



# Constructing a Composite Index of Sports Welfare: Application to the 17 Major Provinces and Cities in South Korea

Eugene Kwon<sup>a\*</sup>, Soowoong Hwang<sup>b</sup>, Jungjoon Kim<sup>b</sup>, Ilhyeok Park<sup>c</sup>

<sup>a</sup>Doctoral Student, Department of Health Education and Kinesiology, University of Texas at Austin, United States

<sup>b</sup>Doctoral Student, Department of Physical Education, Seoul National University, Seoul, Korea

<sup>c</sup>Professor, Department of Physical Education, Seoul National University, Seoul, Korea

## Abstract

The term “sports welfare” has been widely used in South Korean society for over a decade. In contrast, the academic definition of it remains largely undefined, which led to inefficiency in the policies regarding sports welfare. This paper quantifies the degree of sports welfare on a first-level division basis by developing a composite index model through three rounds of Delphi surveys and an Analytic hierarchy process. 5 Key factors and 13 sub-factors were identified to composite the Index, and the index values were calculated by applying data collected from national sources. As a result, most “Do”’s scored higher than “Si”’s overall, while South Jeolla Do showed the highest (109.5) and Sejong Si showed the lowest (92.1). We expect the results to shed light on the concept of sports welfare and provide guidance on comparing the sports welfare level between regions.

Key words: sports welfare, sports policy, social index, Delphi method, AHP

## Introduction

As welfare is recognized as an essential element of modern society, public interest and research on sports welfare have been ever-increasing. Over the last few decades, welfare discussions have expanded from traditional health and social security issues to broad subjects such as leisure and cultural life, including sports (Bergsgard & Rommetvedt, 2006). In most sport-developed countries, sport is distributed and implemented under government bodies (e.g., Western

European countries). However, there are still huge gaps between social classes, income groups, and regions. There are also blind spots where sports participation itself becomes a problem. The cause of these disparities can partially be accorded to the poor welfare assessment system of sports policies. Despite the increasing involvement of governments in sports and the high level of academic interest in sports-related public policy issues such as equity, doping, harassment, and violence, there is remarkably little research on sports policy that utilizes the major models and frameworks for analysis widely adopted in other policy areas (Houlihan, 2005).

Meanwhile, international organizations such as the OECD and the EU are working in many ways to

construct welfare indicators, including the OECD Global Project for Measuring Social Development, to develop pan-national statistical concepts and standards for quality of life, well-being, and sustainable development levels. Indicators refer to a quantitative or qualitative measure derived from a set of observed facts that can reveal a relative position (e.g., a country) in any area. In policy assessment, metrics help identify trends and draw attention to specific issues, helping to establish cross-policy priorities and track results (Joint Research Centre-European Commission, 2008). The recent trend of constructing social indicators results from a worldwide phenomenon of creating policies based on empirical evidence.

In the case of South Korea, sport-related data are not regularly nor systematically collected, and the Korean Institute of Sports Science (2008) raised the issue of overlapping data and repeated data collection by different entities (central government, local governments, private organizations, and private companies). As a result, there is a limit to deriving significant implications from the statistical data (Kim, Choi, et al., 2010).

We, therefore, find that there is significant room for improvement in assessing the sports welfare state in South Korea. The primary purpose of this paper is to build a foundation for estimating the level of sports welfare by region, using the data provided by official sources such as nationally collected statistics. The specific aims are to construct a composite index model of sports welfare, apply it to 17 provinces and cities of South Korea, and find evidence of usefulness in its application. This analysis will contribute to a better understanding of sports welfare by presenting a way of measuring it across the provinces and cities under study. It is hoped that the results of this research provide policymakers with valuable new insights on sports welfare for better assessment and policymaking.

## Literature Review

### Concepts of Sports Welfare

The previous studies on Korean sports welfare show that the term "sports welfare" has long been discussed under various definitions for different purposes without forming a single concept. While numerous attempts have been made to establish an integral academic concept of sports welfare, there have been difficulties in establishing a clear concept due to the conceptual confusion between sports welfare, athlete welfare, sports service, and sport policy (Noh, 2015).

Regarding the concept of sports welfare, Kim Sa-yeop (2006) mentioned, "It is a social system that ensures that all the people, regardless of age, gender, and class, can enjoy the benefits of various sports cultures, such as recreation, and play as much as they want." Kim Sang-gyeom (2007) proposed a broader concept of "an environment where one can live happily or happily through sports activities." In addition, Noh Yong-gu et al. (2017) defined it as "public-level sports support aimed at creating a social welfare service that guarantees the right to survive, creating an environment for non-discriminatory sports participation, improving quality of life and pursuing happiness." According to these studies, it can be confirmed that sports welfare has been reviewed as a public-led service, including the state, by guaranteeing happiness through sports participation in target for all the people. Meanwhile, Kim Kwon-il et al. (2010) emphasized the need for sports welfare for the underprivileged and separate concepts for them in their social sports model development study. This means that, in contrast to the former definition, sports welfare may be provided as selective welfare depending on the beneficiaries.

To summarize the discussions in previous research, sports welfare is divided mainly into two contexts. The first concept is the context of universal welfare in which the entire nation has guaranteed opportunities to participate in sports and enjoy sports to pursue health

and happiness. The second concept is the context of selective well-being, which provides the benefits of sport participation only to the class who are restricted from free sports activities. However, this discussion is not about the pros and cons of the two divided concepts but the priority of beneficiaries under the same concept. A more precise operational definition would be necessary for the concept of sports welfare to serve as a sound theoretical framework for developing a composite index.

### Constructing a Composite Index

Attempts to find quantitative grounds for social development using composite indicators (CI) in social welfare and policy assessment have increased significantly yearly (Joint Research Centre-European Commission, 2008). These composite indicators are used as a relatively simple means of representing complex and elusive problems emerging in various fields, such as environmental, economic, social, or technological development.

Development procedures vary widely according to what type of index is in question. The Society at a Glance, published biennially by the OECD, introduces

significant social indicators by the social trends of the period, with the number currently surpassing 120 (OECD, 2019). The development procedures of indices are closely examined from diverse perspectives, which can be distinguished mainly as 1) creating indicators directly for composite indexes and 2) aggregating the already existing indicators. Regardless of the procedure, many studies recommend developing them according to academically validated development principles, especially when inventing new ones (Bell & Morse, 2003; Keeble et al., 2003; Wackernagel et al., 2002). This is because researchers can only fully understand the need and completeness of the index by following academically verified procedures. When understanding is preceded, the results should be more reasonable and reliable. Therefore, the index development process is as crucial as the index itself (Walter, 1998). In this study, 10 stages of index development procedures presented by JRC (2008) are adopted as the framework (see Figure 1).

### Methods

The index development process for this study was established based on the procedures presented by the

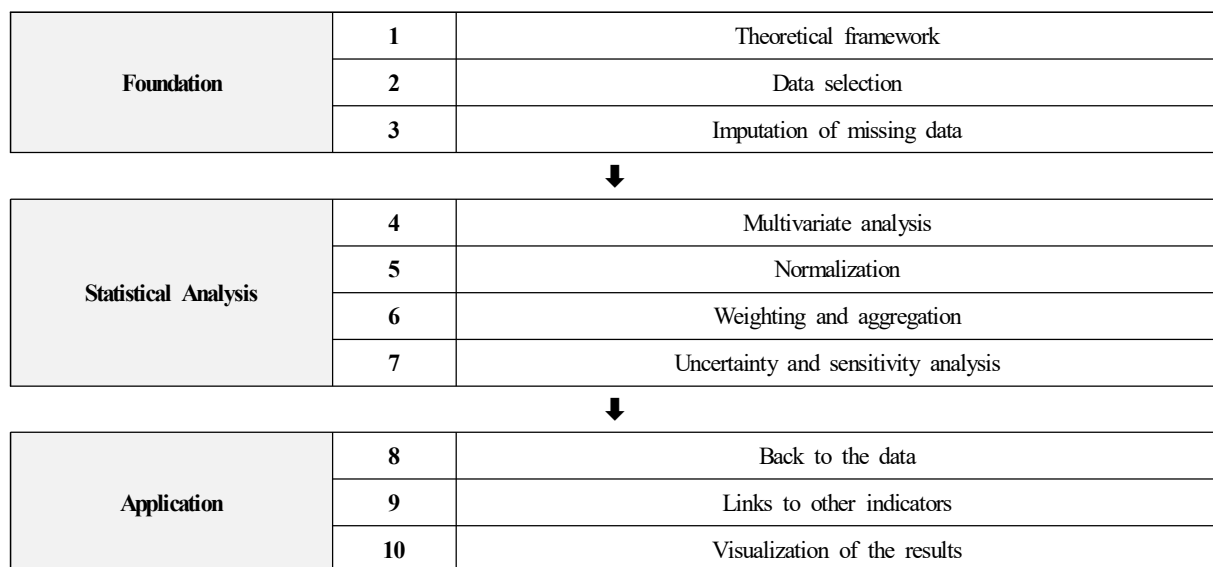


Figure 1. Composite index development procedure presented by JRC (2008)

OECD and the Joint Research Centre-European Commission (2008). Three rounds of the Delphi survey and the Analytic Hierarchy Process (AHP) were proceeded to derive the concept and factor structure of the sports welfare index. The list of factor candidates and data for input was collected from government publications and public institution research. Data that lacked regional information or had not been collected for more than three years were classified as insufficient and deleted beforehand.

### Delphi Method

A 3-round Delphi Method was conducted to derive the concept of sports welfare. Each round was designed to (1) extract the operational definition in question, (2) collect the factors representing the concept using the

definition from the previous round, and (3) organize the structure by ordering the factors by importance. Since a Delphi survey's outcome is restricted to the knowledge of the experts' pool, selecting the panel becomes a matter of utmost importance. The selection of panels was based upon having (1) a firm theoretical background in sports welfare, (2) expertise in quantifying and analyzing social concepts, and (3) practical experience in the field of sports welfare policy. Professionals of sport sociology (1) adapted physical education (1), sports informatics (1), sports welfare (2), researchers of sports welfare (2), and public officials working for sports welfare policy (3) were selected according to the criteria (a total of 10). Questions were carefully worded based on the previous literature covering topics of "sport service," "sports policy," and "sports welfare," and the validity of the questions was

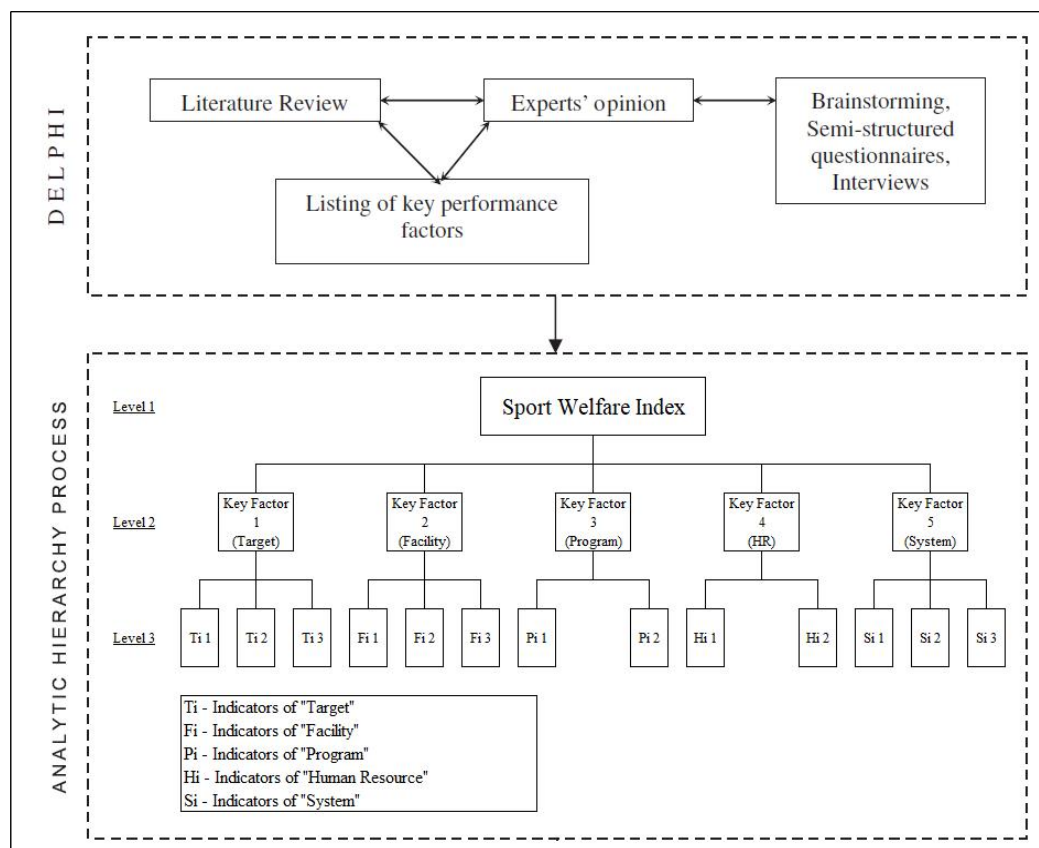


Figure 2. Delphi – AHP procedure applied on deriving (i) concept and (ii) factor structure of the sports welfare index

reviewed through a prior expert advisory meeting.

In the first round, Experts were asked through open-ended questions on (1) the concept of sports welfare and (2) the factors of sports welfare referring to the concept the respondent had answered previously. The definition of sports welfare covered in previous studies and sports-related indices surveyed by public institutions were given as materials. In the second round, a Likert 5-point scale was given to evaluate the concept of sports welfare derived from the first round. The list of indicators, also collected from the prior round, was reorganized into homogeneous groups according to their relevance to the subject (e.g., sports participation, sports facility usage, sports program satisfaction). Each indicator was asked on a Likert 7-point scale to be evaluated according to its importance. The final round of the Delphi asked the experts to assess the validity of the revised definition of sports welfare on a Likert 5-point scale. The indicators extracted from round 2 were sorted into groups (“key factors”), thus forming a factor structure consisting of two levels. Open-ended questions were made for comments about the validity and soundness of the factor structure.

### Analytic Hierarchy Process (AHP)

The sports welfare index (level 1) was broken down into 5 key factors (level 2) and 13 sub-factors (level 3) from the 3-round Delphi, as shown in Figure 2. The analytic hierarchy process (AHP) was proceeded to obtain each factor’s relative weight through a pairwise comparison among factors within the same level. Two levels of pairwise comparison were conducted respectively: “Key factor level” comparison (level 2, 5 factors) and “Sub factor level” comparison (level 3, 13 factors). The consistency ratio (CR) was calculated to check the consistency of pairwise comparisons.

## Results

### Operational Definition of Sports Welfare

The initial definition of sports welfare, “Sports welfare is a social welfare service that guarantees participation in sports for the purpose of health, leisure and happiness of the entire nation.” was achieved by collecting and rearranging the replies in order of frequency by sentence units (subject, object, means,

**Table 1.** Round 1 Delphi survey: Deriving the definition of sports welfare (Subject, Object)

Subject (who)	Object (for)
<ul style="list-style-type: none"> <li>● Individual and Society</li> <li>● Anyone</li> <li>● All people and special groups</li> <li>● All people</li> <li>● Individuals</li> <li>● Who needs sports</li> <li>● All people</li> <li>● General public</li> </ul>	<ul style="list-style-type: none"> <li>● Health, quality of life, happiness</li> <li>● Desire to exercise</li> <li>● Healthy life, happy life</li> <li>● Right to live healthy and happy</li> <li>● Individual health and social integration</li> <li>● Improving the quality of life and improving the benefits of the people</li> <li>● Prosperous life with sports</li> <li>● Prosperous life and sports activity</li> <li>● Improving the quality of life with leisure</li> <li>● Healthy and happy life</li> </ul>
Keyword (count)	
<ul style="list-style-type: none"> <li>● All people (7)</li> <li>● Individual and society (2)</li> <li>● Sports in need (1)</li> </ul>	<ul style="list-style-type: none"> <li>● Health and quality of life (5)</li> <li>● Exercise and leisure (5)</li> <li>● Happiness (4)</li> </ul>

Table 2. Round 1 Delphi survey: Deriving the definition of sports welfare (Means, Concept)

Means (by)	Concept (it)
<ul style="list-style-type: none"> <li>● Sports participation</li> <li>● Sports facilities</li> <li>● Sports</li> <li>● Sports participation</li> <li>● Sports participation</li> <li>● Sports Infrastructure</li> <li>● Quality facility, program, and personnel</li> <li>● Barrier-free integrated sports</li> <li>● Sports opportunities</li> <li>● Pro-sports, Sports for all</li> </ul>	<ul style="list-style-type: none"> <li>● Social security system</li> <li>● State</li> <li>● State</li> <li>● Social policy and service</li> <li>● Social welfare service</li> <li>● Welfare of the governments</li> <li>● Service</li> <li>● National and social benefits</li> <li>● Service</li> <li>● Welfare Service</li> </ul>
Keyword (count)	
<ul style="list-style-type: none"> <li>● Sports participation (7)</li> <li>● Sports infrastructure (3)</li> </ul>	<ul style="list-style-type: none"> <li>● Welfare and service (8)</li> <li>● State (2)</li> </ul>

Table 3. Round 1 Delphi survey: Deriving the definition of sports welfare

<b>Subject</b>	<b>Who</b>	<input type="checkbox"/> All people (population) The direction of sports welfare should be aimed at a universal form of welfare for the entire nation.
<b>Object</b>	<b>For</b>	<input type="checkbox"/> Health, leisure, and happiness <i>The narrow welfare purpose</i> of reducing medical costs and positively impacting public health, and the broad welfare purpose of pursuing leisure and happiness through sports were presented.
<b>Means</b>	<b>By</b>	<input type="checkbox"/> Sport participation An environment should be established where high-quality sports services can be provided to ensure opportunities to participate in sports without discrimination or barriers.
<b>Concept</b>	<b>It</b>	<input type="checkbox"/> Welfare and service The prevailing view is that sports welfare is a social service provided to individuals by the state or local governments.
Definition		
Sports welfare is a social welfare service that guarantees participation in sports for the purpose of health, leisure and happiness of the entire nation.		

concept). The definition was relatively valid, with an average of 4.7 / 5.0 (std. 0.46).

The second version of sports welfare, “Sports welfare is a broad service delivery system that guarantees participation in sports for the health, happiness, and leisure of the whole nation,” was corrected upon the comments that the definition of sports welfare should directly reflect its status as a system. The validity, however, dropped to an average of 4.0 / 5.0 (std. 0.85).

The final form of the operational definition of sports

welfare was derived as “Sports welfare is a service that guarantees participation in sports aimed at improving the health, happiness, and quality of life of the entire nation.”

#### Factor Structure of the Sports Welfare Index

A total of 518 indicators were identified by the Ministry of Culture, Sports and Tourism and the National Statistical Office. 273 indicators were deleted as they lacked longitudinal data, and 121 indicators

Table 4. Survey results of major factors of sports welfare

Factor presented	Keyword	Count
Number and area of public sports facilities per person, area	Public sports facilities	8
Ratio of sports budget to total budget of local governments	Sports budget	8
Access to sports facilities (cost compared to income and convenience of reservation)	Sports facilities	5
Number of sports professionals (leaders, etc.) per person	Sports professionals	5
Existence of laws and ordinances concerning support for sports activities	laws and ordinances	5
Satisfaction level sports participation	Participation	5
Number and area of sports facilities per person	Sports facilities	4
Number and area of private sports facilities per person	Private sports facility	4
Number of sports clubs or club members and members by population	Club	4
Number of sports programs per person	Program	3
Number of sports events and sports-related competitions held in the community	Events / competitions	3
Actual number and time of exercise per month/week	Actual exercise	3
Population and proportion of local sports participants	Participating population	3
Accessibility to Spectator Sports	Spectator sports	2
Percentage of health fitness index and annual medical expenditure	Fitness / medical expense	2
Number of sports-related competitions, etc.	Competitions	2
Sales of local sports goods and sales of sports-related food (drink, etc.)	Food / goods	1
Number of favorite sports	Sports	1
Approximate total number of in-house sporting goods	Goods	1
Status of local sports teams	Sports teams	1
Number of workplace sports teams (including persons with disabilities) and sports clubs	Sports clubs	1
The degree of school sports	School sports	1
Satisfaction of Public Sports Facilities	Public sports facility	1
Satisfaction of Private Sports Facilities	Private sports facility	1
Number of sports facilities available for sports vouchers	Sports facilities	1
Number of winter/summer classified facilities	Sports facilities	1
Number of facilities available for the underprivileged and disabled	Underprivileged	1
Specialized personnel by subject	Professionals	1
Activity level of sports organizations in the region	Sports organization	1
the administrative level of a local government	administration	1
Number of available public sports programs per person	Program	1
Level of sports program	Program	1
Number of participants in sports programs	Program	1
a sports budget per person	Sports budget	1
Sensitivity to sports ethics (including violence, sexual harassment, and sexual violence), existence of sports ethics codes, manuals for responding to sports ethics issues, etc.	Ethics	1
<b>5 Major Factors</b>		
Target, Facility, Program, Human Resource, System		

found irrelevant to the research question of comparing provinces and cities were excluded from the list. The remaining 124 indicators were used as references on the Delphi survey. After three rounds of Delphi surveys, 13 factors were extracted as most relevant to the operational definition. The factors were then grouped into 5 key factors according to context.

Using the derived factor structure, two levels of pairwise comparisons were conducted: Key factor

comparisons (5 factors, 10 comparisons) and sub-factor comparisons (13 factors, 78 comparisons). A total of 10 experts participated in the process, and the consistency ratio (CR) was reviewed on every round to secure a reasonable level of transitivity.

“Target” and “Facility” earned the highest weight among the key factors by 0.372 each, and “Local Sports Participation Population and Percentage” was the factor considered most important among the indices.

Table 5. AHP: Factor structure of the sports welfare index

Sports Welfare Index						
Level 1	Sports Welfare Index					
Level 2	Class	Target dimension	Welfare service dimension			System dimension
	Key Factor	Target	Facility	Program	Human Resource	System
Level 3	Factor 1	Local Sports Participation Population and Percentage	Number and area of public sports facilities per person	Number of sports programs per person	Number of sports instructors per person	Ratio of sports budget to total budget of local governments
	Factor 2	Sports participation satisfaction	Satisfaction with the use of public sports facilities	Number of sports voucher programs	Number of professional sports administrative personnel	Sports budget per person
	Factor 3	Actual number and time of exercise	Number of facilities for the underprivileged and the disabled			Laws to support sports activities (binary)

Table 6. AHP: Factor weight of the sports welfare index

Key Factor	Weight	Indicator	Weight	Total Weight
Target	.372	Local Sports Participation Population and Percentage	.732	.272
		Actual number and time of exercise	.138	.051
		Sports participation satisfaction	.130	.048
Facility	.372	Number and area of public sports facilities per person	.682	.254
		Number of facilities for the underprivileged and the disabled	.216	.080
		Satisfaction with the use of public sports facilities	.102	.038
Program	.089	Number of sports programs per person	.750	.069
		Number of sports voucher programs	.250	.021
Human Resource	.047	Number of sports instructors per person	.875	.041
		Number of professional sports administrative personnel	.125	.006
System	.119	Sport budget per person	.476	.057
		Ratio of sports budget to total budget of local governments	.452	.054
		Laws to support sport activities	.072	.009
<b>Total</b>	<b>1.000</b>		<b>5.000</b>	<b>1.000</b>



Table 7. Sports welfare index applied on region terms by each weighting method

Division	Equal Weight	Delphi Weight	AHP Weight
(SC) Seoul	-1.69	-10.53	-0.19
(C1) Busan	<b>-6.53</b>	<b>-39.21</b>	<b>-0.47</b>
(C2) Daegu	-0.85	-5.88	-0.15
(C3) Incheon	<b>-4.53</b>	<b>-26.51</b>	-0.31
(C4) Gwangju	4.76	25.84	-0.05
(C5) Daejeon	2.43	12.78	-0.27
(C6) Ulsan	1.95	11.73	0.04
(C7) Sejong	<b>-5.08</b>	<b>-29.18</b>	<b>-0.79</b>
(P1) Gyeonggi	0.77	5.45	0.24
(P2) Gangwon	<b>5.49</b>	<b>32.32</b>	0.34
(P3) N.Chungcheong	2.27	13.94	-0.16
(P4) S.Chungcheong	-1.34	-7.51	-0.08
(P5) N.Jeolla	<b>7.61</b>	<b>46.19</b>	<b>0.89</b>
(P6) S.Jeolla	<b>5.60</b>	<b>33.46</b>	<b>0.95</b>
(P7) N.Gyeongsang	<b>5.15</b>	<b>30.59</b>	0.44
(P8) S.Gyeongsang	-1.82	-10.34	0.12
(P9) Jeju	0.81	3.85	-0.43

\*Boldface: over or under 1 std., SC: Special City, C: City (“Si”), P: Province (“Do”)

Table 8. Sports welfare index values and ranks by key factors of 17 provinces and cities

Division	Inform	SC	C1	C2	C3	C4	C5	C6	C7	P1	P2	P3	P4	P5	P6	P7	P8	P9
Overall	Rank	12	<b>16</b>	10	14	8	13	7	<b>17</b>	5	4	11	9	<b>2</b>	<b>1</b>	3	6	15
	value	98.1	95.3	98.5	96.9	99.5	97.3	100.4	92.1	102.4	103.4	98.4	99.2	108.9	109.5	104.4	101.2	95.7
Target	Rank	10	8	4	9	<b>2</b>	13	6	<b>14</b>	7	<b>15</b>	<b>17</b>	12	<b>1</b>	<b>3</b>	5	11	<b>16</b>
	Value	0.02	0.04	0.23	0.04	<b>0.28</b>	-0.13	0.10	-0.27	0.07	-0.42	-0.45	-0.06	0.51	0.26	0.22	0.00	-0.42
Facility	Rank	11	<b>17</b>	14	11	<b>15</b>	13	10	<b>15</b>	4	<b>2</b>	5	9	<b>3</b>	<b>1</b>	6	7	8
	Value	-0.13	-0.32	-0.25	-0.13	-0.30	-0.17	-0.10	-0.30	0.20	0.37	0.14	-0.05	0.35	0.55	0.09	0.07	-0.05
Program	Rank	<b>2</b>	13	11	14	7	7	15	<b>17</b>	<b>1</b>	6	9	11	9	<b>3</b>	<b>3</b>	5	15
	Value	0.10	-0.04	-0.02	-0.06	0.00	0.00	-0.07	-0.15	0.11	0.03	-0.01	-0.02	-0.01	0.07	0.07	0.06	-0.07
Human Resource	Rank	13	13	12	<b>15</b>	10	3	8	<b>15</b>	<b>17</b>	<b>1</b>	3	9	5	<b>1</b>	5	10	5
	Value	-0.04	-0.04	-0.03	-0.05	-0.01	0.03	0.01	-0.05	-0.06	0.08	0.03	0.00	0.02	0.08	0.02	-0.01	0.02

\*SC: Special City, C: City (“Si”), P: Province (“Do”)

\*red=higher than 1 std. away from the mean, blue=lower than 1 std. away from mean

## Applying Regional Data

The model was tested by applying the indicator data from a total of 17 regions (9 provinces “Do” and 8 metropolitan cities “Si”) collected at the factor listing phase. The factor weights from AHP appeared to have a sufficient degree of normality in skewness, kurtosis, and range. Also, the final form of the index was transposed for better usability. Index transposed [sports welfare index:  $a \rightarrow$  adjusted index:  $100 + 10 * a$ ]

## Discussion and Conclusion

This study has constructed a composite index of sports welfare to evaluate the level of sports welfare on a first-level division basis. The research holds value in that it operationally defined the concept of sports welfare, built the factor structure according to the definition, calculated the weights for each factor, and tested the composite index on actual data so that future studies could conduct further research upon the strong quantitative foundation achieved through this study.

Firstly, we have derived an operational definition of sports welfare built upon the previous literature about the concepts and models of sports welfare (Kim, 2006; Noh, 2015). In this study, the concept of sports welfare needed to be more clearly specified in terms of targets, purposes, and means, as it had to contain solid criteria for measurement. Based on the summary and implications of the discussion, an expert Delphi survey was conducted to build the conceptual framework of sports welfare to be used in later procedures. The final definition of sports welfare was derived: “Sports welfare is a service that guarantees participation in sports to improve the health, happiness, and quality of life of the entire nation.”

Secondly, a 3-round Delphi survey and AHP were conducted to construct the factor structure of the sports welfare index to 5 key factors and 13 sub-factors. Despite the widespread coverage of sports welfare in the field and various forms of policies being

implemented, not many prior studies have analyzed nor reported sports welfare in the form of a factor structure. While there have been attempts to evaluate some sports welfare policies on more minor scales (Kim et al., 2010), research to express the overall level of sports welfare has been insufficient. The result addresses a composite index with five key factors: target, facility, program, human resource, and system, consisting of two to three sub-factors.

Thirdly, the overall difference in sports welfare levels between regions was identified by calculating regional sports welfare indexes and ranking them by whole and each key factor. While there were studies that aimed to diagnose the status of sports welfare, they only targeted evaluating sports welfare projects for specific targets such as people with disabilities. As a result, narrow or minor discussions of sports facilities and programs had to undergo without a whole framework of sports welfare itself. Moreover, there was not much ground to develop the discussion into how sports welfare was or could interact with external social factors. This is crucial as local governments need to conduct self-evaluation for various policy reasons such as earning government support, attracting external funds, and evaluating self-development performance. Qualitative or quantitative indicators can be a resourceful foundation for these evaluations. Today, when health and sports account for a growing proportion of the country's welfare policies, we could expect the index to confirm the level of sports welfare by region and set the direction of sports-related policy development.

## Limitations and Future Research

Several limitations regarding this study need to be noted. The first limitation has to do with the nature of the factors used. Upon developing the Delphi survey, the factor pool had to be limited to the existing factors where data existed, which hindered the experts from selecting the exact form of factors they would have rather preferred. Since sports-related indicators are

constantly being added and measured, we believe that more accurate forms of the index could be structured by future research.

Another limitation is that the Delphi method and AHP heavily depend on the selected experts, so the same procedure might not guarantee the same result for different countries. This problem has been treated by inviting experts from various fields and positions as much as possible, but it is believed that it will not completely solve the cultural heterogeneity. Still, we could expect many applications within South Korean society before we reach out to different cultural contexts.

Furthermore, most of the input data used in this study did not have more than five years of data kept on track, and more detailed regional information had not been collected in the first place. This resulted in a lack of longitudinal analysis, which could be valuable in identifying how the degree of sports welfare had changed over time. Although a short-term analysis has been established, long-term data management is crucial for further research.

Some research gaps are still open and thus raise interesting research questions for further studies. Firstly, could the term sports welfare be applied in countries where private welfare is more established? Further research should be aware of the worldwide welfare shift from public to private welfare. Secondly, what factors should the sports welfare index consist of for comparing smaller and larger levels? With the increasing amount of data regarding sports, there would be a fair amount of space to fill in the index for versatile usage.

### Acknowledgments

This work was supported by the Seoul National University Research Grant in 2019.

### References

Bell, S., & Morse, S. (2003). Learning from experience

in sustainability. in *Proceedings of International Sustainable Development Research Conference 2003*, Nottingham, UK.

Bergsgard, N. A., & Rommetvedt, H. (2006). Sport and politics: The case of Norway. *International Review for the Sociology of Sport*, **41**(1), 7-27.

Houlihan, B. (2002). Sport, policy and politics: A comparative analysis. Routledge.

Joint Research Centre-European Commission (2008). *Handbook on constructing composite indicators: Methodology and user guide*. OECD.

Keeble, J. J., Topiol, S., & Berkeley, S. (2003). Using indicators to measure sustainability performance at a corporate and project level. *Journal of Business Ethics*, **44**(2-3), 149-158.

Kim, K., Kim, M., & Lee, J. (2010). The concept and model development of sports welfare for the underprivileged. *Journal of the Korean Society of Social Physical Education*, **40**(1), 197-205.

Kim, S. (2006). *Sports social welfare theory*. 21st Century Education Company.

Kim, S. (2007). A study on the constitutional challenges of sports welfare. *Journal of Sports Entertainment and Law (JSEL)*, **10**(1), 125-147.

Kim, Y., Choi, Y., & Ahn, S. (2010). Study on the development of welfare indicators system in Korea. *Korean Health and Social Studies*, **30**(2), 219-253.

Korean Institute of Sports Science (2008). *Establishing a sports welfare project promotion plan*. KISS Publishing.

Noh, Y. (2015). *A study on the concept and policy direction of sports welfare*. The Korea Sports Promotion Foundation.

Noh, Y., Yeo, K., & Kwon, Y. (2017). Theoretical consideration for the establishment of the concept and model of sports welfare. *The Korean Sports Science Association*, **26**(6), 35-48.

OECD (2019). *Society at a glance 2019: OECD social indicators*. OECD Publishing.

Wackernagel, M., Schulz, N. B., Deumling, D., Linares, A. C., Jenkins, M., Kapos, V., ... & Randers, J.

(2002). Tracking the ecological overshoot of the human economy. in *Proceedings of the National Academy of Sciences*, **99(14)**, 9266-9271.

Walter, G. R. (1998). *Community sustainability auditing*. *Journal of Environmental Planning and Management*, **41(6)**, 673-691.