

Research Article

Clarifying the Innovation Value of Sports Policy by Network Analysis: Adding the Case of Shohei Ohtani's Two-way High Performance

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Abstract

This study is an empirical study on sports policy. To explore the social value of future sports policy, we extracted key concepts from literature summaries. We used a co-occurrence network analysis to qualify items with a high frequency of occurrence from more than 100 international papers concerned sport policy since 2020. From a total of 28,417 terms, the relationship between “growth”, “culture”, “model”, “country”, “environment” and “SDGs” was extracted as policy structures related to sports policy. In addition, using time series grouping from the past to the present and the future (correspondence analysis), more strategical concrete activities and organizational coordination were oriented. It suggested innovative policy developments in the future. Next, to clarify the modern characteristics of a sports model, we discussed the policy development of MLB Shohei Ohtani's two-way challenge (pitcher and batter). A new model of sports innovation supported by sports medicine and science (performance analysis) might have been proposed. The emergence of sports performances beyond preconceived notions might be due to a policy shift from an athlete-first perspective to past policies. We would like to discuss the possibility that innovation could be generated through mutual aid rather than competitive elimination. It could be a consideration of the social values generated by altruism or coexistence.

Keywords

Sport Policy, Network Theory, Correspondence Analysis, Shohei Ohtani

1. Introduction

This study examines the basic knowledge for considering the future of sports policy research. We would like to discuss the possibility that innovation could be generated through mutual aid rather than competitive elimination [1]. Sports policy might be considered to structure based on a unique

relationship of human credibility. Therefore, in addition to macro-level analysis to capture international trends, it is necessary to pay attention to meso-level analysis to understand individual regional characteristics. As a case characteristic, the identification of sports factor parameters with social,

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international and public impact would be understood as the *raison d'être* of future oriented.

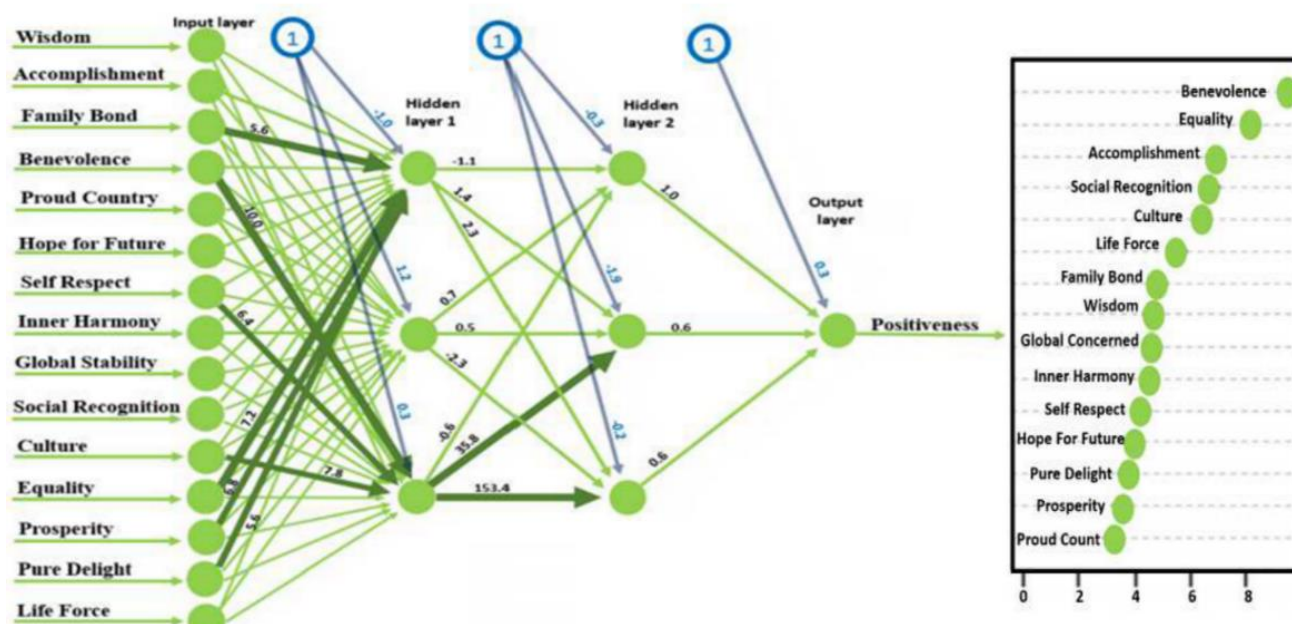


Figure 1. The social value of sports suggesting some contribution to positive thought during the coronavirus pandemic (left) and the hierarchy (right) [5].

At the Paris 2024 Olympics, Japan performed well with 20 gold (3rd in the rankings), 12 silver and 13 bronze (6th in the overall medal rankings), and 14 gold (10th), 10 silver and 17 bronze (11th overall) in the Paralympics. Japan's performance could be attributed to the Basic Law on Sports, which was enacted in 2011 to commemorate the 100th anniversary of the Japan Sports Association and the Olympic Committee. Since 2008, the curriculum pillars of the National Coach Academy, which have made Olympic coaches obliged to participate, are "elite" (highest standards), "professional" (social responsibility), "global" (international standards), "interactive" (cooperation with other sports), and "Team JAPAN" (solidarity) [2]. These could be structured by deep interdependence as mutual aid spirals.

In 2015, the Sports Agency was established, and appropriate policies were developed within the scope of the 2020 Tokyo Olympics Paralympic Games. To adapt to the changing society, policies could support the right of citizens to practice sports in each era, and there is a way to change the existing legal system. The reason for the existence of sports is questioned about how to realize well-being in society, such as the declining birthrate, aging population, total population decline, regional economic disparities, and the prevention of infectious diseases. The draft amendment to the Basic Law on Sports, which has been in place for 10 years, was ap-

proved by the National Assembly in June 2025. It is expected to be used as an important tool for social development to solve social issues suitable for the new era. Japan's unique social perspectives, such as high-performance sports, Japan's unique school and community sports, and sports for all, require scientific interpretation of evidence-based policies [3].

As a characteristic of Japan, it should be shared that it is a country prone to disasters due to its natural conditions surrounded by the sea on a volcanic belt. When a large-scale disaster occurs, whether or not to continue sports in such a situation of social unrest is discussed. Here, it is important to discuss what kind of values sports have in society for people to have positive thoughts under the social unrest of the earthquake and corona disaster. Past studies have reported that altruistic coexistence values such as "benevolence" are placed higher than one's own personal happiness. Of course, people structure not only a single value, but also a variety of values according to various situations. It is as if they are stacking bricks one by one, creating their own judgments and actions [4, 5].

This study explores key thoughts related to the social value from a review of sports policy research papers published in recent international papers and discusses an approach to exploring the global development of sports policy based on the unique characteristics of Japan sports.

2. Materials and Methods

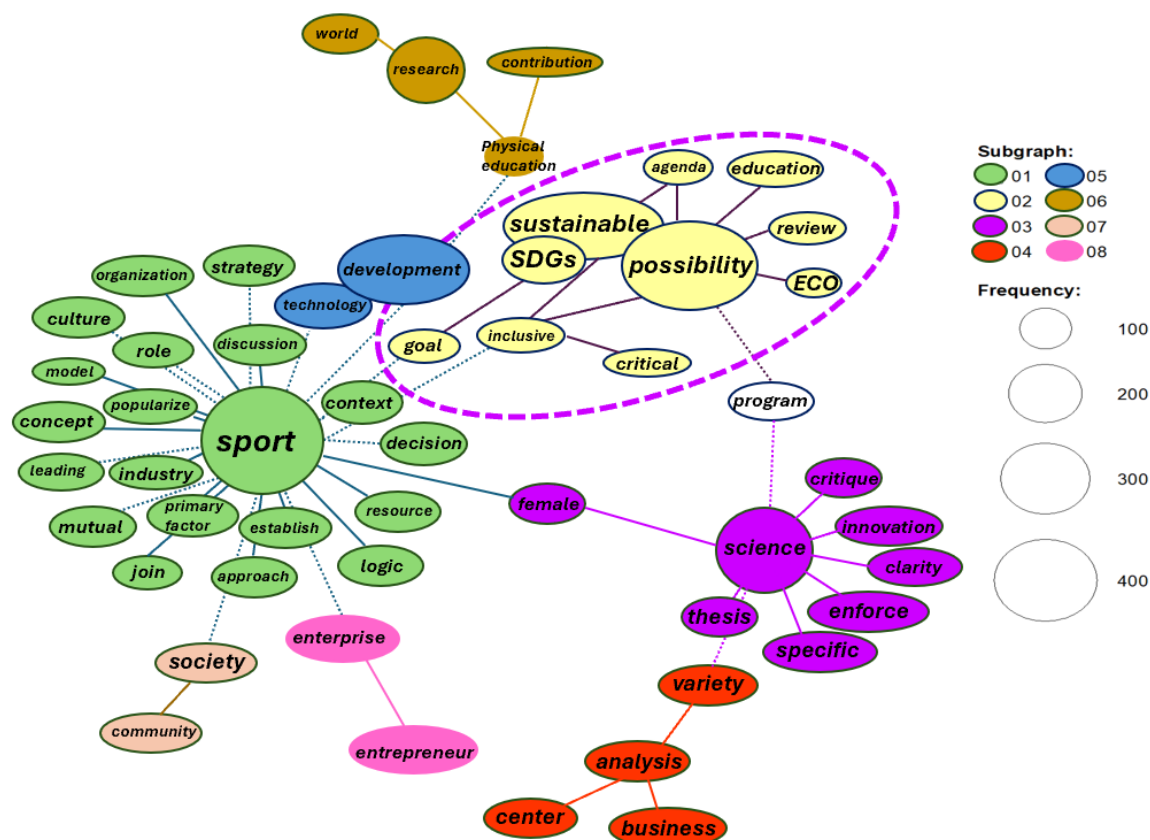


Figure 2. A co-occurrence network of political values of sport extracted from recent international research papers (2020-2025).

For the future of sports policy research, we have summarized the abstracts of more than 100 recent international research papers focused about sport policy in 2020-2025. We also summarized more than 100 news articles and the latest science in 2024-2025 about Shohei Ohtani, who plays two-way (pitcher and batter) in MLB, as an example of sports innovation originating from Japan. The results were organized by a co-occurrence network analysis by KH Coder. KH Coder is a software developed to implement a method of quantitative text analysis in the field of sociology and social research. Among them, the co-occurrence network analyzes the occurrence patterns of each word and visualizes the words structures with a large number of occurrences and strong relationships between items by connecting them in close proximity [6]. This kind of text mining (context extraction) aims to analyze data in the form of documents such as free descriptions in a quantitative way, and to quantitatively summarize and present and understand various answers. Quantitative analysis makes it possible to visualize and show the results of the related structure of terms as well as numerical data [7, 8].

3. Results and Discussion

3.1. Political Values Network

A total of 28,417 words were extracted from the abstracts of more than 100 papers in Sports Policy Research (approximately 2020 onwards). The Figure 2 shows the result of a keyword network analysis. As shown in Figure 2, various policy issues and keywords were associated, mainly sports. In addition, the existence of research in derivative areas such as research, sustainability, and development as subgroups and the SDGs was also revealed.

The issue of sports policy suggests the need for a context that can be "growth", "culture" and "model" for the "country" and "the environment". It is not just a "concept", but more specifically, it is to discuss the "practical role" for the "country" in a "strategic" manner. It is a question of whether it is public policy or not [9]. In the process, a "theoretical structure" of what an "organization", "community" and "university" should be, or how to "start a business" in the future, is required. The relationship with "research" derived from

sports is supported by the promotion of "women" and new "knowledge". It also relates the context of "innovation", which seems to be an important keyword in this study. "Sustainability," "Potential," and "SDGs" are related to "educa-

tion," "ECO," and "inclusiveness" as global social issues. However, what should be noted here is the relationship with "science" that continues.

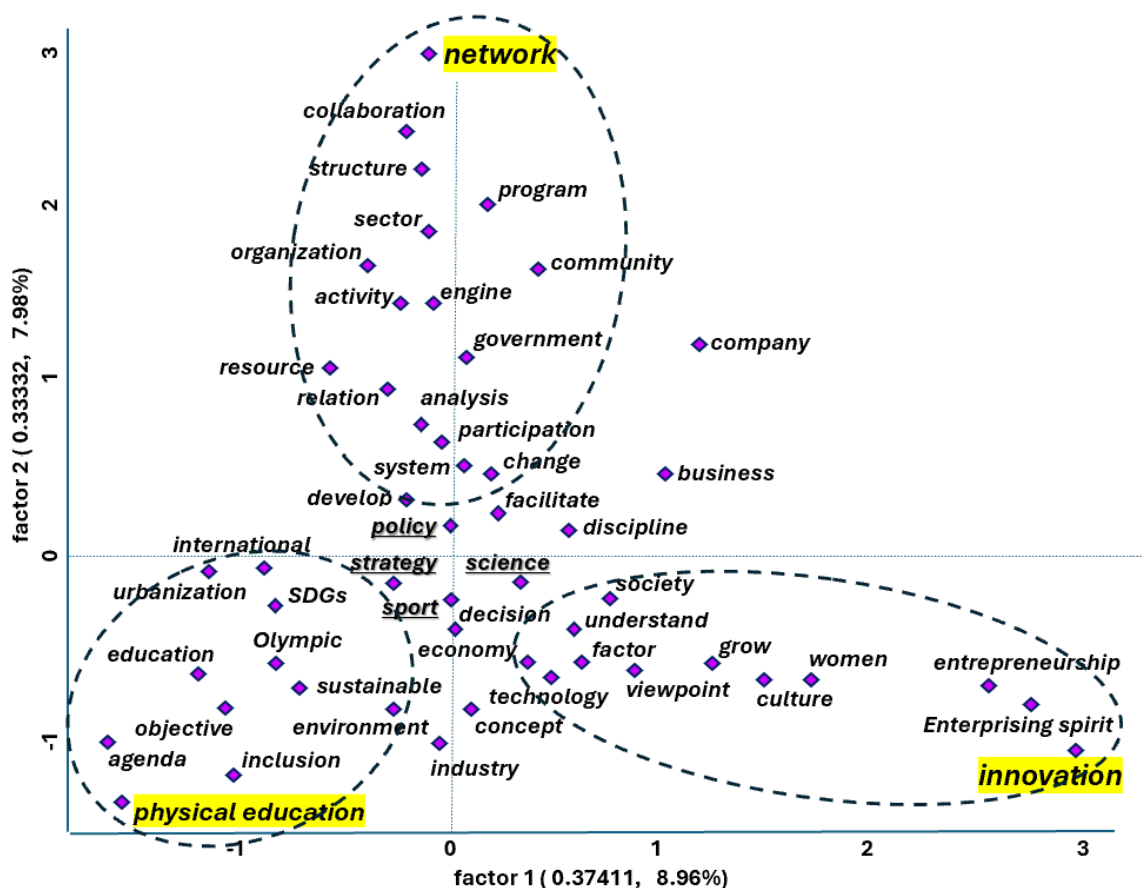


Figure 3. Time series relationship of policy development by correspondence analysis.

While SDGs tend to be used too much, it is important to "analyze" and "verify" what should be "specified" for the country, and to "program" aspects that can become concrete "business". The logic is that if we do not have a mindset that prioritizes "the country" rather than following other countries, we would not be able to truly move forward to the medium- to long-term "goal". That might be the lifeblood of the "enterprising spirit".

3.2. Time Series Relationship of Policy Development: Correspondence Analysis

Furthermore, the results of correspondence analysis as a method to clarify the perspective of capturing the keyword network are shown in Figure 3. It could also be seen as a cluster. Three main areas of practice are shown.

3.2.1. Past: Existing Global, International, and Domestic Business Operations

The first area (lower left of the figure) is "Global, in-

ternational, and domestic existing business research". The SDGs encompass factors such as global environmental change and global warming affecting the venue of international competitions, summer heat countermeasures, and winter snowfall countermeasures and altitude. These are organizational and social issues that have been built from the past to the present. In addition, as a symbol of Japan's sports, "school physical education" has played a central role in "Japan".

3.2.2. Present: Inter-industry Collaborative Management

The second area (at the top of the figure) can be regarded as "current" "inter-industry collaborative research". Developmental "relationships" and "organizations" from the past, such as the public and private sectors, new "collaborations", new "structures", and new "communities" that have been built in the past. The form of "administration" is suggested. It would be characterized as a perspective that studies the op-

eration of "networks" and "programs" that are diverse and suitable for the times. It suggests that "change" is related to

building the possibility of a relationship between "community" and "entrepreneurship" and "business".

3.2.3. Future: Entrepreneurial Culture Creation Management

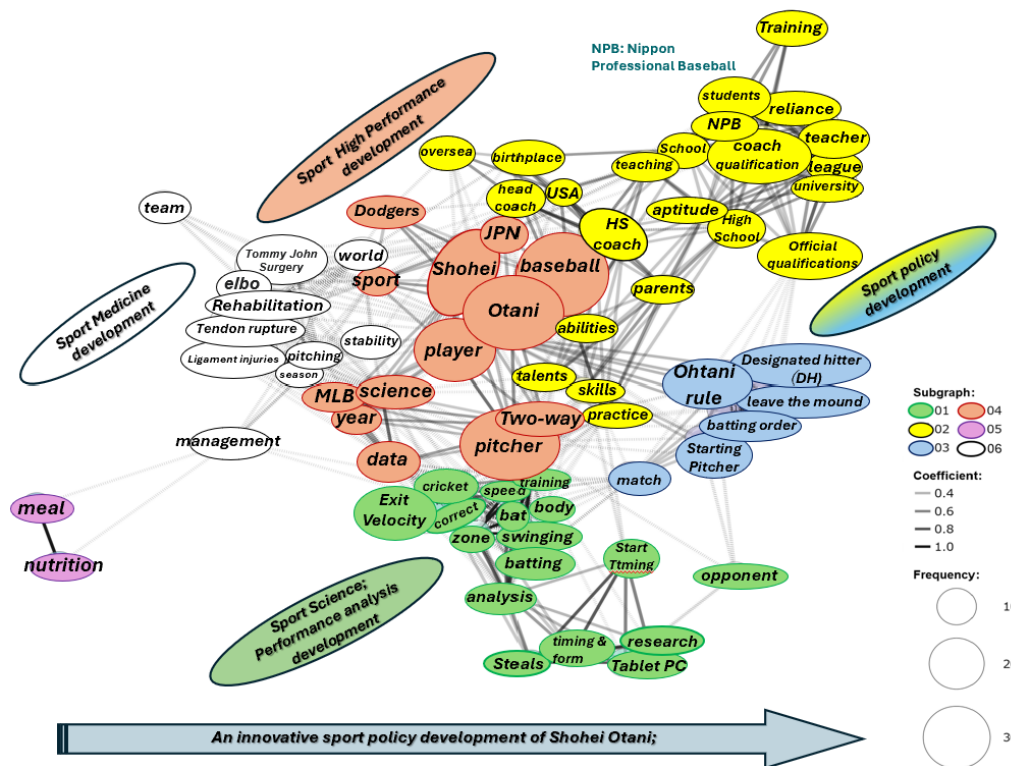


Figure 4. A co-occurrence network leading to innovated political values of Shohei Ohtani.

The third area (right direction of the figure) is probably the perspective for the "future" and "the next generation". It encompasses the meaning of "innovation" and "entrepreneurial spirit" businesses that transcend the narrow framework of "business" and create "cultural" values and intrinsic values that should be passed on to the next generation. That is the so-called "entrepreneur". A "sports policy" that brings business viability from a new "entrepreneurial perspective" and at the same time contributes to society as a culture is required.

3.3. The Case of Shohei Ohtani's Two-way High Performance with Policies

Next, one topic of sports innovation would be discussed. We would like to consider the case of MLB (Major League Baseball) player Shohei Ohtani. We summarized over 100 news articles about Shohei Ohtani in 2024-2025, with a total of 3,460 words extracted. His two-way challenge (pitcher and batter) has led to an international legal development from MLB that has led to a policy innovation called the new "Ohtani Rule". And it was imported back into the Japan baseball.

3.3.1. High Performance Values

Firstly, we focus on his high-performance positioning (central area of [Figure 4](#)). Shohei Ohtani won 2024 MVP award as the first designated hitter in MLB history. Ohtani, who won his third MVP award in his seven-season career, became the first player in MLB history to hit 50 home runs and 50 steals in the single season.

Ohtani continues the "two-way" of "pitcher" and "hitter" in "MLB", but why is it difficult? First, it is rare for both pitchers and batters to reach the professional level. There is also a physical barrier. It is common for professional baseball pitchers to take about 6 days after starting pitching once to prepare for the next appearance. However, to play two-way, he must continue to play in the meantime. It would be difficult to recover from fatigue after pitching, and the risk of injury would also increase. While it is not uncommon for players to lose form due to fatigue even in normal times, maintaining their condition by pitching becomes a major challenge [10]. In the central area of Figure 3, between "Ohtani" and "two-way", there are "talent", "ability", "skill" and "practice". However, it is not difficult to imagine that there was an unremitting dedication while incorporating

medical science and information research to make "talent" bloom. It is said that from the age of 16, "high school coaches" and "parents" focused on how not to destroy the boy's dream of aiming for the "world" with a goal that no one had achieved, a "two-way". The high school coach said that he had a coaching experience of training Ohtani's three-year senior pitcher, Yusei Kikuchi (MLB Mariners), and that Ohtani's guidance made use of Kikuchi's evidence data like as "increasing pitching ball speed (20 km/h increase) due to increased physique (20 kg weight increase)" and that he was able to carry out a carefully formulated training plan [11].

3.3.2. Sports Medicine Development

The physical barrier of two-way makes it difficult to recover from fatigue after pitching, and the risk of injury also increases. The supreme high performance of Ohtani could be supported by the development of sports medicine science. In figure 3, it arises as a group of words on the left side position. Ohtani has undergone twice surgeries to transplant tendons from another part of the "elbow" instead of the "damaged ligaments" of the "elbow", "Tommy John surgery". He underwent his second right elbow surgery in September 2023 and made his return to two-way in 663 days on June 16, 2025. In addition to understanding the "team", "management" of "meal" and "nutrition", and steady "rehabilitation" would have good influences that support high performance.

3.3.3. Sport Science; Performance Analysis Development

From the network graph, Figure 4, when looking at Ohtani's high performance, we should focus on his awareness of "data" and "science". At the bottom area of figure 4, his analysis activities are related to "start-timing", "timing and posture" of "steel", "analysis", "batting", "swinging", and "research" on "tablet". These could indicate that he is constantly analyzing the characteristics of the pitchers and hitters he faces. "Hitting speed" also appears relatively often.

Ohtani uses a bat length of 35 inches (about 89 cm) in 2025 after the 2024 season, which is one inch longer. This could increase the centrifugal force, but its operability might increase the difficulty. There would be a risk that the existing "batting" and "swinging" forms become unstable [12]. He continues to try to change his dealings with his opponent, but of course his opponent also studies Ohtani. The meticulous battle and continuity of the offense and defense might be increasing the centripetal force of "MLB". LA Coach Roberts represents his way of thinking about baseball. "His actions naturally demonstrate leadership. It makes it easier for other players to focus on their own play. He plays games every day, takes the mound as much as possible, chooses a four dead ball if necessary, and accepts changes in the batting order. All for the team, including two-way. He is not the type of leader who talks a lot, but he speaks in his play. It continues every day" [13]. He dislocated his shoulder in a game that was just one win away from winning the 2024 World Series, and his

participation in the game was in jeopardy. However, he forced himself to participate. "We want to focus on tomorrow's game first so that we can win one more game tomorrow. It's only natural that I prepare to play" [14]. His psychological characteristic of resilience in the face of adversity might contribute to the central actor dynamics of the team network [15]. Also, the presence of "female" between "sports" and "science" in Figure 2 might be related to the presence of "parents" in Figure 4. The presence of parents could suggest that performance and resilience are fostered not only through genetic physical characteristics but also through the sociality of watching over upbringing [16].

3.3.4. Sports Policy Development

Policies and domestic laws and regulations are summarized on the right side of figure 4. Japan's unique "high school baseball" structure has an overloaded environment such as national tournaments held in the summer of extreme heat. In recent years, rest periods and Upper limit of the number of pitches have been established to correspond to extremely hot environments. However, there was no player priority rule as described below. In the MLB, even if you leave the pitcher, you can continue to stand at the plate as DH (designated hitter), so-called "Ohtani Rule" from the 2022 season.

Under this rule, the starting pitcher can also serve as DH. The designated hitter is a hitter who stands at the plate instead of the pitcher. In the past, designated hitter was selected before the game and could not be changed in the middle of the game. If the pitcher left, DH could not continue the game. However, in the Ohtani Rule, the starting pitcher and designated hitter are two different people, and the same player can be listed as "starting pitcher" and "designated hitter". In this case, you can participate in the game as a DH even after leaving the starting pitcher. Also, even if a pinch hitter or pinch runner is sent to the designated hitter, you can remain in the game as a pitcher. It is said that the rules were made for Ohtani. And this rule introduced in Japan from the 2023 season by both professional and amateur baseball. The possibility of the birth of a "second Ohtani" may be born.

This could be regarded as a policy that supports high performance in two-way. One of the perspectives of policy research analysis is globalization or globalism. The theory of policy is a phenomenon in which policies and rules spread across national borders. However, in Japanese domestic professional baseball, players who have applied this rule have not yet appeared in the 2025 season. In both the United States and Japan, from youth to professional, it has been rare for coaches to actively engage in two-way and succeed. However, with the advent of Ohtani, coaches might have entered an era where they take on new challenges to support the diverse hopes and possibilities of players beyond the established concepts of the past. It is an opportunity to support policies for coaches that are positioned as an innovation in governance.

MLB's policy of the Ohtani rule would contribute to the development of social ecology not only for the competitive-

ness of individual players, but also for the league and the baseball sports world, as well as to improve the attractiveness to customers. In addition to the development of economic resources, this policy might also bring about the synergistic effect of developing a new training system. These could be interpreted as sports innovations of virtue through altruism [1] to expand the opportunities to play sports.

In Japan, there was an amateur rule that professional coaches cannot teach youth amateurs. However, there is also the hope of ICHIRO, who played an active role in MLB, and in recent years, professional baseball experience has been recognized as a coaching qualification to become an amateur baseball coach. It would be in line with the socio-ecological policy model of a healthy sports coach career passway [17].

There is research on how participation in youth sports in the early teens, especially early specialization, affects athletes' long-term physical health and wellbeing. Early specialization, or intensive training in one sport and exclusion from participation in others, could increase the risk of excessive injury and burnout. On the other hand, participating in multiple sports diversifies physical activity, creates balanced athletic skills, reduces injuries, increases motivation and social skills, and allows for fun. Ohtani also enjoyed not only baseball but also competitive swimming in early teenage years. Furthermore, as the birthrate is declining, it is also important to create opportunities for children to play the best sports and experience high-quality experiences. It could be useful to recognize not only two-way in baseball but also in other sports. Specifically, the youth period is a seasonal development, such as baseball and swimming in the summer, and skiing and rugby in the winter. This requires sports education administration and annual competition cycle policy, that is, the theory of new public management in considering the characteristics of various and specified regions [18, 19].

4. Conclusions

In the sports policy surrounding Shohei Ohtani, the pursuit of two-way high performance could create the competition-space-innovation of MLB. Also, the Ohtani Rule might support to created legal innovation that would be reimported into Japan. Furthermore, it is being generated as an information innovation (intellectual capital; [20]) that would lead to support for the discovery of the next generation's qualities, the possibility of two-way with other sports, and support multi-sports in the community. The network graph suggests the structure of the four value chains of social sports innovation. The governance of athletes and sports is complex and full of country-specific characteristics, depending on historical, socio-political and financial circumstances [18]. The field of medical science could support creating social innovation as a common language. Athletes, coaches, organizations, and society would need medium- to long-term development plans with the related support policies to foster them. These would be systematic leadership promotion policies, medical science

promotion policies, and attractive sports promotion projects.

Author Contributions

Koh Sasaki: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Writing - review & editing

Rina Ito: Conceptualization, Data curation, Investigation

Takumi Kawahara: Conceptualization, Data curation, Formal Analysis, Investigation

Noriyuki Sakamoto: Formal Analysis, Investigation, Project administration

Ichiro Kono: Project administration

Conflicts of Interest

The authors declare no conflicts of interest.

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