แบบจำลองความสัมพันธ์เชิงสาเหตุของความได้เปรียบในการแข่งขันของประเทศและเหรียญรางวัลเอเชียนเกมส์ ปี 2014
A Causal Relationship Model of Nation's Competitiveness on the 2014 Asian Games Medals

วสันต์ สกุลกิจกาญจน์[1]
Wasan Sakulkijkarn

บทคัดย่อ

จุดประสงค์ของงานวิจัยนี้มีเพื่อศึกษาความสัมพันธ์ระหว่างความสามารถในการแข่งขันของประเทศและผลการแข่งขันกีฬาเอเชี่ยนเกมส์ ปี 2557 โดยใช้ตัวแปรด้านอำนาจทางเศรษฐกิจ ขนาดประชากร และจำนวนนักกีฬา ส่วนวัตถุประสงค์ของการศึกษาในครั้งนี้ คือ 1.เพื่อศึกษาความสัมพันธ์ระหว่างตัวแปรในบริบทของการแข่งขันเอเชี่ยนเกมส์ 2.เพื่อตรวจสอบว่าตัวแปรใดที่สนับสนุนการได้เหรียญเอเชียนเกมส์ปี 2557 และสุดท้ายทดสอบโมเดลที่เสนอเพื่ออธิบายความสัมพันธ์ระหว่างตัวแปรโดยผ่านการตรวจสอบข้อมูลเชิงประจักษ์

งานวิจัยนี้มุ่งศึกษาความสัมพันธ์ระหว่างความสามารถในการแข่งขันของประเทศและผลการแข่งขันกีฬาเอเชี่ยนเกมส์ ปี 2557 ซึ่งใช้ตัวแปรอำนาจทางเศรษฐกิจ ขนาดประชากร จำนวนนักกีฬา ผ่านการวิเคราะห์เชิงสาเหตุ อีกทั้งวิเคราะห์ข้อมูลโดยใช้ค่าสัมประสิทธิ์สหสัมพันธ์ และการวิเคราะห์การถดถอยเพื่อหาความสัมพันธ์ระหว่างตัวแปร ผู้วิจัยได้เลือกทุกประเทศที่ได้เข้าร่วมเอเชี่ยนเกมส์เป็นหน่วยของการวิเคราะห์ซึ่งพบผลลัพธ์ดังต่อไปนี้ ประการแรก ผลกระทบทางตรงของขนาดประชากรและเหรียญรางวัลมีความสัมพันธ์ในทางเดียวกันเล็กน้อย ประการที่สอง ผลกระทบทางอ้อมของขนาดของประชากรผ่านจำนวนนักกีฬาและเหรียญรางวัลมีความสัมพันธ์ในทางเดียวกันเล็กน้อย ประการที่สาม ผลกระทบทางตรงของ GDP ต่อเหรียญรางวัลนั้นมีความสัมพันธ์ในทางเดียวกันสูงมาก ประการที่สี่ ผลกระทบทางอ้อมของ GDP ผ่านจำนวนนักกีฬาและเหรียญรางวัลมีความสัมพันธ์ในทางเดียวกันสูงมาก ประการที่ห้าผลกระทบของจำนวนนักกีฬาและเหรียญรางวัลมีความสัมพันธ์ในทางเดียวกันสูงมาก

---

[1] อาจารย์ ดร. ประจำภาควิชาบริหารธุรกิจ คณะสังคมศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ กรุงเทพฯ
Lecturer, Department of Business Administartion, Faculty of Social Sciences, Srinakharinwirot University, Bangkok.
Corresponding e-mail: wasan@g.swu.ac.th

จากการศึกษาในครั้งนี้ทำให้ทราบมุมมองสำหรับเป็นแนวทางและกรอบแนวคิดที่เกี่ยวข้องกับความสัมพันธ์ระหว่างอำนาจทางเศรษฐกิจของประเทศ ขนาดประชากร จำนวนนักกีฬาที่เข้าร่วม และผลงานของนักกีฬาในเอเชียนเกมส์ โดยเฉพาะในเอเชียนเกมส์จะมีองค์ประกอบทางด้านการเงินและปัจจัยด้านประชากรเป็นสำคัญ แต่แทนที่จะพิจารณาปัจจัยใดปัจจัยหนึ่ง การผสมผสานของทั้งสองปัจจัยมีผลกระทบต่อความได้เปรียบในการแข่งขันของประเทศ ไม่เพียงเท่านั้นควรพิจารณาตัวแปรอื่นๆ ด้วย เช่น สถานะของประเทศ ระบบงบประมาณของประเทศ การมีส่วนร่วมในการแข่งขันกีฬา ระดับของนโยบาย และสภาพภูมิอากาศในแข่งขันกีฬาเอเชี่ยนเกมส์ โดยเฉพาะอย่างยิ่งในกรณีของการแข่งขันในฤดูหนาวมีความจำเป็นอย่างมากในการพิจารณานโยบายและวัฒนธรรมด้านกีฬาของประเทศนั้นๆ

คำสำคัญ: *เอเชียนเกมส์ ปี 2557 ความได้เปรียบในการแข่งขันของประเทศ เหรียญรางวัลเอเชียนเกมส์*

Abstract

The purpose of this paper aims to investigate the relation of nation's competitiveness and the results of 2014 Asian Games which used economic power, population size, number of athletics. The objectives of this study are: first, determining the relationships between variables within asian games context; secondly, examining if variables foster on the 2014 Asian Games Medals; finally, testing a proposed model to explain the relationship among variables through an empirical examination.

This paper explores the relationship between nation's competitiveness and the results of 2014 Asian Games which used economic power, population size, number of athletics, and path analysis to find out the relationships of these variables. The data were analyzed by correlation coefficient, regression analysis, and path analysis. The author chose every nation which has attended this game as a unit of analysis which found the following outcomes. First, the direct effect of population size on medals is positive and small. Second, the indirect effect of population size through the number of athletics on medals is also positive and small. Third, the direct effect of GDP on medals is strong and positive. Fourth, the indirect effect of GDP through the number of athletics on medals is positive and very strong. Fifth, the effect of the number of athletics on medals is positive and very strong.

Moreover, through study, it is found that this paper provides a basic view for guidelines and frameworks that address the correlations between a nation's economic power, population size, number of participating athletes, and their performance in the Asian Games. In the Asian Games, financial components and populace factors assume a major part, but instead than inferring that it is one over the other, it is a blend of both that impact a nation's competitiveness. it is useful to inspect factors, for example, country's international standing, national budget, participation in sports, level of policy, and climate in the winter games. Especially in the case of the winter games, it is more imperative to consider sports policies and sports culture.

Keywords: *2014 Asian Games, Nation's competitiveness, Asian Games medals*

Background and Significance of the Problem

The 2014 Asian Games, also known as the XVII Asian, was a multi-sport event celebrated in Inchon, South Korea from September 19 – October 4, 2014. South Korea was the capital city to host the Games, after China in 2010. A total of 9,704 athletes from 45 National Olympic Committees (NOCs) competed in 476 events from 42 sports and disciplines (28 Olympic sports and 14 non-Olympic sports), making it the largest event in the history of the Games (Olympic Council of Asia. 2017). The modern games, just like the ancient games, sought to achieve peace and strengthen humanity by becoming one in the name of sportsmanship without regard to race, ethnicity, ideology, religion, political views, or economic circumstance. The ultimate purpose of the modern games was not simply to prove one's strength or skill, but to increase national cooperation and mutual understanding through sports so that a more peaceful international community would become a reality. Considering the complexity of international relations today, the Asian Games has a significant influence on foreign affairs and diplomacy, and has become inseparable from politics. As politics, culture, and social issues become more and more complicated and intricately woven, the initial purpose of achieving mutual understanding through the Asian Games has inevitably become conducive to ideological and hierarchical conflict as well as political and economic influences. Most participating nations view the Asian Games as an opportunity to boost national image, increase profit and competitiveness, and integrate systems.

International relations has diversified and changed, but throughout the history of the Asian Games, the fundamental spirit of the games and the more functional purposes achieved a fine balance. The Games have been criticized for its duality and yet nations compete rigorously to attain the most medals. The success of a country in sports competitions like the Asian Games depends on its economic growth, its investment in sports, and its capacity to host the games. Some standards of measurement used to reflect the success of the Olympics include the degree of industrialization, economic power, population, sports policy, level of education, and the development of science and technology (Yu. 1984; Lee. 1984).

Among the standards mentioned above, economic power is mostly used to measure a country's competitiveness. In order to evaluate economic power, indicators such as level of wealth, resources, level of economic development, ability to establish and execute sports policies, and quality of life are used. Studies using such indicators are as follows.

In most cases, a country's economic power can be found in its resource potential (Dryzek. 1978), GNP(Gross National Product), GDP(Gross Domestic Product), GNP per capita, or energy consumption per person (Deviney & Crowley. 1978; Lee. 2010). Land size is also used as a unit of measurement to estimate a country's resources (Grimes *et al.* 1974). Other indicators that reflect a country's level of wealth are status in global finance (Ball. 1972), economic structure, energy consumption, income per capita, or purchasing power parity (Grimes *et al.* 1974).

This study began under the pretense that a country's economic level, population, and number of athletes do affect its performance in the Asian Games. Not only do independent variables like economic status population have impact on a dependent variable like performance in the Asian Games, but this paper would like to assume that through such parameters like the number of participating athletes it is possible to examine a pattern and would like to further analyze it.

Research Questions

In order to conclude a correlation between economic power, population, number of participating athletes, and performance in the Olympics, the following research questions surfaced.

1. What is the direct effect that population size has on securing medals?
2. What is the indirect effect that population size has in relation to the number of participating athletes in the Asian Games?
3. What is the direct effect that GDP has on the Asian Games?
4. What is the indirect effect that GDP has in relation to the number of athletes on the number of medals won in the Asian Games?
5. Which channel has the biggest impact on the number of medals won in the Asian Games?

Literature Review

A country's level of economic development and status (McIntosh. 1963; Novikov & Maximenko. 1972) are also basic factors that determine its potential to discover and foster athletes for the Olympics. This is because favorable results stem from high levels of stamina, better facilities, and training. Like this, there are several indicators that show a country's economic power, but it is difficult to collect such data. In this paper, GDP will be used as the variable representing economic power because of its symbolic and comprehensive significance and also because of the accessibility to data.

There are many studies that deal with the correlation between progress in sports and economic power as well as economy size and success in the Olympics. However, with the exception of Bernard & Busse (2004) and Lee (2010), there are almost no studies done on the correlation between success in sports and population size. If GDP is an important variable in economic evaluation, then population size can be considered to be a significant measurement of human resources, which is also included in the social sphere. Population has always been of interest to rulers since ancient times because it served as a valuable resource of determine taxes and land distribution. In ancient Babylonia, Egypt, and China, consensuses were held from 3,000 years ago, and the same was done BC 1,250 in Israel. In Roman times, consensus of the population and personal assets were used for financial and military purposes (Kim. 2000). Like this, population size became an important indicator that reflected a country's competitiveness along with the economy. In this study, population will be used as a variable, which has rarely been done in studies on ports competitiveness.

Bernard & Busse (2004) state that countries with large populations and high economic standing claim the most medals based on the concept of 'GNP per capita'. The exceptions are the host countries, the Soviet Union, Eastern Europe, and other socialist states. This is because of the home ground advantage that host countries have and because socialist states tend to invest more in the training of their athletes.

Oh (1996) studied 97 countries that won medals in past Olympic Games and classified them according to culture, religion, language, and race, and then analyzed how these factors were related to conquest sports, combat sports, and functional sports. Although the population size for each nation was not used, the study was meaningful in that it looked at regional factors. Jung (1998) correlated types of sports and sports events to the number of medals won. According to the study, countries with higher economic standing won more gold medals in functional and conquest sports, and countries with middle to lower economic standing won more gold medals in combat sports. Specifically, economically powerful countries did well in events like track and swimming, and economically lower ranking countries excelled in gymnastics and physical matches.

Along with population and economic power, whether such resources are being used efficiently is also important. Use of resources is affected by a country's political situation, social structure, and ideology. According to data from the Ministry of Youth & Physical Education (1992), such political, economic, and social factors influence international sports and have a codependent relationship. For instance, when we consider that the income per capita is the same, under the government's lead, socialist countries that produce and distribute resources efficiently are much more successful

than capitalist countries that are active in the free market. Deviney & Crowley (1978) studied the number of medals won in the Olympics and the GNP of free market countries and revealed that a $6 billion increase in GNP roughly converted into one more gold medal.

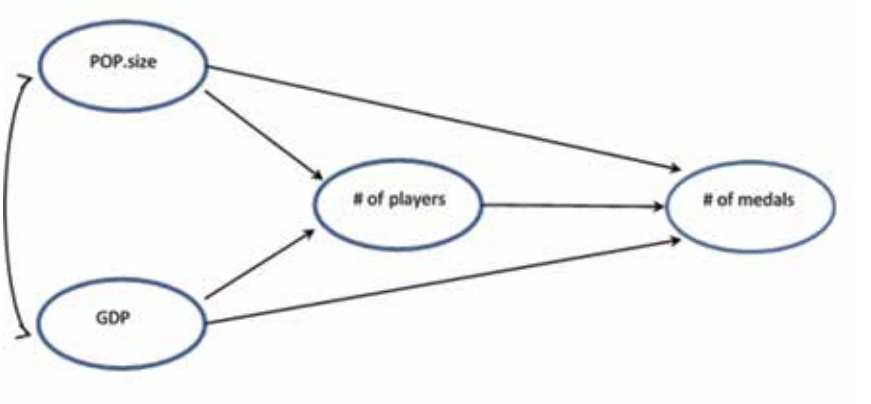
If a country's economic compass, meaning its choice to engage in socialism or capitalism, affects its success in the Asian Games, then likewise, the number of participating athletes from a particular country is also related to the country's national power and the sports policies it adopts. Even if countries have a similar level of economic power and population, the number of its athletes will be determined by how interested the country is in international sporting events such as the Asian Games. For example, countries that show more interest in national competitions rather than international games will have a smaller number of competing athletes in the Asian Games.

Unlike this, there are many cases where the number of participants from countries is similar but there are differences in economic power or population size. Even though there are similarities in economic standing and population, depending on the sports policies adopted and implemented by the countries as well as the attitude toward the Asian Games, the number of participants can be quite different. Accordingly, this study will indirectly use sports policy to measure the number of athletes a country sends to the Asian Games along with other indicators such as economic power and population.

In competition, economic power, population, and number of athletes are important factors that influence the success of a nation in the games. In future Asian Games, along with practical factors such as policy implementation and economic variables, it is in the interest of this study to examine a variety of different factors.

Conceptual Framework

A conceptual framework is used in research to outline possible courses of action or to present a desired approach to a system analysis project. This framework is constructed from a set of concepts linked to a planned or existing system of methods, behaviors, functions, relationships, and objects. A conceptual framework might, in computing terms



Research Methods

1. Participants

Data for the study was obtained from the 2014 GDP, population, and athletes of 36 countries that competed in the 2014 Asian Games, of these variables, the number of medals won and the number of participating athletes was found on the official website (Olympic Council of Asia. 2017) and population size and GDP were found on information above. As for the dependent variable, which is the 2014 Asian Games, the number of medals won was based on the bronze medal, meaning that gold and silver medals carried three times and two times more weight, respectively. There are many different debates revolving around the importance and value of medals (Bernard & Busse. 2004; Lee. 2010) but this study shall define the value of one gold medal equivalent o the value of three bronze medals. It is possible to conduct the study of only gold medal-winning countries or of the total number of medals won, but previous studies show that it is significant to distinguish between bronze, silver, and gold medals.

2. Data Analysis

In order to measure the impact that GDP has on the number of athletes in a country and the impact that these three variables have on a country's performance in the Asian Games, this study used both correlation analysis and regression analysis, upon which path analysis was conducted.

3. Data Handling

The collected data was analyzed using the SPSS 17.0 version for Windows and AMOS program. The specific methods used were correlation analysis, regression analysis, and path analysis. The significant level of statistics handling was set at .05, .01, and .001

4. Properties of Variables

The basic properties of each variable are as shown in Table 1. Because all could be shown, countries are listed based on the significance of medals won. The equivalent ranking of medal significance is three gold medals, two silver medals, and one bronze medal.

Table 1: Basic properties of variables

Rank	Country	Number of athletes	Medals won	Population	GDP (Millions of USD)
1	China	960	416	1,347,350,000	7,298,147
2	South Korea	788	232	50,004,441	1,116,247
3	Japan	726	216	126,659,683	5,866,540
4	Iran	362	59	75,149,669	482,433
5	Kazakhstan	365	79	16,815,000	186,199
6	India	626	64	1,210,193,422	1,826,811
7	Chinese Taipei	399	67	23,268,372	466,424
8	Uzbekistan	220	56	29,123,400	45,353
9	Thailand	593	52	65,479,453	345,672
10	Malaysia	325	41	29,537,000	287,943
11	Hong Kong	401	40	7,103,700	243,666
12	North Korea	188	36	24,554,000	40,000
13	Saudi Arabia	164	13	28,376,355	597,086
14	Bahrain	82	9	1,234,571	25,866
15	Indonesia	216	26	237,641,326	846,450
16	Singapore	240	17	5,183,700	259,849
17	Kuwait	184	11	3,582,054	160,984
18	Qatar	250	15	1,951,591	104,300
19	Philippines	188	16	92,337,852	224,771
20	Pakistan	169	8	181,128,000	210,216
21	Mongolia	219	16	2,736,800	8,709
22	Myanmar	69	10	48,724,000	51,444
23	Jordan	86	6	6,365,800	28,881
24	Vietnam	260	33	87,840,000	122,722
25	Kyrgyzstan	135	5	5,477,600	5,920
26	Macau	168	6	568,700	31,271
27	Bangladesh	150	3	152,518,015	113,855
28	Tajikistan	67	4	7,800,000	6,523
29	Syria	44	2	21,819,000	5,040
30	United Arab Emirates	84	5	8,264,070	341,958
31	Afghanistan	66	3	25,500,100	18,315

Table 1: (cont.)

Rank	Country	Number of athletes	Medals won	Population	GDP (Millions of USD)
32	Iraq	42	3	33,330,000	115,400
33	Lebanon	49	3	4,292,000	39,039
34	Laos	53	2	6,465,800	8,302
35	Nepal	140	1	26,620,809	18,977
36	Oman	52	1	2,773,479	72,680

Sources: Olympic Council of Asia. (2017)

Because geographical matters are not at the center of this study, it cannot be compared to the studies of Oh (1996) who studied the impact of geographical circumstance on the number of medals won. However, when looking at the data collected in this study, we can see that there is a correlation between a country's economic standing, population, and the number of medals it is able to secure. If data from Oh (1996) on variables such as language, religion, and nationality along with climate were referenced in this study, it may be possible to find more detailed results.

According to the Ministry of Youth & Physical Education (1992), when countries have similar level of economic power, socialist countries fare better than capitalist ones. Because socialist regimes have crumbled today and it is difficult to define whether a country's economic system is clearly socialist or capitalist, this study uses socialist systems as the number of participating athletes and cannot be directly compared with the results of the Ministry of Youth & Physical Education (1992). However, an indirect comparison shows that while the variables are different, when we conclude that the sports policies and number of athletes reflect the sports spirit and culture of a country there is a close relation to the number of medals secured.

Results

1. Analysis of variable relations

Table 2 shows the relation between the GDP, population, athletes and medals won in 36 countries. The purpose of this study is to research channels that lead to attaining more medals, but when we take a look at the variables, there is a slight but positive relationship between the medals won (.154), population and number of athletes (.144), and population and GDP (.143). Statistically speaking, there is low relevance. The relevance between GDP and medals won is .601, which is meaningful statistically by .01. This shows similar results to previous studies in that it shows that

economics do influence the number of medals won (Deviney & Crowley. 1978; Bernard & Busse. 2004), but show different results from Lee (2010). This disparity can be explained by the fact that this study examines the 2010 Asian Games while Lee (2010) studied the 2008 Beijing Summer Olympics. While almost all countries around the world compete in the summer Olympics, the 2010 Asian Games usually is an event that more developed countries competes in. The correlation between GDP and number of athletes is .562 which is similar in relevance to the number of medals, and is statistically meaningful by .001.

The correlation between participating athletes and the number of medals won is .854 which is higher than the relationship between other variables. This can be understood that countries that send more athletes to compete in theAsian Games tend to win more medals. Upon compiling the data, in the case of the 2010 Asian Games, the population of a country has little correlation to GDP, the number of participating athletes, and the number of medals won. This is different from the findings of Lee (2010) and his studies of the summer Olympics. This is because of the differences between the 2014 Asian Games mentioned above.

Table 2: Correlation between variables in the path model

Variables	Population	GDP	Number of athletes	Number of medals
Population	-			
GDP	.143	-		
Number of athletes	.144	.562***	-	
Number of medals	.154	.601***	.854***	-

Source: Author (2017)

2. Regression Analysis of Variables

Table 3 depicts a regression analysis of the results of two dependent variables the number of athletes and the number of medals won. The purpose of this paper is path analysis and therefore will use only a standardized regression coefficient because it shows more relative influence than a nonstandard regression coefficient. When we look at the first standard regression coefficient for the dependent variable, number of participating athletes, the GDP is .553 which is positive by .001, and the population size, which is 0.65, is not. The impact that GDP has on the number of athletes participating is larger than the population size. The coefficient determination in this model is .303, which means that GDP and population account for 30.3 percent of the number of competing athletes, bringing F to 18.1.

Second, focus on the standard regression coefficient of another dependent variable, the number of medals won. The population comes to .021, which means little, and the GDP is .175, which has .05 in meaning, and the number of participants is .753, which has the largest influence of all the variables. The coefficient determination of this model is .741, and population, GDP, and the number of athletes account for 75.3 percent of the number of medals won. We can observe that the parameter of participating athletes is much more influential than GDP and population. When we put F as the relevance that such analysis has, we can say that it comes to 76.5, which is significant by .001.

Table 3: Regression analysis on the number of competing athletes and medals (Standard regression coefficient)

Variables	Athletes	Medals
Population	.065	.021
GDP	$.553^{***}$	$.175^{*}$
Athletes	-	$.753^{***}$
	Adj.R^2=.303 F=18.1***	Adj.R^2=.741 F=76.5***

Source: Author (2017)

3. Path Analysis of Variables

In the case of a one-way model rather than a two-way model, the regression coefficient is simply the beta number, and the leftover path coefficient is the square root of the coefficient determination subtracted from one. The path regression of this analysis is shown in Figure 2. The path regression is standardized, so there is a causal relation in the standard deviation. Also, because all path coefficients are standardized, the direct effect of variables is relatively simple as it is in many regression analyses

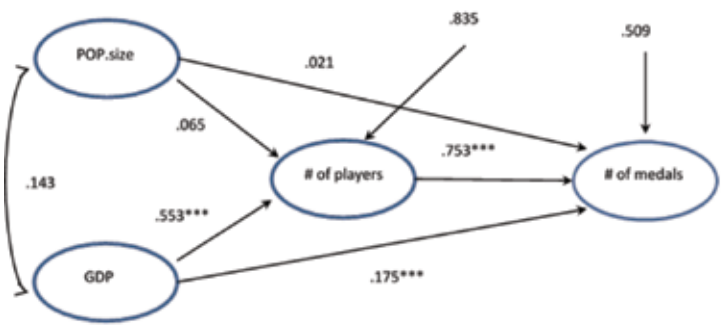


Figure 2: Results of Path Analysis

Results

1. Population and the number of medals won

If we look at Figure 2, the direct causal impact that population and GDP have on the number of medals won is .143, which is small. This means that countries that have large populations do not necessarily have high GDPs. The impact that population size has on the number of medals won is .021, which is not statistically significant, and this is different from findings in earlier studies. According to the findings of Lee (2010) who studied the summer Olympics, the population of a country as a large impact on the number of medals won. We must consider that 2014 Asian Games require various equipment and facilities, which means that the population size does not have a great influence on the number of medals won.

The impact that the population has on the number of competing athletes is .065, which is statistically insignificant. What we can tell in this model is that the population has almost no impact on the number of medals won and that population also has almost no effect on the number of athletes that compete in the 2010 Asian Games. On the other hand, the number of athletes competing has more of an impact on the number of medals won than any other variable (.753) which is considered significant by .001. More than a country's population, the number of athletes has more influence on the number of medals won.

The path model allows one to find not only the direct effect but also the indirect effect by multiplying the numbers of all channels connecting the two variables though parameters. The direct effect that population size has on the number of medals won is .021, as mentioned above. The indirect effect that population has on the number of medals won through the number of participating athletes is 0.49 (=.065 x .753) and leans toward the same direction has the direct effect (.021), but the indirect effect as shown in the model in about 2.3 (=.049 /.021) larger than the direct effect. The total of the direct and indirect effect that population has on the number of medals won is .070 (=.021 + .049). If we compile this, the causal effect that population has on the number of medals won is .070, which is small. This shows different results from that of Lee (2010), who stated that the total effect of population on participating athletes as well as population on the number of medals won was big. This is because of the different sporting events in Olympic Games as well as each country's ability to participate and the conditions they participate in.

2. Economic power and medals

The direct effect that GDP has on the number of medals won is .175, which is statistically significant. This shows different results from the findings of Lee (2010), who stated that there was no correlation between GNP per capita and the number of medals won and needs further examination. The impact that GDP has on the number of competing athletes came out to .553 which is considered to be statistically significant by .001. The indirect effect that GDP has on the number of medals won through the number of participating athletes is .416 (= .553 x .753) and leans to the same direction as the direct effect. Through the model, we can observe that the indirect effect is about 2.4 (=.416 /.174) times bigger than the direct effect. The sum of the direct and indirect effects that GDP, which represents a country's economic power, has on the number of medals won is .591 (=.175+.416). Therefore, we can see that the total causal effect that GDP has on medals won is .591, which is quite big. When looking at the economic power has more of an impact than population by approximately 8.4 (=.591/.070) times.

GDP has a strong static relationship to the number of participating athletes and the number of medals won, and this is slightly different from the direct effect that is the result of the study by Lee (2010) but similar to the findings of Deviney & Crowley (1978). This difference can be attributed to that fact that Deviney & Crowley (1978) conducted their study on the number of gold medals won only while this study includes silver and bronze medals and converts the medals into the weight of its significance, distinguishing between medals. It is different from the findings of Lee (2010) because of the differences from Olympic Games. It is possible to have further studies done on this, but for now, we can attribute this to the difference between the games. Jung (1998) conducted a study distinguishing between types of sporting games and sporting events, but this study does not, making it difficult to compare the two.

Looking at the 2014 Asian Games, the effect that population size has on the number of medals won can be seen as quite small and static. This shows different results from earlier studies, which state that population size and the number of participating athletes as well as the population and the number of medals won have a strong correlation. This is due to the difference in sporting events as well as the ability to participate of the countries and the conditions they participate in.

Many scholars (McIntosh. 1963; Novikov & Maximenko. 1972; Ball. 1972; Grimes et al, 1974; Deviney & Crowley. 1978; Dryzek. 1978; Bernard & Busse. 2004; Lee. 2010) have attempted to draw correlations between a nation's economic competitiveness and their performance in the Asian Games and have shown positive relationships between such variables. In this study, too, it is possible to see that a nation's economic

power has an influence on the number of athletes that participate in the Olympics and the number of medals it secures. Lee (2010) states that the population of a country is more influential than the GNP per capita. However, in the case of the winter games, population has almost no effect on the number of athletes that compete in the games nor the number of medals won, so further studies on the difference Asian games is needed.

The leftover path coefficient is the square root of the coefficient determination subtracted from one. The leftover path coefficient explains how much of the dependent variable cannot be explained by the assumed causal relationship (Jang & Dong. 1991). There are two leftover path coefficients here, the first being .835 (= 1 – Square Root of Correlation Coefficient (.303)) and the second being .509 (= 1- Square Root of Correlation Coefficient (.741)). The first number is quite high, and it means that 83.5 of the participating athlete factor cannot be explained. The second number is relatively low, and it means that 50.9 percent of the factor concerning the number of medals won cannot be explained. Therefore, it means that 49.1 percent of the number of the medals won can be explained by this model. Overall, we can conclude that this model is quite accurate.

Conclusions

This study, which looked at the 2014 Asian Games, came up with five research questions to draw correlations between a nation's economic power, population size, number of participating athletes, and their performance in the Asian Games. The findings are as follows.

First, the effect that population has on the number of medals won is .021, which is static and not very significant.

Second, the effect that population size has on performance through the number of athletes participating is .49, which is static, but 2.3 times bigger than the direct effect. The total of the direct effect (.021) and the indirect effect (.049) that population has on the number of medals won is .070, which is quite small.

Third, the direct effect that GDP has on the number of medals won is .175, which is static and statistically meaningful by .05. Fourth, the indirect effect that GDP has on the number of medals won through the number of participating athletes is .416, which is static and leans toward the same direction as the direct effect, and is 2.4 times bigger than the direct effect assumed in the model. The total causal effect that GDP has on the number of medals won is the sum of the direct effect (.175) and the indirect effect (.416), which is .591. This is about 8.5 times bigger than the total effect

that population has. It shows that in the Olympics, economic power is about 8.5 times more influential than the population factor.

Fifth, the number of athletes competing has .753 of an impact on the number of medals won. In other words, this is the most influential factor on the number of medals won. According to the study, economic factors are more influential than population factors in determining the number of athletes that compete in the games from each country. Finally, the model concludes that this number comes to 49.1, which is relatively big.

Recommendations

Considering that most earlier studies centered around economic factors and sports performance, this study goes one step further to analyze population, the number of participating athletes, and the 2014 Asian Games as variables. It is true that in the Asian Games, economic factors and population factors play a big role, but rather than concluding that it is one over the other, it is a combination of both that influence a country's performance. For instance, it is helpful to examine factors such as a country's international standing, system, national budget, participation in sports, level of policy, and climate in the winter games. Especially in the case of the winter games, it is more imperative to consider sports policies and sports culture.

This study looks at only the 2014 Asian Games and no other Asian Games. It would be interesting to also examine the World Cup games and other international sporting games. It also does look at the different climates within the competing countries, and it may be necessary to closely examine such factors in future studies.

Acknowledgement

The author would like to thank the anonymous referees for their helpful and invaluable comments which helped to improve the presentation of the paper considerably

References

Ball, D. W. (1972). Olympic Games competition: Structural correlates of national success. International **Journal of Coparative Sociology,** 13, 186-200.

Bernard, Andrew & Busse, Meghan. (2004). Who Wins the Olympic Games: Economic Resources and Medal Totals. **Review of Economics and Statistics,** 86(1), 413-417.

Deviney, S., & Crowley, J. (1978). Universality of modernization. **Studies in International Comparative Development,** 13, 23-29.

Dryzek, J. (1978). Politics, economics and inequality: A cross-national analysis. **European Journal of Political Research,** 6, 399-410.

Grimes, A. R., Kelly, W., & Ribin, A. (1974). A socioeconomic model of national Olympic performance. **Social Science Quarterly,** 55, 777-783.

Jang, Sang Hee and Dong Sik Hong (1991). **Social Statistics.** Seoul: Pak Young Sa Press.

Jung, Il Bum (1998). **"A Fact-Revealing Analysis about the Number of Olympic Gold Medals by Economic Levels.** MA Thesis, Kookmin University.

Kim, Min Kyung (2000). Understanding of Population Census. Seoul: **Global Press.**

Lee, Jang Young (2010). "Correlations between National Competitiveness and Achieved Olympic Medals: Based on Beijing Olympic Games," **Korean Society of Sport and Leisure Studies,** 42: 107-115.

Lee, Sae Ki (1984). Olympic and National Development. Seoul: **Jun Sung Sa Press.**

Novikov, A., & Maximenko, A. (1972) The infleunce of selected socio-economic factors on the level of sports achievement in various countries. **International journal of Sport Sociology,** 7, 22-44.

McIntosh, P. C. (1963). **Sport, Politics and Internationalism.** In M. Hart(Ed.), Sport in the sociological process. Dubuque, IA: William C. Brown.

Oh, Young Do (1996). **"A Comparative Study of Cultural and Geographical Characteristics and Types of Sports".** Ph.D Dissertation, Kookmin University.

Olympic Council of Asia. (2017) **List of countries by Asian Games 2014, Number of athletes, and Medals won** (online) Retrieved March 8, 2017 from website: http://www.ocasia.org/

The Ministry of Youth And Physical Education (1992). **Sports for All of the Various Countries and Modern Society.** Ministry of Youth & Physical Education.

The World Bank. (2017) **List of countries by Population, and GDP** (online) Retrieved March 8, 2017 from website: http://databank.worldbank.org

Yu, Jong Woo (1984). **OLYMPIC Sports.** Seoul: Il Shin Press.