitors must be analyzed and prepared in advance along with winning qualifying matches in the Asia division.

Therefore, the purpose of this study is to examine the Asian national football team's differences in centrality analysis using pass information by country and player among the 2018 Russia World Cup results, objectively analyze each country's game patterns, and provide strategic tactical basic data.

2. Research Method

2.1. Subjects

As of February 2021, Asian countries that participated in the 2018 World Cup in Russia were selected as research subjects. In terms of the FIFA ranking, Japan ranked 28th, Iran 30th, South Korea 39th, Australia 41st, and Saudi Arabia 67th. The ranking and performance of the recent international competitions of the countries studied are shown as in <Table 1>.

Table 1. National information.

Nation	2021	2019	2018
Korea	38	5	Elimination of qualification
Japan	27	2	Advance to the round of 16
Iran	29	3	Elimination of qualification
Australia	41	7	Elimination of qualification
Saudi Arabia	67	12	Elimination of qualification

Note: 2021 FIFA rank: as of february 2020, 2019 asian cup results, 2018 Russia world cup results.

This study targeted Asian countries out of 32 countries participating in the 2018 World Cup in Russia and analyzed only group qualifying matches for analysis under the same conditions as quantitative indicators. The results of the 2018 Russia World Cup qualifying matches are as shown in <Table 2>.

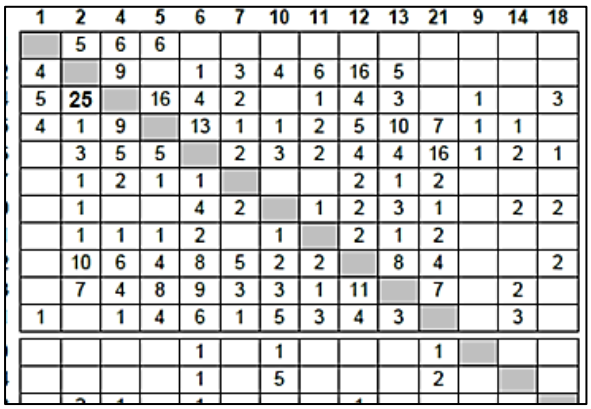
Table 2. 2018 World cup qualifying results.

Nation	Match 1	Match 2	Match 3	Result
Korea	Loss 0-1	Loss 1-2	Win 2-0	1W, 2L
Japan	Win 2-1	Draw 2-2	Loss 0-1	1W,1D,1L
Iran	Win 1-0	Loss 0-1	Draw 1-1	1W,1D,1L
Australia	Loss 1-2	Draw 1-1	Loss 0-2	1D, 2L
Saudi Arabia	Loss 0-5	Loss 0-1	Win 2-1	1W, 2L

2.2. Research data

Of the 32 teams that participated in the 2018 FIFA World Cup in Russia, a total of five Asian countries participated in the preliminary round(South Korea, Japan, Iran, Australia, and Saudi Arabia). Pass information collected from a total of 15 of their qualifying matches was selected as the final data.

Figure 1. Is the pass information exchanged among players officially provided after a match by FIFA.



2.3. Collection and analysis of data

This study conducted a social network analysis based on pass information among players in each of the three qualifying matches in the 2018 Russia World Cup on FIFA's official website.

First, the data collected by FIFA were classified using Microsoft Excel 2016(Microsoft Corp., Redmond, WA) and descriptive statistics using SPSS 21.0.

Second, social network analysis is a way to social scientifically analyze social networks and structures and it is one of the ways to identify specific network structures or interrelationships between individuals(nodes) in complex relationships.

In this study, centrality analysis was used for the purpose of evaluating the performance of countries. The UCINET 6(Analytic Technologies, USA) program was used for centrality analysis, and centrality information was indicated up to two decimal places. Finally, Pass Network between countries was visualized using Netdraw.

2.4. Centrality analysis measurements

Measurement of degree centrality: Connectivity refers to the sum of connection points among nodes in a network, which allows us to see how many nodes a node is connected to. When two nodes i and j are connected or linked(i, j), the centrality(A) of the degree of connection of player A is calculated as follows:[35].

Degree centrality

$$(\alpha) = \sum_{j=1}^{L} link(i,j)$$

Measurement of closeness centrality: closeness centrality measures the distance among nodes based on centrality, and is measured by considering indirect connections, unlike degree centrality. When the distance of the shortest path between two nodes a and j is called dist(i, j), the closeness centrality(A) of the player A is calculated as follows[35]. The closeness centrality of this study was expressed as the average value of inward and outward proximity.

Closeness centrality

$$\sqrt{\sum_{j=1}^{L} distance(i,j)}$$

Measurement of betweenness centrality: Betweenness centrality is an indicator of the extent to which one node is between different nodes in the network, and nodes with high betweenness centrality are likely to act as brokers and core nodes. When the number of cases of shortest paths between two nodes a and j is called geod(j, k), and the number of cases of passing node a between two nodes j and k is called geod(j, k, a), the betweenness centrality of player a is calculated as follows:[35].

Betweenness centrality

$$(\alpha) = \sum_{j<k} \geq od(j,k,a) / \geq od(j,k)$$

3. Research Results

3.1. Analysis of passes of asian national football teams

Of the total 48 matches in the 2018 Russia World Cup qualifying round, 15 matches were selected to analyze the number of passes, average, success rate, and ball share of Asian national football teams, and the results of the analysis were presented sequentially.

As shown in <Table 3>, Saudi Arabia had the highest pass count at 1,544, and the pass average per game was 514 times. By country, the results were shown in the order of Saudi Arabia, Japan, Australia, South Korea, and Iran. South Korea and Iran have a lower total number of passes and pass averages than other countries. According to an analysis of the ball share, Saudi Arabia had the highest share at 87.33%, followed by Japan, Australia, South Korea, and Iran, in the order

named. South Korea and Iran also had the lowest ball share. Saudi Arabia had the highest ball occupancy time of 33.7 minutes, followed by Japan, Australia, South Korea, and Iran, in the order named.

Table 3. 2018 FIFA WC asia nation pass result.

Nation	Korea		Japan		Iran		Australia		Saudi Arabia	
WC pass information	246[1)]	738[2)]	448	1345	145	436	417	1252	514	1544
Ball possession	39.7%[1)]		55.7%		32.7%		51%		58%	
WC passes success rate	78.33%[1)]		85.67%		68.00%		85.67%		87.33%	
WC actual playing time information	21.7[3)]		31.0		16.33		29.0		33.7	

Note: Average[1)] : pass information : number of pass, total[2)] : WC passes success rate : pass attempt / pass successful * 100, minute[3)] : WC actual playing time information : ball possession time.

3.2. Analysis of centrality of the asian teams

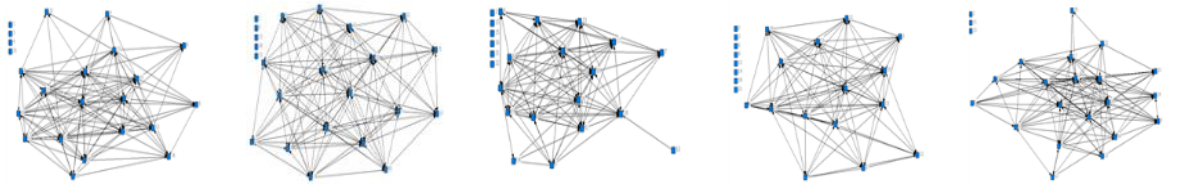
The results of the 2018 Russia World Cup qualifying matches and the analysis of extroversion centrality, introversion centrality, close centrality, and betweenness centrality are as shown in <Table 4> and <Figure 2>.

Table 4. Asian country centrality analysis result.

	POS	Degree		Closeness	Betweenness
		Out	In		
Korea	Forward	30.67	41.00	18.70	9.48
	Midfield	45.00	42.00	18.88	9.58
	Defender	34.88	37.50	18.43	6.48
	goalkeeper	52.00	21.00	18.59	7.70
	Total	38.84	38.84	18.65	8.16
Japan	Forward	21.67	34.33	15.82	5.46
	Midfield	77.75	78.88	15.98	6.83
	Defender	101.17	96.83	15.93	6.61
	goalkeeper	51.00	30.00	15.78	1.34
	Total	74.72	74.72	15.92	6.22
Iran	Forward	18.80	30.00	12.87	7.40
	Midfield	34.50	29.00	12.96	9.78
	Defender	28.50	26.33	12.86	5.81
	goalkeeper	16.50	6.00	10.62	1.50
	Total	25.65	25.65	12.62	6.71
Australia	Forward	22.83	34.17	10.80	2.46
	Midfield	93.75	86.50	10.90	4.91
	Defender	157.50	159.50	11.01	7.38
	goalkeeper	110.00	63.00	10.79	0.10
	Total	83.47	83.47	10.88	4.27
Saudi Arabia	Forward	9.67	15.33	21.60	2.15
	Midfield	114.88	113.63	23.16	12.85
	Defender	90.67	92.00	23.24	11.75

	goalkeeper	17.33	12.33	21.59	1.07
	Total	77.20	77.20	22.71	9.15

Figure 2. Asian country centrality pass network.



Australia's DF was the highest at 157.50 for extroversion centrality, followed by Saudi Arabia's MF, Japan's DF, South Korea's GK, and Iran's MF. Australia's DF was also the highest with 159.50 for introversion centrality, followed by Saudi Arabia's MF, Japan's DF, South Korea's MF, and Iran's FW. Saudi Arabia's DF was the highest at 23.24 for closeness centrality, followed by South Korea's MF, Japan's MF, Iran's MF, and Australia's DF. Betweenness centrality was also the highest in Saudi Arabia with 12.85, followed by Iran's MF, South Korea's MF, Australia's DF, and Japan's MF.

4. Discussion

This study analyzed the five Asian countries participating in the 2018 World Cup in Russia, especially on passes and key players. Pass information is one of the most important information in a football game because football is played based on passes exchanged by players[25]. In the past, a dichotomous approach was mainly used to analyze football games, but recently, various research methods and IT technologies have been used to measure and analyze the contents of the game[33]. Therefore, it is intended to discuss the centrality analysis of social networks along with various pass information and interpret the match patterns of each country.

First, based on the number of passes per game, the total number of passes, ball share, pass success rate, and ball occupancy time, we looked at how each country run the game. Japan, Australia, and Saudi Arabia's national football teams had an average of more than 400 passes per game, an average ball share of more than 50%, and an average pass success rate of more than 85%. On the other hand, the Iranian and South Korean national football teams showed an average pass count of less than 300, an average ball share of less than 40%, and an average pass success rate of less than 80%. According to a study by Choi and Lee[36], it can be interpreted as an advantage to the game when the ball share and pass success rate are high. Therefore, it seems necessary to prepare for pass play when playing against Japan, Australia, and Saudi Arabia. Teams with high pass success rate tend to run games mainly through short passes[25]. In this study, Japan, Australia, and Saudi Arabia have a high pass rate and run the game mainly with short passes. In addition, unlike the other teams that used short passes based on high pass success rates, Korea and Iran lowered the line overall and strengthened their defense rather than using a lot of short passes, focusing on fast attacks and long passes. According to a study by Kim[37], overseas football leagues have more time to play than domestic leagues, which is positive for their performance. Similarly, the study identified 31 minutes for Japan, 29 minutes for Australia and 33.7 minutes for Saudi Arabia. On the other hand, South Korea and Iran have been confirmed to have an average actual game time of around 20 minutes. These results are

thought to be based on the fast counterattack after defense, which is not a occupancy based football game.

Second, social network analysis in team sports is one of the ways to find key players, including evaluating team tactics[29]. First of all, it is hard to say that players with high degree centrality play a central role in a actual network simply because they are primarily pass-exchanging players in the team[38]. Therefore, considering the indirect connection within the pass network, it is possible to identify an influential player within the network through closeness centrality through distance between players[38].

Closeness centrality is a concept that allows us to see how closely one node is connected to other nodes[33], and players with high closeness centrality can be classified as key players and interpreted as players with high contributions to the team[29]. In this study, when analyzing closeness centrality by country, the more players out of the 23 players participated, the higher the closeness centrality. In particular, closeness centrality is an indicator of the player at the center of the pass network, indicating that players with high connectivity centrality also showed high degree centrality.

Betweenness centrality is a centrality that identifies the influence of the mediator role in building the network[30], and studies show that betweenness centrality is high when interchanging passes with multiple players when a pass network is connected[39]. Saudi Arabia's midfielders were the highest in this study. This showed that there were many passes done by the Saudi Arabian team and that there were many passes that were highly dependent on midfielders. On the other hand, the other countries had low betweenness centrality because players of multiple positions exchanged passes.

Similar results to those of Lee and Kim[39] showed that degree centrality and closeness centrality factors show differences between countries when identifying the differences in centrality between the countries studied. This suggests that it can be used as an important factor in evaluating performance between countries, and demonstrates its potential for use as a new evaluation indicator.

As a result of conducting a central analysis of five Asian countries using pass information, each player was quantified and analyzed objectively, laying the foundation for evaluating performance. This method was highly likely to be used in ball games other than football games, and unlike the frequency and success rate of technical factors such as scoring, shooting success rate, and pass success rate, it was confirmed that it was possible to evaluate players' performance.

In addition, the network indicators used in this study only presented the overall characteristics of the graph, but did not provide information on specific interactions within the team.

5. Conclusions and Suggestions

This study used pass information to analyze three centralities based on pass information for 15 preliminary matches in the 2018 Russia World Cup. In this study, we were able to find influential players and players with great interrelationships within the network of the competition situation, and we were able to confirm the quantitative value within the network of the participating players. Therefore, the conclusions of this study are as follows.

First, the Asian countries showed that when the average number of passes per game was more than 400, and the ball share was more than 50%, and the pass success rate was more than 80%.

Second, players with high degree centrality also showed high closeness centrality, confirming that they can objectively evaluate major attack directions and key players. In addition, players with high betweenness centrality were able to identify the players who were mainly involved in the build-up situation by country, and the higher the betweenness centrality, the higher the dependence on certain players in the pass network.

The results of this study can be used as an objective indicator to identify key players and evaluate their performance through passes by players in team sports events. However, due to the nature of

the World Cup games, it is difficult to secure a lot of match data by country, and it is a pity that players who have not participated in the games due to injury cannot be evaluated.

Based on the results shown in this research, we hope that it will be used as a new evaluation method to identify key players and objectively analyze each country's game patterns in order to advance to the 2022 Qatar World Cup finals.

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7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Lead Author	SK	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑
Corresponding Author*	JK	-Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Co-Author	BH BL JB	-Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑