

## **Research on the Issuance and Distribution Model of Sports Lottery in Taiwan from a Systems Thinking Perspective**

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### **Abstract**

The sports lottery in Taiwan is different from other countries around the world as it has a special distribution system for the sports lottery and the stakeholders, including the government, the operator, retailers, and players. In addition to the overall planning and policy promotion by the government, the sports lottery in Taiwan has complex and dynamic characteristics as it also requires the professional management of the operator and professional sales of the retailers. Therefore, it is necessary to think from a holistic view, to better understand the problems from an overall perspective and then proceed to propose suitable policies. However, there is not much research focusing on the issuance and distribution model of sports lottery in Taiwan from systems thinking perspective, and thus this research adopts the methodology of system dynamics and builds a qualitative analysis model for the issuance and distribution of sports lottery in Taiwan. This research interprets causality and interactive relationships among the factors for the issuance and distribution model of sports lottery in Taiwan, from the perspectives of four stakeholders such as the government, the operator, retailers, and players. This research also proposes suggestions for improving the system structure and it can be used as a stipulation reference for policy-makers.

**Keywords:** Sports lottery, Stakeholders, System dynamics, Systems thinking.

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## 1. Introduction

Sports lottery is usually issued by government authorities or authorized agency and it is a lottery based on the outcome of sports events. People who bet on the sports lottery must thoroughly understand the sports and have confidence in the prediction of the outcome of a game in order to win lottery prizes. Many countries around the world issue sports lottery to raise funds to facilitate the development of the sports industry. Taiwan started to issue sports lottery in 2008 and the profits of sports lottery are dedicated to the government's earmark fund for sports development. In 2018, the total turnover of sports lottery in Taiwan reached US\$1,424 million (ranked 6th worldwide). The Taiwan sports lottery has a special distribution system, compared with the other countries in the world. The government serves as the competent authority to stipulate relevant laws and regulations and select the operator; the selected the operator issues the Taiwan sports lottery and signs contracts with the retailers; the regional retailers are responsible for selling sports lottery tickets to players, and a certain proportion of the number of players' bets will be used as sports development earmark fund by the government.

The issuance and distribution model of sports lottery in Taiwan involve stakeholders such as the government, the operator, retailers and players, and thus the encountered issues include the stakeholders pursue their own interests, the operator pursue economies of scale, retailers lack expertise and problem gambling. These interactive relationships are worth further study and they are described respectively as follows:

### (1) The stakeholders pursue their own interests

The total turnover to sports lottery in Taiwan will be distributed to the government, the operator, retailers, and players in proportion, including 78% of the sales amount will be paid to players as winning prizes, 12% will be the remuneration and commission for the operator and retailers and 10% will be used as sports funds for the government. All stakeholders hope to obtain a higher distribution ratio. For example, players desire to have a higher ratio for winning prizes and a low winning prizes ratio will reduce the sports lottery attraction. The operator and retailers share 12% of the total sales amount. The retailers hope to increase the commission ratio, but the increasing of the sale's commission ratio for retailers will result in the decreasing of earnings to operator ratio; similarly, increasing the earnings to operator ratio will result in decreasing the sales's commission ratio for retailers, which will affect the retailers' sales motivation; moreover, the government also hope to increase the sports development earmark fund by increasing the profit ratio of lottery issuance. How to distribute the sales amount and balance the interests and profits of the four stakeholders are subjects that need to be discussed.

### (2) The operator pursue economies of scale

The number of retailers is mainly determined according to the demands of the market by the operator. As of now, there are about 1,500 retailers in Taiwan. The operator expects that retailers to be distributed in all regions to increase the access to betting sports lottery and hence increase the amount of sales. However, too many retailers will result in the reduction of the commission for the existing retailers

which will affect their motivation for business operations and even cause them to operate illegal betting. On the other hand, an insufficient number of retailers will decrease the access to betting sports lottery and hence affect the number of sales.

### (3) Retailers lack expertise

It is necessarily having a certain understanding of the sports games in order to interact with players and facilitate the sales of sports lottery. Therefore, a certain degree of understanding of the sports and analysis expertise is required for selling the sports lottery tickets. However, the retailers in Taiwan generally do not have sports expertise and the operator does not provide sufficient demand for job training, which cannot significantly enhance the professional capability of retailers and affect the overall sales amount of sports lottery.

### (4) Problem gambling

The issue of problem gambling is getting more serious as more and more countries have legalized gaming. Problem gambling refers to gambling behavior that has an impact on people's lives, including family life and work. The issuance of the sports lottery will inevitably lead to the issue of problem gambling. The countries that have developed the gambling industry in the world focus on the prevention of problem gambling and they hope to minimize the social costs caused by problem gambling. Although the Taiwanese government has stipulated relevant regulations for responsible gambling, and the operator also adopts the seven principles and ten factors for responsible gambling by the World Lottery Association, to implement related measures regarding responsible gambling, the circumstances of violation to responsible gambling by retailers or players with problem gambling still exist. If the stakeholders fail to value the importance of the impact of problem gambling, the social cost of the gambling industry will increase and result in the public's negative impression on the sports lottery, which will affect the issuance of the sports lottery. Many factors are required to be considered for the issuance and distribution of sports lottery in Taiwan as different factors have an effect on each other, causality with each other and are interrelated. The stakeholders include the government, the operator, retailers and players, and the interactive relation between each other is dynamic and complex. Therefore, it is necessary to think from a holistic view, to better understand the problems from an overall perspective and then proceed to propose suitable policies. For the review of existing researches, most of the sports lottery-related researches mainly focus on the players' bet behavior (H. Li et al., 2012; Shu-zhuang, 2007; K. ZHOU & ZHOU, 2004), sales performance of retailers, and the software and hardware services for sports lottery (Farrell, Morgenroth, & Walker, 1999; Gilmore & Collucci, 2009; Jawaharlal et al., 2003), and there is not much research focusing on both the issuance and distribution of sports lottery. Therefore, this research adopts the methodology of system dynamics and builds a qualitative analysis model for the issuance and distribution model of the Taiwan sports lottery. This research interprets causality and interactive relation among the factors for the issuance and distribution of the Taiwan sports lottery, from the perspectives of four stakeholders such as the government, the operator, retailers, and players; this research also proposes suggestions for improving the system

structure and it can be used as a stipulation reference for policy-makers.


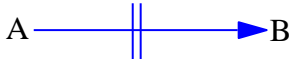
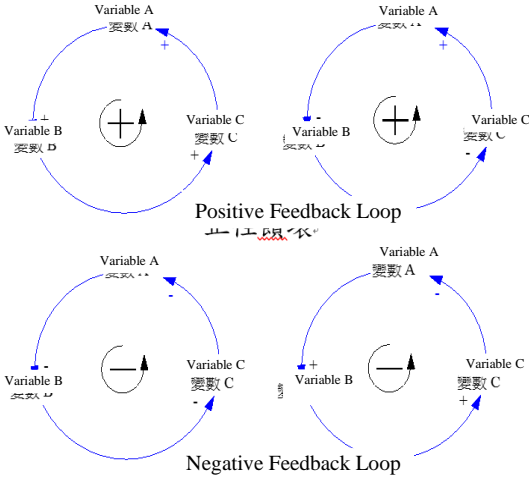
This paper will introduce the systems thinking of system dynamics in Section 2; discuss the related research papers of sports lottery in Section 3; build a qualitative analysis model with systems thinking in Section 4, to interpret the key factors and causal interaction for each of the stakeholders that affect the issuance and distribution of the Taiwan sports lottery and build a model for the issuance and distribution system of the Taiwan sports lottery; discuss the management significance of the analytical model and propose suggestions for improving the system structure in Section 5; and at last, conclusions and recommendations of the research are stated in Section 6.

## 2. System dynamics

System dynamics is a management science methodology developed in 1956, by Jay W. Forrester who was a professor at the Massachusetts Institute of Technology. Jay W Forrester (1961) believes that system dynamics utilizes models to improve the organizational structure and assists policy stipulation by understanding the internal information feedback of the system. System dynamics is a teleology oriented-research approach that emphasizes the system integration and feedback model building. It is a methodology that is suitable for the interpretation of system with complex and dynamic causality(Jay W. Forrester, 2007). System dynamics has been applied in the field of social science over the past few years and it is widely applied in various aspects such as organizational strategy, industrial economy, and policy development (J. H. Chen & Jan, 2005a, 2005b; C.-T. Hsiao, Chang, Chen, & Huang, 2011; C.-T. Hsiao & Liu, 2012; Jan & Hsiao, 2004; John, 2000; D.-Y. Liu, Fang, & Liu, 2016; P. Senge, 1990; Sterman, 1988; Trappey, Trappey, Hsiao, Ou, & Chang, 2012) which indicates that system dynamics is suitable for analyzing the overall dynamic and complex issues.

Systems thinking has the ability to assist researchers in finding effective strategy to solve problems in complex system (C. T. Hsiao, 2014; P. M. Senge & Forrester, 1980). For the time delay and dynamic complexity problems, system dynamics is able to provide a systematic thinking of overall perspective, qualitatively describe complex problems and interpret the causal structure of variables, through the analysis process of internal information feedback of the system (C. T. Hsiao, 2014). To describe the characteristics of the system and dynamic development, the causal feedback loop with the modeling structure of visualization is able to understand the entire structural characteristics of the system (M.-C. Chen, Ho, & Jan, 2006), as shown in Table 1. On the basis of the research objectives and literatures, the interviews with experts were conducted for the qualitative model building with causality; at the same time, the key factors and the causality among the factors in the literatures were summarized. Ensure the validity of model through the inspections by experts(G. Coyle, 1998; R. G. Coyle, 1997; Doyle & Ford, 1998; A. Ford, 1997; C. T. Hsiao, 2014).

**Table 1: Symbols of the components in system dynamics**

Name	Symbol	Definition and description
Causal		<p>The causality is represented by the arrow among the variables; a "+" sign is represented if the variables are in positive variation; a "-" sign is represented if they are in reverse variation.</p>
Time Delay		<p>It indicates that variable B is affected in a certain period of time after the occurrence of variable A.</p>
Causal Feedback Loop		<ol style="list-style-type: none"> <li>1. A closed causal loop is formed as a variable in the system that affects other variables while being affected by other variables at the same time.</li> <li>2. If all of the "+" or "-" signs in the loop are added up to an even number, it is a positive feedback loop which indicates that it is a reinforced loop (usually referred to as the snowball effect)</li> <li>3. If all of the "-" signs in the loop are added up to an odd number, it is a negative feedback loop which is called a balancing or stable loop.</li> </ol>

In view of the fact that the issuance of the Taiwan sports lottery and its distribution model is a complex system collaboratively developed by relevant variables including the government, the operator, retailers and players, and the dynamic causal feedback relationship among the multiple variables. And thus, this research discusses the issuance of the Taiwan sports lottery and the structure and behavior built in the distribution model, through a dynamic model of the system. The procedures of model building in this research are as follows:

1. Definition of research problems

Dangerfield (2008) believes that the foundation of model building in system dynamics is the definition of the model objectives, which is the alleged definition of problems. In general, the clearer the objective is defined, the

clearer the problem required to be resolved, and thus the suitable scope and boundary of the dynamic model in the system can be developed (M.-C. Chen et al., 2006; John, 2000; D.-Y. Liu et al., 2016). On the basis of the research objectives, this research uses the Taiwan sports lottery as the research case study, to analyze the characteristics of the problem and determine the boundary of the system. The research scope is defined as "discussing the issuance and distribution model of the Taiwan sports lottery from systems thinking perspective."

## 2. Identification of key factors

Comprehensively understand the influencing factors for the current status and other related problems in the system, in-depth observe the system behavior, interpret the characteristics such as mutual causality and information feedback among the factors, and verify the composition of key variables in the system model of the problem (M.-C. Chen et al., 2006; R. G. Coyle, 1997). This procedure usually requires an experienced system integrator to cooperate with members who have a good understanding on the problem, to discuss the observed system behavior or circumstance for the foundation of subsequent model building (D.-Y. Liu et al., 2016). This research discusses the complexity of issuing sports lottery through a literature review of related researches on sports lottery and it can be used as a reference for model building. With the classification, induction, and analysis of literature, as well as conducting interviews and discussions with academic researchers and experts, it is expected to determine the issuance and distribution characteristics of the Taiwan sports lottery and the possible influencing factors.

## 3. Qualitative model building

Build a qualitative model (*i.e.*, a causal loop diagram) based on the aforementioned variables that affect the problem in the system and the interaction among variables; and verify the validity of qualitative model through the discussion with experts in related fields (John, 2000; P. M. Senge & Forrester, 1980). This research invites the Taiwan sports lottery experts to review, discuss and participate in the model building process, to verify the validity of the qualitative model. At last, we use the Vensim DSS version 6.4 software package to draw causal loop diagrams and conceptualize the entire system as an image model, to understand the important variables and interpret the interrelation between the variables.

### **3. Literature review**

Many countries around the world have issued a sports lottery. Sports lottery will not only bring a considerable amount of taxes but also create job opportunities; some countries even establish public welfare funds based on the profits of sports lottery, to facilitate the development of national sports; and then the promotion of beneficial result generated by sports lottery that facilitates the development of the sports would gain the general public's recognition and thus purchase the sports lottery (Garrett, 2004; LingFeng, 2009; Meer, 2011). The way of sports lottery issuance by a government includes direct issuance and sales or authorizing a non-governmental institution for issuance and sales (Smith, 2011). If a non-governmental institution was authorized, the government will regulate the issuance and sales behavior on the contract so that the benefits of short-term sales and long-term development will be both considered (GAN, ZHONG, & XU, 2009). Sports lottery is issued in more than 100 countries around the world, and the total amount of global sales in 2017 was about US\$304,357 million. Taiwan started to issue a sports lottery in 2008, and its sales amount in 2018 reached US\$1,424 million, which was ranked 6th in the world (La Fleur, 2019). The main purpose of issuing the Taiwan sports lottery is to use the profits to facilitate the development of national sports. The government serves as the competent authority for the issuance, and non-governmental institutions propose their business plan for the selection; after a non-governmental institution is selected, the government will sign an issuance contract with the selected non-governmental institution, to authorize the operator to conduct the issuance and sales of the Taiwan sports lottery. The operator then entrusts and signs a contract with retailers, and the retailers sell the sports lottery tickets in various regions. The Taiwan sports lottery only authorized one non-governmental institution to be the operator, and the operator had entrusted about 1,500 retailers to sell the sports lottery tickets in various regions. The total turnover to sports lottery, after deducting the total amount of the winning prizes, the earnings to operator and the retailers' commission, will be the issuance profit of the government (accounts for about 10% of the total sales amount); the profit will be the sports development earmark fund for the government and the fund is dedicated to the development of sports.

The key of attracting players to buy sports lottery includes the players' bet odds and a variety of products and games. Different products and games can attract different players' bet through the purchase of legal sports lottery tickets. New products and new games can attract more players to join betting and increase the sales amount of sports lottery (Chung & Hwang, 2010; Hui & Hai, 2010; Humphreys & Perez, 2012; YANG, CHENG, & ZGAO, 2012; ZANG & GONG, 2009; L.-I. ZHOU, HUANG, & FAN, 2012). The sports betting products offered by the Taiwan sports lottery include more than 10 different kinds of sports products such as baseball, basketball, football, tennis, billiards, volleyball, golf, hockey, boxing, and car racing (majority are overseas sports games). The offered betting games are based on the prediction of game process and outcome. Moreover, new products and games will be offered to attract more players' bet during special sports events such as the Asian Games

and Olympic Games. Furthermore, most of the worldwide sports betting players join the players' bet at a sports lottery ticket shop or via online betting. Therefore, the amount of sales will be affected by the distribution of sports lottery shops and the selling capacity of sales staff; in addition, the way of betting has a tendency to online betting in the past few years, as the players prefer a more access to betting sports lottery (Chiu, Lee, Liu, & Liu, 2012; Dao-hai, 2010; Hua, 2013; Peng & Ge, 2016). However, the gambling issue of sports lottery is involved in various countries, and the issue is more likely to occur in online betting than betting at a sports lottery ticket shop. The government and the operator must carry out good supervision and preventive measures, to prevent the gambling issue and reduce its impact on the society so that the development of sports lottery will be sustainable (BAI, WANG, & MA, 2010; Griffiths, Wardle, Orford, Sproston, & Erens, 2009; H. Li et al., 2012; H. Li, Mao, Zhang, & Xu, 2015; Rodenberg & Kaburakis, 2013; Shi & Liu, 2009). The issue of sports lottery tickets in various countries is becoming more and more popular, and the related issues of issuance and distribution are still to be resolved. However, the research literature focuses on consumer research, market demand, and research on issuance mechanisms. It is worth further exploring how to develop sustainably (Gassmann, Emrich, & Pierdzioch, 2017; L. Li & Wang, 2011; Mao, Zhang, & Connaughton, 2015; Mao, Zhang, Connaughton, & Holland, 2015; Peng & Ge, 2016; Shibin, 2009; ZANG & GONG, 2009; L. Zhou & Zhang, 2017). The issuance of sports lottery has complex and dynamic characteristics. This research discusses the issuance of the Taiwan sports lottery and the development of distribution model based on the systemic perspective and methodology.

#### **4. Model building**

The issuance and distribution of the Taiwan sports lottery involves stakeholders such as the government, the operator, retailers and players. Many factors are required to be considered and different factors are interrelated and they have dynamic and complex characteristics. On the basis of research objectives, this research utilizes the issuance and distribution of the Taiwan sports lottery for problem analysis and to determine the system boundary. The key variables are identified through the experts in the field of sports lottery and we discuss the causal interaction among the variables, to develop the qualitative causal feedback loop diagrams. This research adopts the expert modeling approach of system dynamics (D. N. Ford & Sterman, 1998). The interviewed experts in the field include representatives of the government, the operator and retailers. We verify the causality among various variables in the qualitative model and the applicability of the system structure through discussions and inspections with experts, to ensure the validity of this model (G. Coyle, 1998; R. G. Coyle, 1997; Doyle & Ford, 1998; A. Ford, 1997; C. T. Hsiao, 2014; C.-Y. Liu, Hsiao, & Liu, 2017).



### 4.1 The role of the government

The profits generated from the issuance of the Taiwan sports lottery will be used as sports development earmark fund, to facilitate the development of the sports industry in the nation. 10% of the total sales amount in sports lottery is deemed as the issuance surplus (earnings to government) and it will be used as the sports development earmark fund to facilitate the development of the sports industry, and for the promotion of sports lottery to increase the sports lottery attractions. The general public will then recognize the public welfare nature of sports lottery and join the players' bet of sports lottery and thus the amount of sales in sports lottery will increase.

The research of Shi and Liu (2009) also pointed out that improving the reputation of sports lottery can enhance the sports lottery attractions. Therefore, the government issues sports lottery in pursuit of profits and to maximize the profits. The higher the sales amount of sports lottery is, the more issuance profits the government obtains, and hence the higher the amount of sports development earmark fund that can help facilitate the development of the sports industry. The enhancement of reputation and attraction in the sports lottery will attract more players to join in the betting and generate higher amount of sales, and hence the government will obtain more issuance profits which forms a positive feedback loop (Figure 1).

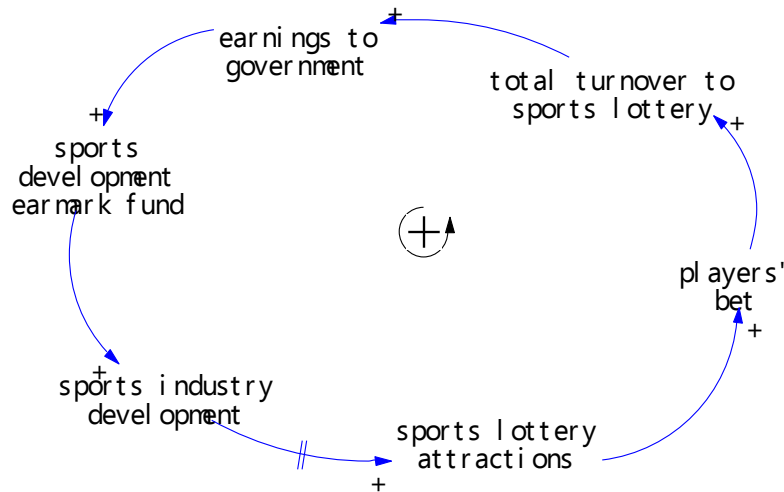


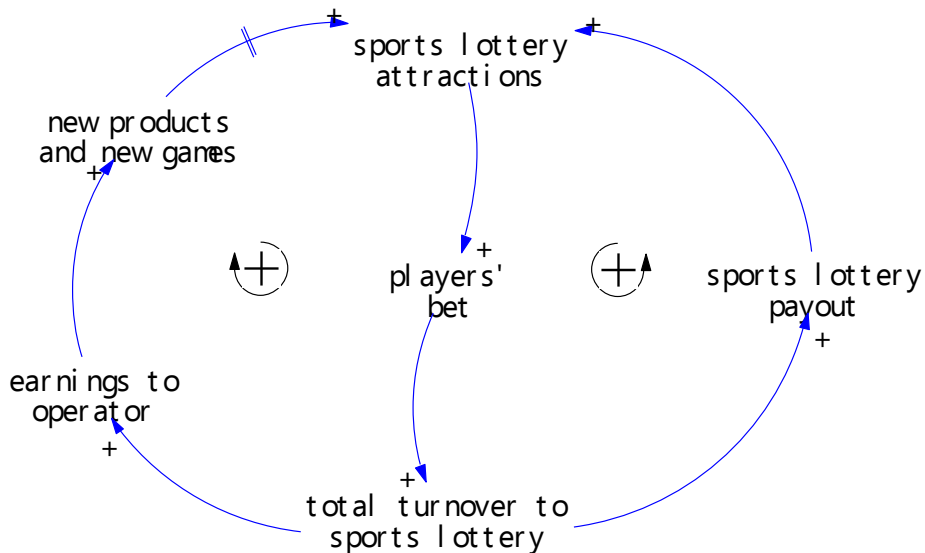
Figure 1: Causal loop diagram of the role of the government

### 4.2 The role of the operator

The operator for the sports lottery issued in Taiwan is publicly selected and authorized by the government for the issuance of sports lottery. The operator can obtain 12% of the sales amount in the sports lottery for remuneration and

commission (need to distribute to the retailers). After earning the remuneration, the operator continues to develop new products and games. There are more than 10 types of products and games as of now, which can effectively help to increase the amount of sales in the Taiwan sports lottery. The research of L.-l. ZHOU et al. (2012) pointed out that enhancing the variety and diversity of products will help to increase the amount of sales in sports lottery. After adding more game products and enhancing the betting variety by the operator, more players will be attracted to join players' bet to increase the amount of sales and form a positive feedback loop (Figure 2).

In addition, the operator also hopes to create the sports lottery attractions with higher winning prizes. The payout ratio of winning prizes was adjusted from 75% to 78% after the first-year issuance of the Taiwan sports lottery in 2008. The operator can even moderately increase the payout ratio to attract more players' bet for certain sports events; however, the payout ratio still cannot match to the extremely high payout ratio of illegal betting. According to the issuance experience of foreign sports lottery, opinions from the experts during the interviews and the research of Farrell et al. (1999), increase of winning prizes can attract more players to join the sports lottery betting (also can suppress illegal betting) to increase the amount of sales and form a positive feedback loop (Figure 2).



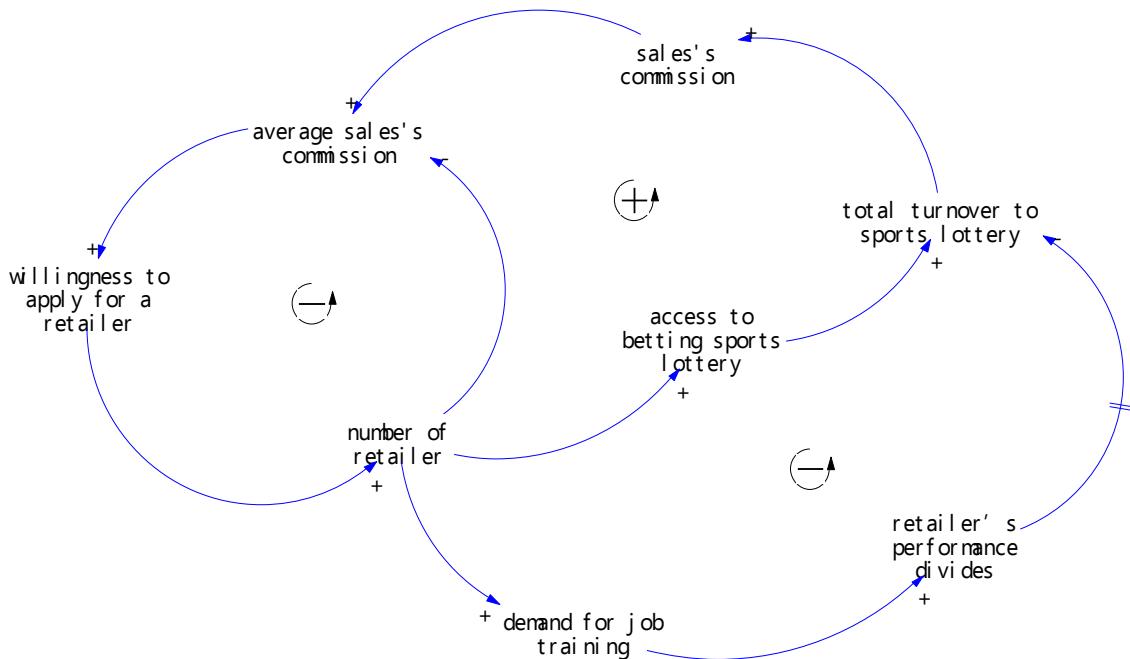
**Figure 2: Causal loop diagram of the role of the operator**

### **4.3 The role of retailers**

Upon acquiring the authorization for the issuance of Taiwan sports lottery, the operator will entrust and sign a contract with the retailers for selling the sports lottery tickets in various regions. The sales commission will be distributed to retailers based on their amount of sales. The increase of sales amount in sports lottery enables the retailers to obtain higher commission, and hence the average sales's commission obtained by the retailers will also relatively increase. High commission will motivate more applicants to apply for a distributor, which will result in the increasing number of retailers. The study has shown that the increasing number of retailers and expansion in the distribution of the sales distributor, so that players can easily reach to the location of sales, which means that the enhanced access to betting sports lottery (Dao-hai, 2010; Mao, Zhang, Connaughton, et al., 2015; YANG et al., 2012; L. Zhou & Zhang, 2017) will facilitate the sales in sports lottery. The increasing number of retailers forms a positive feedback loop (Figure 3).

The number of retailers is mainly based on the demand of market. At present, the number of retailers is increased to 1,500 due to the increasing amount of sales. The number of retailers is controlled and managed by the operator. If the sales market of Taiwan sports lottery is not expanded, the excessive number of retailers will result in reduction of commission for the retailers which will affect their motivation to apply for a distributor in the future. The excessive number of retailers will result in the reduction of the average sales's commission and form a negative feedback loop (Figure 3).

According to the issuance experience of the Taiwan sports lottery, the sale of sports lottery is affected by the products and games, as well as by the sports expertise and sales capability of the retailers. The retailers' capability of discussing the sports events with players is also a key factor that affects the sales of sports lottery. Hua (2013); Ladouceur et al. (2004); D.-Y. Liu, Tsai, Fang, and Liu (2019); YANG et al. (2012) also pointed out that the enhancement of professionalism and sales capability for the interaction with players will facilitate to increase the amount of sales. Some other studies also pointed out that the demand for demanding for job training increases as the number of retailers increases; the sufficient amount of hours and courses for demanding for job training should be provided to effectively enhance the professional sales capability of the retailers (D.-Y. Liu et al., 2019). The operator offers demanding for job training to retailers every year in order to improve their professional sales capability so that the retailers will be able to provide professional sales services. The lack of sales capacity cannot fulfill players' betting requirements and will affect the growth of sales. The increasing number of retailers, the increasing demand for demanding for job training and the retailer's performance divides form a negative feedback loop (Figure 3).

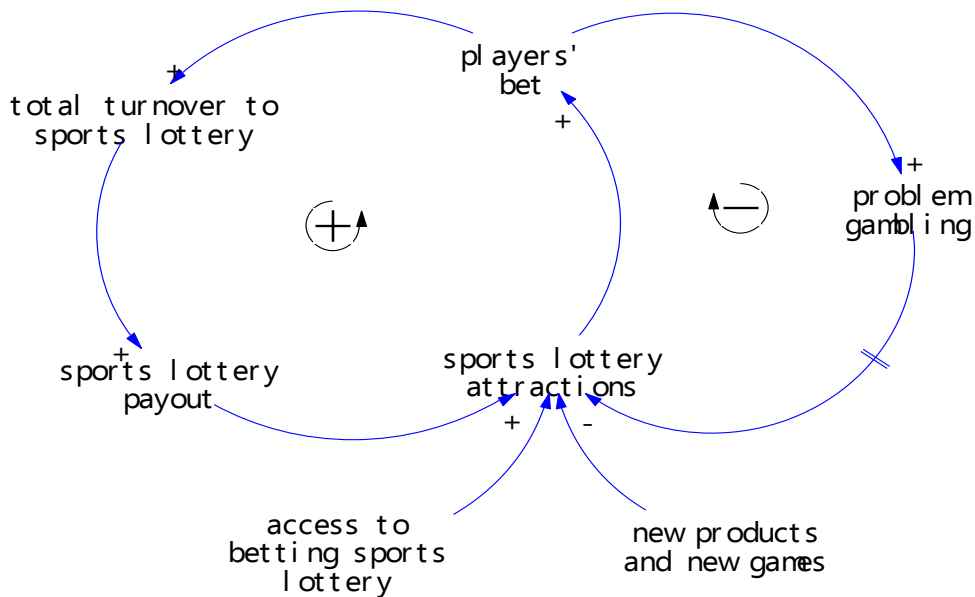


**Figure 3: Causal loop diagram of the role of retailers**

#### 4.4 The role of players

The winning prizes, new products, new games and access to betting sports lottery will enhance the sports lottery attractions. As it attracts more players' bet to buy the Taiwan sports lottery tickets and the amount of sales increases, and thus more sports lottery prizes will be accumulated, which will result in the increase of sports lottery attractions and form a positive feedback loop (Figure 4).

As more and more players' bet, it is required to pay attention to the prevention of problem gambling. The Taiwanese government has stipulated relevant regulations for responsible gambling and these responsible gambling measures will be implemented by the operator and retailers, including products' limitation to maximum bets and winning prizes, warning messages on the propaganda material, posting of promotional slogans, promotion of self-control betting, providing assistance for over betting behavior and offering help for self-control, etc. As more and more players' bet, if the responsible gambling measures are fail to be reinforced, more issues regarding problem gambling will be created which will result in society costs, negative image in the society, reduction of sports lottery attractions, impact on players' bet, and thus form a negative feedback loop (Figure 4).



**Figure 4: Causal loop diagram of the role of players**

## 5. Conclusion

The issuance and distribution of the Taiwan sports lottery are affected by many involved variables and environment variables in the system that have a mutual effect on each other and causality with each other, and thence these are complex and dynamic issues. Figure 5 demonstrates the issuance and distribution system of dynamic model for the Taiwan sports lottery, which is the integration of aforementioned causal feedback loops. There are seven major loops for the demonstration of system structure.

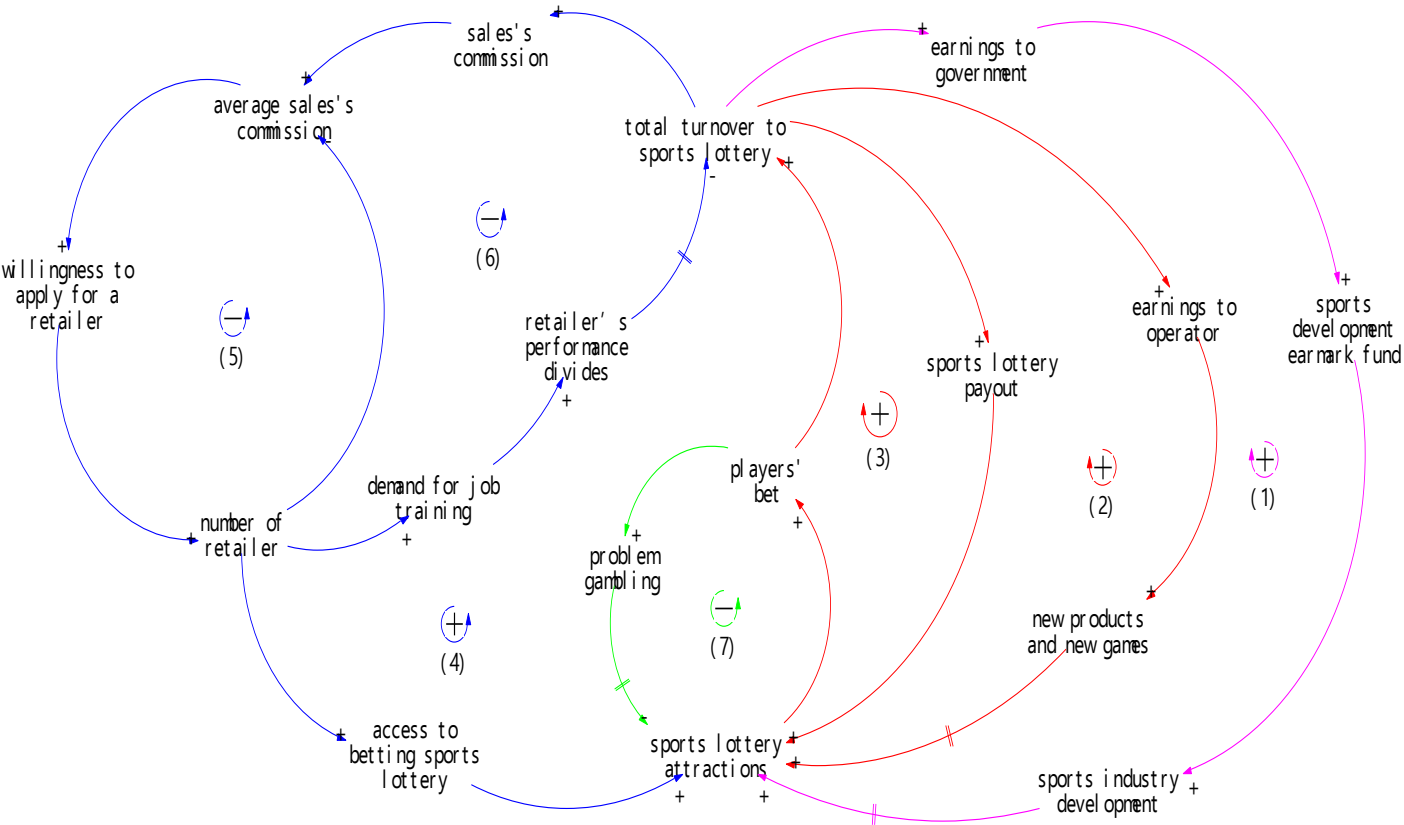
The government obtains profits with the issuance of the Taiwan sports lottery and invests in sports development earmark fund for the development of the sports industry. The purchase of sports lottery will help the government to facilitate the development of sports in the nation and the public welfare nature of sports lottery will attract more players' bet, which will result in increasing of sales amount in sports lottery and the earnings to government on the sports development earmark fund (loop 1).

Upon acquiring the authorization for the issuance of the Taiwan sports lottery, the operator will develop game products and innovative games to attract players' bet, increase amount of sales, obtain more remuneration, and then invest more funds to develop betting subjects and games (loop 2). At the same time, the Taiwan sports lottery prizes can also attract more players' bet. Upon the increasing amount of sales, the huge lump sum of prizes will attract more players' bet (loop 3).

The retailers obtain commission based on their sales amount in the Taiwan sports lottery. The higher sales amount in sports lottery enables the retailers to obtain a

higher average sales commission, and hence it will motivate more applicants to apply for a distributor, which will result in the increasing number of retailers, making the players' bet more convenient for players and thus the increasing sports lottery attractions will lead to more players' bet and increase of sales amount (loop 4). However, if the operator fails to control the number of retailers and excessively increases the number of retailers without enhancing the amount of sales, which will result in reduction of average sales's commission for the retailers and affect their motivation to apply to be a distributor in the future. This may result in no applicants for retailers when there is a demand for more retailers (loop 5). At the same time, the demands for demanding for job training are required after the number of retailers is increased. If the demands for demanding job training cannot be fulfilled, the retailer's performance divides will affect the number of sales in the Taiwan sports lottery (loop 6).

The players are attracted to the Taiwan sports lottery to join the players' bet on sports lottery, and a higher amount of sales will be generated. They will be also sports lottery attractions to the high winning prizes, access to betting sports lottery, new products, and new games, and join the betting on the Taiwan sports lottery again (loop 3). However, more players joining the sports betting may lead to more issues of problem gambling, which may result in social costs, the poor reputation of sports lottery and affect the attraction of sports lottery (loop 7).



**Figure 5: Causal loop diagram of the issuance and distribution system of dynamic model for the Taiwan sports lottery**

### 6. Management significance

Taiwan started to issue sports lottery in 2008 and the issuance profits were dedicated to the sports development earmark fund for the development of sports and the funds also facilitate the development of the sports industry. In the future, more profits will be generated if the Taiwan sports lottery can be continuously issued for a long period of time, which will directly and indirectly facilitate the development of the sports industry in the nation. The stakeholders such as the government, the operator, retailers and players in the issuance and distribution model hope to increase their distribution ratio and profits; however, the distribution ratio is interrelated among these stakeholders. At the same time, the number of retailers was significantly increased. If the increasing or decreasing number of retailers is not properly

controlled, it will affect new retailers to join as well as the access to betting sports lottery. Furthermore, with the increasing number of retailers and the continuously updating of issuance information, the demands of demanding for job training for retailers need to be fulfilled so that their professional sales capability can be enhanced. In addition, the amount of sales in sports lottery has been increasing year by year, which indicates that more and more players' bet, and thus the prevention of problem gambling need to be well handled, to facilitate the sustainable development of sports lottery in Taiwan.

For the research significance, the issuance and distribution of the Taiwan sports lottery is a complex and dynamic issue that requires overall planning and policy promotion by the government, professional business operations and management by the operator, the sales efforts by the retailers, and responsible betting behavior from the players. The relevant influencing factors have mutual interaction and are interrelated with each other. However, most of the previous researches are based on the discussion in a single aspect, such as the players' bet, the demand of the market, or issues related to government's policies and regulations. There is not much research concurrently focusing on government's policies, the operator, sales of retailers and players' bet. From an overall perspective, the four stakeholders who issue and distribute the Taiwan sports lottery, such as the government, the operator, retailers and consumer are deemed as a dynamic system in this research, to interpret their causal interactions. Moreover, we can have a better understanding on the issuance and distribution issue of the Taiwan sports lottery through a research with an overall perspective, to discuss the source of the issue. This research also proposes the following management significance and suggestions for improving the system structure; they can be used as a reference for policy stipulation.

1. The proper distribution of sales profits in sports lottery by the government  
The four stakeholders such as the government, the operator, retailers and consumer all desire to obtain higher distribution profits and enhance the positive growth in their loop system. However, the distributable ratio is fixed in the system with the overall issuance and distribution model of lottery, and thus the distribution ratio is interrelated with each other. The government is the competent authority and it may refer to the proposed distribution ratio combinations by the operator. The government can consider how to create win-win solutions for all parties by arranging the distribution ratio from an overall perspective, so that the issuance and distribution model of the Taiwan sports lottery will be able to grow positively and develop sustainably.
2. The operator decides number of retailer  
From a systems thinking perspective, it is discovered that the operator should properly control the number of retailers. The excessive number of retailers in various regions will increase the access to betting sports lottery, however, it will also result in reduction of sales market and commission for

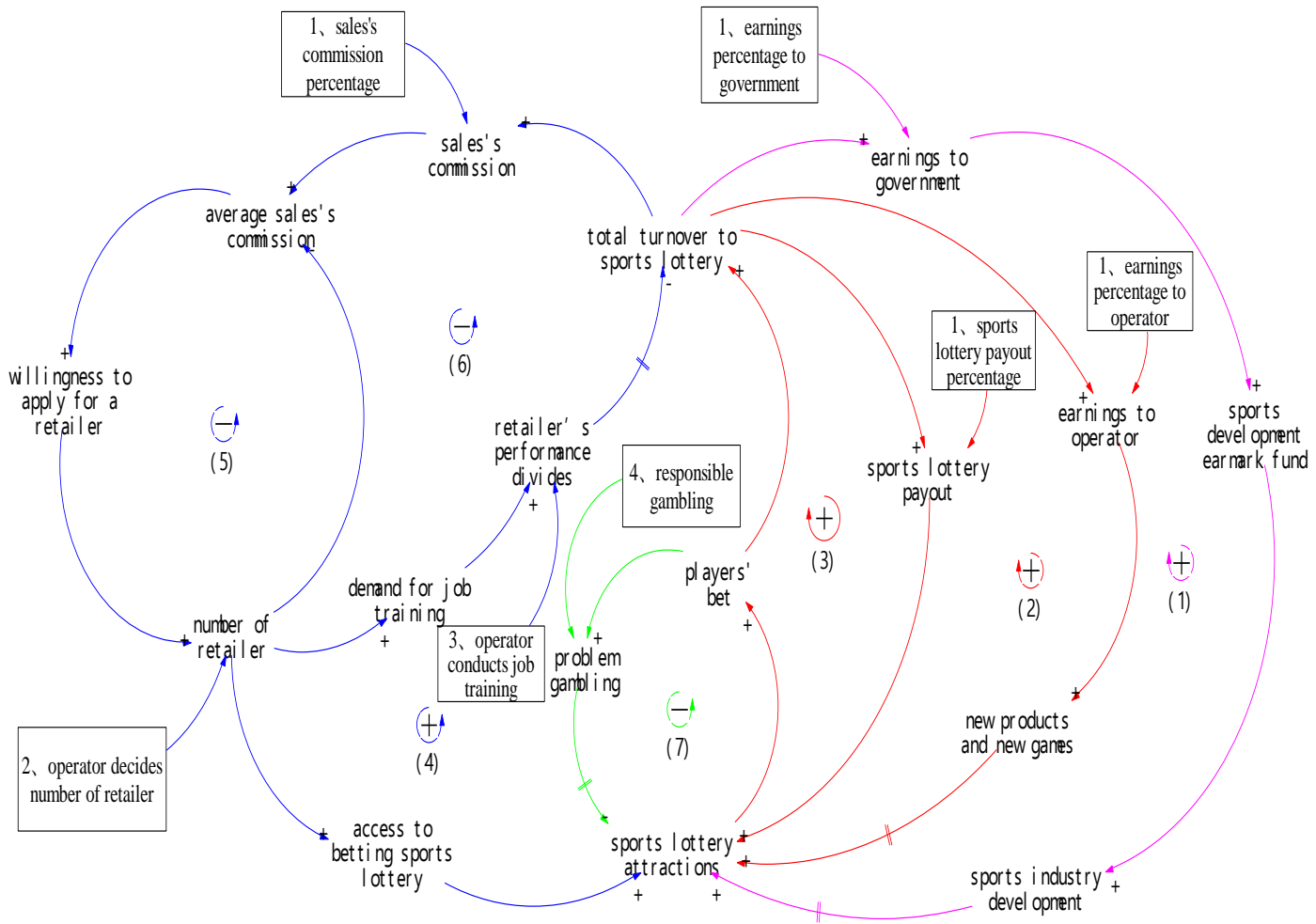


the existing retailers which will affect their motivation to apply for a retailership in the future. The insufficient number of retailers will cause in access to betting sports lottery, reduction of sports lottery attractions and thus higher amount of sales cannot be generated. It is suggested that after the professional evaluation for the issuance market of sports lottery, the operator can also apply a diverse evaluation mechanism to determine the increasing or decreasing number of retailers. It can not only help to add more retailers in a timely manner, but also eliminate the retailers with poor sales capability, and thus the appropriate number of retailers can be controlled.

3. **Strengthening the demanding for job training for retailers by the operator**  
With the information required for the issuance of the Taiwan sports lottery and the demands of new retailers, the operator shall conduct comprehensive demanding for job trainings for retailers to fulfill their needs of professional sales capability. Although the operator conducts demanding for job trainings for retailers every year, but the improvement of professional sales capability is not significant due to the limited number of courses and short hours, which is difficult for retailers to have an in-depth learning; and the courses are not subject the participant's job position, and thus a suitable demanding for job training cannot be offered. Therefore, it is necessary to redesign the demanding for job training courses to fulfill the retailers' needs of professional sales capability. The professional sales capability of retailers will be enhanced through sufficient and suitable demanding for job training, the lack of sales capability will be reduced, players' bet requirements can be fulfilled and hence the amount of sales in Taiwan sports lottery will increase.
4. **Re-inforce the control measures of responsible gambling**  
"Responsible gambling" means that gaming activities will not create a negative impact on the society under an appropriate supervision. At present, the gambling industry in various countries around the world has gradually developed into a matured stage. These countries now focus on minimizing the social cost of gaming (problem gambling) by adopting the concept of responsible gambling. Therefore, it is found that the stakeholders such as the government, the operator, retailers and players must reinforce the control measures of responsible gambling, from the perspective of an overall system. The government has stipulated relevant regulations for responsible gambling, and the operator also adopts the seven principles and ten factors for responsible gambling by the World Lottery Association, to implement related measures regarding responsible gambling. In the future, it is necessary to re-inforce and assign job responsibility of responsible gambling to all stakeholders, and the government shall include the relevant measures regarding responsible gambling in the contract with the operator for practical implementation. In addition to re-inforcing the measure regarding responsible gambling proposed by the WLA, so that they can be practically

implemented, the operator should also put in effort to obtain international certification. The operator should implement reward and punishment measures on the implementation status of the retailers, to verify whether the retailers are in accordance with responsible gambling. The players should avoid excessive betting and apply self-management betting measures, to prevent pathological gambling caused by over-betting. The four stakeholders shall collaboratively re-inforce the control measures of responsible gambling, to ensure the sustainable development of the Taiwan sports lottery.

On the basis of the aforementioned management significance, this research proposes four policy recommendations, including appropriate profit distribution of the Taiwan sports lottery by the government, the operator decides number of retailer, the operator conducts demanding for job training for retailers, and reinforce the control measures of responsible gambling, which will be able to improve or avoid issues derived in some loops and maintain the sustainable development of the entire system. The intervention point of the preceding policy is as shown in Figure 6



**Figure 6: Causal loop diagram of the intervention point of the policy of the issuance and distribution system for Taiwan sports lottery**

## 7. Conclusions and recommendations

### 7.1 Conclusions of the research

The issuance and distribution of sports lottery in Taiwan involves stakeholders, including the government, the operator, retailers and players. In addition to the overall issuance planning and policy promotion, the government also has to choose an the operator with operation and management capability. The professional sales capability of the first-line sales retailers as well as the players' enthusiastic and responsible betting behavior are required for the sustainable development of sports lottery. Many factors are required to be considered and different factors are interrelated and they have dynamic and complex characteristics; however, there is

not much research focusing on the issuance and distribution model of sports lottery in Taiwan from a systems thinking perspective. This research adopts the methodology of system dynamics to analyze the roles of four stakeholders and discusses the interactive relation between the issuance and distribution of sports lottery in Taiwan, and then proceeds to build a dynamic model in the issuance and distribution system for the sports lottery in Taiwan. This research interprets how the variables of the key loops in the four roles such as the government, the operator, retailers and players affect the issuance and distribution of sports lottery in Taiwan; this research also interprets causality and interactive relation among the factors for the issuance and distribution of sports lottery in Taiwan, and seeks for the approach to improve the system architecture, to propose policy suggestions and it can be used as a supplement reference for related studies. The main conclusions of this research are described as follows:

1. With the special issuance and distribution system of sports lottery in Taiwan, the four stakeholders involved such as the government, the operator, retailers and players have a mutual effect on the issuance and sales of sports lottery, and each party can obtain the distributed sales amount in a fixed ratio (profits for the government, earnings to operator, sales's commission, and winning prizes for players). The government should consider the distribution of sales amount in sports lottery from an overall perspective, so that the distribution ratio is able to fulfill the demands of each party. Therefore, the government will be motivated to issue sports lottery, the operator will be motivated to operate and manage, the retailers will be motivated to selling more sports lottery tickets, and players will be motivated to bet on sports lottery, to achieve the objectives of issuing the sports lottery.
2. The operator entrusts the retailers to sell the Taiwan sports lottery tickets. The number of retailers should be controlled according to the demands of the market and the profits of the retailers. The insufficient number of retailers cannot fulfill players' bet demands of convenience betting, and the excessive number of retailers will result in decrease of the retailers' profit.
3. The operator of the Taiwan sports lottery has to re-inforce the professional training of retailers, as the number of retailers is increasing and the retailers' professional sales capability are requiring. The lack of sales capacity cannot fulfill players' bet requirements. The professional sales capability of the retailers can continuously help to increase the amount of sales in the Taiwan sports lottery.
4. The amount of sales in Taiwan sports lottery has reached a new high year by year. As more and more players join the Taiwan sports lottery betting, the issue of problem gambling is inevitable, and thus everyone needs to pay

attention to and comply with responsible gambling. Each of the parties needs to value the importance of responsible gambling, otherwise it may cause an imbalance in the issuance and distribution system of the Taiwan sports lottery. We hope that the government will strengthen the supervision of regulations in responsible gambling, the operator and retailers will reinforce the responsible gambling measures and players will enhance self-control and management to collaboratively maintain the positive and public welfare image of sports lottery, to facilitate the sustainable development of the Taiwan sports lottery.

## **7.2 Recommendations of the research**

The sports lottery in Taiwan has been issued for 11 years. The distribution ratio of sales amount in sports lottery, the control of the number of retailers, demanding for job training for retailers and issue of problem gambling have been often widely discussed. The issuance and distribution of Taiwan sports lottery involve stakeholders such as the government, the operator, retailers and players, and many of the involved variables and environment variables in the system have a mutual effect on each other and causality with each other, and thence these are complex and dynamic issues. This research utilizes the systems thinking to connect the relation among the factors with the positive and negative causal chains, to clarify the dynamic structure of a complex system with feedback loops, and to replace the complex and abstract descriptions in texts with the presentation of images. We recommend the government and the operator to use this model as a reference to understand the complex and dynamic circumstances from an overall perspective as well as to conduct supervision, management and auditing.

The issuance of sports lottery in Taiwan has to face the issue of planning the distribution of sales amount in sports lottery. From the qualitative model building in this research, it can be seen that the distribution of the Taiwan sports lottery includes the earnings to government, earnings to operator, sales' s commission, and winning prizes for players. The issuance of Taiwan sports lottery need to consider the distribution ratio of sales amount, and hence the earnings to government can be maximized, the operator is motivated to operate the business, and the retailers are motivated to selling more lottery tickets while not affecting the players' bet, to create win-win solutions for all parties. It is suggested that further research and policy scenario simulation can be conducted in a quantitative model so that better analysis and suggestions can be provided.

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