



Development of national tennis player value chain structure: Statistical analysis of tennis player pathway

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ABSTRACT

Creating a system of tennis player development to establish and sustain a nation's competitive performance is a problem faced by many countries. This research attempts to implement the value chain structure of tennis player development and the tennis player pathway developed by Cakravastia and Setiawan (2022). This paper develops a partial least squares model by analysing the data of 41 countries from the ITF Global Report (2021). The results of this study identify number of certified tennis coaches and number of tennis courts in a country have significant effect on the number of total tennis players in that country. Subsequently, this study confirmed there is a significant relationship between the total number of tennis players, the total number of junior players, the total number of pro players, and the total number of players representing a country in the grand slam main draw.

Key words: Value chain, national performance, statistical analysis, tennis player pathway.

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INTRODUCTION

To sustain a nation' competitive performance at the global level, efforts have been made in many countries to create a structure for tennis player development from junior to professional players (Gerdin et al., 2020). Each country may have a different strategy to develop and sustain its tennis performance. Different stakeholder groups, relationships between stakeholders, and the structure of the overall system may create varying results for nation-wide performance in tennis.

This challenging problem attracts researchers to study the structure of the national tennis development system from various perspectives. The identification of stakeholders for elite athlete development in tennis has been conducted by Brouwers et al. (2015b). From the angle of country macro policy, Crespo et al. (2022) explain the programme of the Spanish tennis federation. Brouwers et al. (2015) explain country policies and identify factors supporting national tennis performance at the international level. Cakravastia and Setiawan (2022) proposed a value chain structure of stakeholders and a pathway from grass-roots tennis player to professional athlete. In this value chain structure, key stakeholders are the family, education sector, tennis club, national and local government, national tennis federation, international tennis federation, and private and professional sectors. Interaction and collaboration between stakeholders are required to develop a path to international-level performance.

Focusing on the journey of athlete performance, Kovacs et al. (2015) provide an analysis of the milestone ranking of the top 100 ATP athletes. Brouwers et al. (2012) analyse indicators of junior performance to predict the success of future athletes tennis careers. Reid (2007) emphasises the importance of competition structure for national performance in women's tennis.

ITF (2021) published a global tennis report by providing participation and performance data for their country members. This paper is positioned as the subsequent research of Cakravastia and Setiawan (2022). This paper utilises ITF Global Tennis Report data to find important variables and relationships among variables for developing tennis grass-roots players and to find a path from the pool of talent of tennis players into global tennis performance.

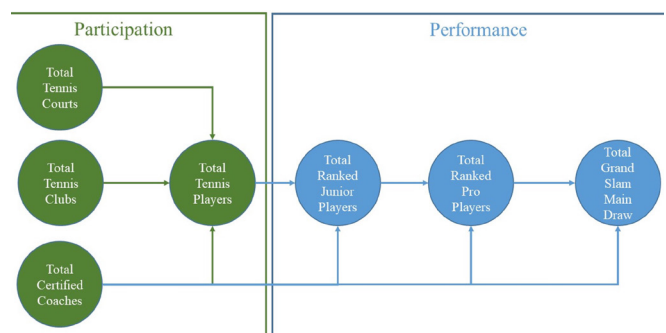


Figure 1. Proposed Model.

PROPOSED MODEL

This research attempts to find variables and interaction among variables of value chain structure of tennis player development and the tennis player pathway developed by Cakravastia and Setiawan (2022). Considering the availability of the data, Figure 1 depicts the model proposed in this paper.

Data for this research was extracted from the ITF Global Tennis Report (2021). The data in this report is divided into two categories: (i) participation data and (ii) performance data. Participation data includes: tennis players (number of players, percentage of population that plays tennis, and player gender balance); access to tennis (total clubs, number of clubs per 1000 populations, and total courts); and tennis delivery (number of certified coaches, number of certified coaches per 1000 players, and certified coach gender balance). The elements of performance data include: ranked players (number of ranked junior and professional players, number of professional players ranked in the top 250, and number of professional players ranked in the top 100), grand slam representation (numbers of main draw and qualifying drawing representation for junior and professional players), and professional players in the top 50 classified by age.

Considering the availability of the data, this paper uses the number of tennis courts, the number of tennis clubs, and the number of tennis coaches as variables related to the development of grass-roots tennis players in a country. Following the tennis player pathway proposed by Cakravastia and Setiawan (2022), this research is using the number of tennis players, followed by the number of ranked juniors, the number of ranked professionals, and the number of Grand Slam main draw representatives, as the path of a tennis player's career. To develop the career of a tennis player from grass-roots player to professional player, the number of certified coaches is considered to have a relationship with the number of ranked juniors, the number of ranked pros, and the number of country Grand Slam main draw representatives.

DATA COLLECTION AND ANALYSIS

The ITF Global Report (2021) shows 41 countries with complete participation data. This paper uses all of these 41 countries in its research. Following the proposed model in Figure 1, this paper considers total tennis courts, total tennis clubs, and total tennis coaches as variables relevant for the development of total tennis players in a country. Following the pathway of tennis players developed by Cakravastia and Setiawan (2022), total tennis players, total ranked junior tennis players, total ranked professional players, and total included in the analysis will be the total number of rated juniors, the total number of ranked professionals, and the Grand Slam main draw representation. To deal with the different magnitudes

of the data, player data will be presented in millionths, court data in thousands, and coach data in thousands. This paper use the latest participation of 2018 and the performance data of 2019. The latest performance data is 2020, however the pandemic in 2020 limit the opportunity for tennis players to travel and compete.

A path analysis is applied to show direct and indirect effects between variables as proposed by model in Figure 1. To perform the analysis, this research is using MPlus statistical software. Table 1 indicates that there is multicollinearity between the number of tennis courts and the number of clubs. Availability of tennis courts and coaches are the core element of tennis club. Therefore, in this paper we apply these two variables.

In Table 2, the number of tennis courts and the number of coaches are significantly related to the number of tennis players. Further, there is a relationship between the number of players, the number of ranked juniors, the number of ranked professionals, and the number of tennis players who represent a country in the Grand Slam main draw. The data reveals that the number of coaches in a country has a direct effect on the total number of junior players and the total number of professional players.

From the indirect effect in Table 3 and Table 4, the number of coaches shows an indirect effect with the total players who represent a country in the Grand Slam main draw. Therefore, it can be interpreted that coaches increase the number of ranked professionals, which in turn increases the number of Grand Slam main draw representation.

Based on the result above, number of tennis courts and number of certified coaches have significant role in determining the number of tennis players in a country. Number of tennis courts that can be accessed is the basic requirement to develop pool of tennis players. Some countries build number of public tennis courts, so players at any level can have access to play and practice tennis. Competitive player need to have experience to play in different surfaces and it need to be provided.

Number of certified coaches is important to increase number of ranked player in both junior and professional level in a country. Further, it is potentially increase number representative of the country in grand slam main draw. Therefore, the coach education program in every country is very important, not only to ensure higher participation retention, also to increase the number of high-quality players that can compete in international level. In a tennis-growing country, National Association need to have a coach education structure, managers, and tutors to produce sufficient number of quality coaches for all level of players. A system that includes certification and Continuing Professional Development (CPD) would be the ideal one.

Table 1
Multi collinearity.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(constant)	125.063	531.367		.235	.815		
1 Total Tennis Clubs	-.687	.183	-1.188	-3.761	.001	.069	14.456
Total Certified Coaches	.128	.123	.112	1.036	.307	.589	1.699
Total Tennis Courts	.266	.048	1.862	5.526	.000	.061	16.455

Table 2
Direct Effect.

Dependent Variable	Independent Variable(s)	Estimate	Standard Error	Est. Std Error	Two-tailed p-value
Total Tennis Players	Total Tennis Courts	0.094	0.017	5.606	0.000*
	Total Certified Coaches	0.240	0.133	1.789	0.072
Total Ranked Junior Players	Total Tennis Players	0.012	0.003	3.848	0.000*
	Total Certified Coaches	0.007	0.004	1.997	0.046*
Total Ranked	Total Ranked Junior Players	0.473	0.051	9.191	0.000*
	Professional Players	0.007	0.001	4.850	0.000*
Total Grand Slam Main Draw Representative	Total Ranked Pro Players	0.097	0.010	9.753	0.000*
	Total Certified Coaches	0.000	0.000	0.689	0.491

*significant variable.

Table 3
Total and Indirect Effect.

Effects from Total Coaches to Total Grand Slam Representative	Estimate	Standard Error	Est. Std Error	Two-tailed p-value
Total	0.001	0.000	5.271	0.000
Total Indirect	0.001	0.000	4.847	0.000

Table 4
Specific Indirect Effect.

Specific Indirect	Estimate	Standard Error	Est. Std Error	Two-tailed p-value
Total Main Draw Grand Slam Representative	0.001	0.000	4.343	0.000
Total Ranked Professional Players				
Total Certified Coaches				
Total Main Draw Grand Slam Representative	0.000	0.000	1.914	0.056
Total Ranked Professional Players				
Total Ranked Junior Players				
Total Certified Coaches	0.000	0.000	1.582	0.114
Total Main Draw Grand Slam Representative				
Total Ranked Professional Players				
Total Ranked Junior Players				
Total Tennis Players				
Total Certified Coaches				

CONCLUDING REMARKS

This research attempts to find variables and interaction among variables of value chain structure of tennis player development and the tennis player pathway developed by Cakravastia and Setiawan (2022). This paper identifies the number of tennis courts and the number of coaches as significant variables in determining the number of tennis players in a country. These two variables are important for creating the grass roots of a tennis player. Further investigation is required to find other variables to attract people to playing tennis. The number of tennis players, as a pool of talent, is significantly correlated with the number of ranked junior pros. This research shows that there is a path between the number of tennis players, the number of ranked juniors, the number of ranked professional tennis players, and the number of players in the Grand Slam main draw of a country. Therefore, this research confirms the model of the pathway of a tennis player proposed by Cakravastia and Setiawan (2022).

Further research can be directed towards considering the number of junior and professional tournaments in a country in the model. The resources of the family and the roles of the government and private sectors are interesting to be investigated in the model.

CONFLICT OF INTEREST AND FUNDING

The author declares that he has no conflict of interest and that he did not receive any funding to carry out the research.

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