

**The Universities Become More while
Students Are Getting Less?
A System Analysis of the
Taiwanese Higher Education Crisis⁺**

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Abstract

Under the trend of declining infant birth rate, higher education in Taiwan is now facing severe crises such as excessive number of universities, high level of unemployment, and the impact of colleges/universities' withdrawal from market, etc. This study analyzes threats and opportunities confronted by the Taiwanese government and university operators with the *Tragedy of the Commons*, *Limits to Growth* and *Fixes and Fail* models that are derived from the System Archetypes. First, this study discusses developments and management of higher education in Taiwan by literature analysis and interviews. Secondly, it reviews the plans and strategies of the Ministry of Education toward this crisis. Finally, this paper analyzes the implementation strategies of the Taiwanese government and universities which include moderate adjustment of scale, reasonable number of schools, colleges/universities' withdrawal mechanism, distinguishing feature enrollment, overseas

schooling program, and so on. The research expects to introduce a more systematic approach to examine Taiwan's current crisis in higher education and to seek survival strategy, then try to provide a feasible framework for coping with such crisis either in policy design or system practice level.

Keywords: *System Archetypes, declining birth rate, higher education crisis, university exit mechanism*

1. Introduction

Taiwan's higher education has been plunged into an unprecedented crisis due to the impact of declining birth rate. The former Republic of China President Ma Ying-jeou has even reaffirmed that low infant birth rate is the crisis of Taiwan's national security¹. The so-called "crisis", in the Greek word "crimein", means "decision". (Jan, 2004: 3) Simply to say, crisis is a matter of instability in the situation, facing the rapid deterioration or turning the key moment, the urgent need to decide or change the state immediately.

Affected by the above reason, the student population of higher education in Taiwan tends to decline after 2016, therefore university enrollment has been facing difficulty and more intense competition due to lower birth rate. Consequently, the education authorities have begun to start the exit mechanism and innovation transformation plan to respond to the university crisis. On December 4, 2015, Minister of Education Wu Si-hua gave his speech entitled "Review and Prospect of Higher Education Evaluation" at the International Symposium on Higher Education Evaluation. He elaborated that "the specific approach is divided into three categories: first, to share resources through the University alliance; secondly, to complete universities' merging through more government-led power; thirdly, to shift the focus of teaching from

young people to senior citizens.” In addition, he suggested to adjust the scope of enrollment from home territory abroad, and from the purely academic personnel training to become a business university that cooperate with industries.

Before this, the Ministry of Education had launched the “Transformation and Development Program of Private Fund Universities” in 2013. In November 2014, it announced the “Principles for the Merger of Colleges and Universities”. On January 20, 2015, the MOE issued the “Higher Education Innovation and Transformation Act”. It has always stated that Taiwan’s higher education is facing the challenges and difficulties due to rapid changes, especially the impact of less children, the need to actively face and seek to respond with countermeasures in the system, and it is necessary to plan the transformation of higher education with innovation. In general, the reform of the Higher Education Innovation and Transformation Ordinance is intended to be over a five-year period, and scheduled follow-up period: (1) January-February 2015: held a work circle, completed the draft; (2) March 2015: for the briefing and collecting of opinions and advices; (3) April 2015: submitted to the Regulations Board and the Council of MOE for review; (4) May 2015, the Executive Yuan transferred the Drafts to the Legislative Yuan for consideration and review.

On February 12 of 2016, the MOE issued the “Regulation for Set up the Higher Education Innovation and Transformation Office in the Ministry of Education”, and then established the “Higher Education Innovation Planning Office”. The main purpose of the Office is to adopt cross-sectoral structure to strengthen the policy coordination and communication for improving the efficiency of administrative coaching and the transformation of Higher Education in Public and Private Colleges. However, since the new Democratic Progressive Party (DPP)

government came to power in 2016, it announced that the above Regulation would be stopped active on September 29 of 2017. Soon after, the MOE has put forward a new “Private University/College Transition and Exit Regulations” draft in February of 2017.

Many programs and policies that were mentioned above let people wonder about the main theme of strategy of the Ministry of Education for countering the impact of lower birth rate upon higher education. Is there any continuity and consistency of such policies? Was the situation lost in the dilemma of *Fixes and Fail* that has led to negative sequelae in the long term as Peter Senge has argued? Therefore, this article firstly reviews the historical background of educational reforms – a story of the open green light to set up the university, now leading to the need to merge, exit, or transition. Secondly, the study tries to use documentary analysis and based on the “system model” to analyze the impact and problems of higher education in Taiwan systematically, and hopefully provide a holistic and dynamic view for answering questions the paper has raised.

2. Literature Review

This paper is using the System Archetypes model – that of the system thinking method developed by Peter Senge, and trying to clarify the structure of the case, and find the key element of the management problem.

The word “archetype” is originally from the Greek “*ἀρχέτυπον*”, meaning “the first among the same class” (Guo, 1995 (tr.): 199-200). The System Archetypes is defined as using of certain graphic symbols, simple and clear description of the relationship between the various factors that affect the problem. In the 1980s, Peter Senge and Michael Goodman began to organize ideas and concepts about system dynamics,

originally used in the field of “learning organization”, and have advocated five disciplines, including: personal mastery, improving mental models, building shared vision, team learning and systems thinking (Senge, 1990; Goodman and Kleiner, 1994; Senge *et al.*, 1994).

Before using the systematic thinking approach, we must first understand its language and basic components of the image, in order to facilitate the subsequent selection and establishment of the base model. Peter Senge has pointed out nine kinds of the System Archetypes model in his book *The Fifth Discipline* (Guo, 1995 (tr.): 161-184). Although only part of the system thinking approach, Senge thinks that can be enough to cover most of the dynamics of human complex problems. Senge’s nine kinds of the System Archetypes model are shown below:

- (1) *Balancing Loop with Time Delay*: it means to improve the action effect takes time.
- (2) *Limits to Growth*: while thing goes to the extreme, it will begin to suffer.
- (3) *Shifting the Burden*: people only pursue a temporary but not fundamental solution.
- (4) *Eroding Goals*: people is often reducing the standard to cope temporarily.
- (5) *Escalation*: it refers to coming into destructive competition or being over-competitive.
- (6) *Success to the Successful*: the stronger is overwhelming the weak, and the winner takes all.
- (7) *Tragedy of the Commons*: it refers to the resources being limited and growth becoming slow.
- (8) *Fixes and Fail*: short-term strategy may be effective, but will lead to negative sequelae in the long term.
- (9) *Growth and Underinvestment*: it refers to self-limiting growth inadvertently.




In summary, some of the system archetypes are very similar, but the focuses are different; some are more fundamental that will appear in other archetypes; some are a variety of archetypes' combinations. Some believe that many complex problems can be observed by several different archetypes, and they have argued that it may probably help to understand more root causes of problem (Guo, 1995 (tr.): 160; Tu and Chang, 2010).

In addition, the system of thinking simultaneously includes three basic elements of the language:

- (1) *Reinforcing feedback*: it is a positive feedback loop meaning the increase or decrease in the value of a factor that, after feedback, causes the value of its next cycle to be in the same direction. The so-called benign cycle and vicious circle are usually caused by positive feedback (Lei, 2005: 67).
- (2) *Balancing feedback*: it is a negative feedback loop meaning the increase or decrease in the value of a factor that, after feedback, causes the value of its next cycle to be in the reverse direction (Lei, 2005: 67).
- (3) *Time delay*: refers to the phenomenon of delay between action and the results, which will occur both in the enhanced loop or adjustment loop; it will interfere with the impact of the process, but if use properly, it may produce positive effect.

As Senge *et al.* (1994) have argued, each image of picture is telling story of certain system of thinking. Someone can go from any of the elements in a situation (or “variable”), and begin tracking that will affect other elements of arrows (“chain”). These mutual relationships will appeared repeatedly, that will let the situation turn good or bad in a cycle, but the ring chain never exists separately, always forming a causal ring. The feedback “loop”, in which each element is “cause” as well as

Table 1 Selected Archetypes and Their Contents

Archetypes Contents	<i>Balancing Loop with Time Delay</i>	<i>Tragedy of the Commons</i>	<i>Fixes and Fail</i>
Situation	Organizations constantly adjust actions to fit target, however, actions have exceeded goals.	Many individuals share the limited resources.	Countermeasures are short-term effective, but problems will worsen in the long term.
Crisis message	Thought it was in a balanced stage, but the action has exceeded the target.	Adequate in the past, but now becomes difficult.	It seems to be effective previously, why not now?
Management strategy	Be patient, adjust gradually, and try to find stability and balance point of the system.	Users understand the current use of resources and jointly manage common resources.	Focus on the long-term targets. Short-term measures are used in exchange for long-term solutions.
Causal loop diagram			

Source: Author.

“result”, by some elements of effect, will affect other elements, so each result will eventually return to its nest (Qi, 1995 (tr.): 188).

As an analytical tool for this study, Table 1 shows the general situation, crisis message and manage strategies of the *Balancing Loop with Time Delay*, *Tragedy of the Commons* and *Fixes and Fail* archetypes respectively.

The main hypothesis of this study would be: “expansion of higher education schools” meets the “declining birth rate”, having long adopted “error policies and non-systematic strategy, will eventually run into crisis and tragedy. In this study, three models of archetypes and the concept of “reinforcing feedback” have been used for exploring the crisis management in the higher educational system in Taiwan. Hopefully, it can find out the mechanism or strategy behind the crisis, further establish a management mechanism through system thinking to respond earlier and to act properly.

3. Review of the Expansion of Taiwan Higher Education Schools

In 1986, Taiwan began to implement the nine-year compulsory national education, and the schools in Taiwan faced many high malformations under the pressure of rising schooling competition. Therefore, the educational authorities began to plan the “12-Year National Education” program in 1989. In April of 1990, an extension of the National School of Education was promulgated – graduates of secondary schools who were eligible but volunteer to study in high schools – and implemented in the form of a post-experiment promotion.

In April of 1994, the “410 Educational Reform of the Whole People Union” assembled over 20,000 people to gather on the streets and made four demands: (1) implementation of small class teaching in school; (2) increase in setting up high school and university; (3) promoting

modernization of education; 4) developing the Basic Law on Education. On September 21, 1994, the Executive Yuan responded to the civil appeal and set up the “Education Reform Review Committee of the Executive Yuan”.

After two years of review and research, on December 2, 1996, the “General Counseling Report on Educational Reform” was published, putting forwards five major directions of educational reform: (1) education deregulation; (2) taking care of every student; (3) unblocking the channels to study; (4) enhance the quality of education; (5) establishing a lifelong learning society. Also, there have some suggestions for the relaxation of education, including: (1) higher education capacity should continue to increase; (2) the deregulation of private school – it is recommended that the government should provide freer environment and incentive policy to encourage private funding school (General Counseling Report on Education Reform, 7: 59).

On 26 February 1997, after the end of the reform committee, the Executive Yuan set up an “Educational Reform Promotion Group” to follow up on the relevant works. The National Educational Reform Review and Conference” was held on 17 May 1999, and then a “New Thinking, New Action, New Vision: Review and Improvement Conference on Educational Reform” was held on 15 December 2001.

From the opinion of the 401 Educational Reform Union, the report in the “General Educational Reform” in 1994, to the Ministry of Education’s “New Vision” in 2001, one of main theme is to “continue to promote and increase in the capacity of high schools and universities” (National Education Archives, 2002: 223); however, it is not necessarily to suggest increasing the number of university but measures to increase the capacity and program in existing universities.

Taiwan’s higher education school expansion can generally be divided into four stages:

(1) 1951 to 1962: the first wave of higher education expansion period

During the period, there were 27 additional universities, including 6 universities that were originally established in the mainland China and re-school in in Taiwan, 7 new universities and 14 three-year colleges (Chen, 2015: 14).

(2) 1963 to 1972: mainly to set up specialized colleges or schools

During this period, 52 five-year college schools have been set up. This wave of specialist schools has been expanding for 10 years. It can be said that the number of colleges in the history of higher education in Taiwan is the largest and fastest. (Chen, 2015: 15)

(3) 1985 to 1995: the government once again opened private school establishment

In 1985, the Executive Yuan re-opened the private school application, the main opening to the scope of the institute of technology, technical college, two professional business and nursing schools and 5 years of engineering-based college (Chen, 2015: 16).

In 1989, the Minister of Education Mao Gao-wen declared to improve the proportion of students in higher education accounted for 3% of population. Then, the Ministry of Education started to expand the scope of the application of private schools to the management, art, marine and three other types of college, during which a total of 25 colleges were added. (Chen, 2015: 16-17)

(4) 1996 to 2005: the second wave of colleges/institutions' growth and upgrade

During this period, there were 15 additional colleges and universities that were founded, including 2 national universities and 10 private

universities (Chen, 2015: 22). It is noteworthy that during this period the number of universities increased, a large part being restructuring or upgrading from the second stage (1963-1972) of the specialist and technical schools. By 1999, a total of 35 colleges were upgraded to technical colleges and technology universities (Chen, 2015: 22)

In addition to the increase in the number of schools, there were many important events, policies and reforms related to the development of higher education in Taiwan, as shown in Table 2.

Table 2 Reforms in Taiwanese Higher Education²

Time	Event/Policy	Note
1988.1.31	The first Civil Society Education Conference, held by the Humanistic Education Foundation, Homemakers United Foundation and 32 other groups.	
1994.4.10	The “410” Parade.	The establishment of the “410 Educational Reform Alliance”.
1994.6	The Ministry of Education held the 7th National Education Conference.	
1994.9.21	The Executive Yuan set up the “Education Reform Review Board”.	On December 2, 1966, it was dissolved after the “General Counsel Report” was proposed.
1995	Ministry of Education issued the “Education Report on the Republic of China”.	Encourage some schools of small scale, low efficiency, and less competitiveness to seek the feasibility of merging strategy with other schools.

Table 2 (Continued)

Time	Event/Policy	Note
1998.1	Set up the Educational Reform Promotion Task Force.	
1998.5.14	The Executive Yuan adopted the Education Reform Program of Action.	Integration of the “General Counsel Report” and the “Overall Outline of Educational Reform”.
1998.1	Announced the set-up standards of all levels of private schools.	
1999	Announced the “Private School Branches Set Up Standards, Procedures and Management”.	
1999	Adopted the “Incentives Program to Private Education Institutions”.	
1999	Held the National Educational Reform Conference.	
1999.6.23	President promulgated the ‘Education Basic Law’.	Encouraged for funding private school; the public school will be entrusted to private managing.
1999	Ministry of Education promoted the “Regional Characteristic National University/College Merge Pilot Program”.	National Chiayi Normal College and the National Chiayi Institute of Technology formally merged into the National Chiayi University on February 1 of 2000.

Table 2 (Continued)

Time	Event/Policy	Note
2001.8	Ministry of Education announced the “Development Plan for National Universities Regional Resources Integration”.	National universities began to merge.
2002	Announced the “Research-based University Integration Program”.	Led to the establishment of the Taiwan United University system.
2002.10.19	Established the “Education Reform Promotion Committee”.	
2003.8.8	Huang Kuang-guo and other professors published the “Declaration of Reconstruction Education” and the “Ten Thousand Words Proposal for Educational Reforms”.	Criticized 13 kinds of educational malpractices which included setting up high school and university.
2005	Proposed the “Development Program for Normal Colleges’ Positioning and Transformation” and established “The Preparatory Office of National Taipei Normal College and other six transformations to the University of Education”.	
2011.1.26	The amendment to the <i>University Act</i> was adopted, in which article 7 states authorizing the Ministry of Education to draw up university merger plan.	

Table 2 (Continued)

Time	Event/Policy	Note
2012.6.22	Formulated the “National University Merger Promotion Program”.	
2013.1.23	The MOE promoted merging where there were more than 2 national universities within a single county/city and less than 10,000 students.	Issued document to the 19 eligible national institutions.
2013.9	The MOE announced the principle of “Counseling Private Fund University/ Institutions to Improve Performance or Stop Implementation”.	Formally started the so-called “university exit mechanism”.
2015.2.2	Announcement of “Higher Education Innovation and Transformation Project”.	For promoting the transformation of higher education innovation, to minimize the impact of low birth rate.
2015.3.27	Release the “Higher Education Transformation Program”.	The program established the Office and set up three platforms for dealing with the relevant issues including the innovation and transformation, teaching quality maintenance and human resource promotion.

Table 2 (Continued)

Time	Event/Policy	Note
2015.7.3	Adopted the “Higher Education Innovation and Transformation Act”.	Including 4 strategies of the “High-Level Talent Promotion”, “Exit College Counseling”, “College Model Reconstructing” and “Cooperation and Merger among Universities”.
2016.9.29	Stopped adoption of the formula of the “Higher Education Innovation and Transformation Project” which was issued by the MOE.	
2017	Formulated plan for setting up fund to assist colleges’ transition and exit.	It is proposed to set up the rules for the custody and use of the Fund in accordance with the provisions of Article 4 and Article 21 of the <i>Budget Law</i> . (Subject to the approval of the Central Government Special Fund Management Guidelines).
2017.2	Proposed the “Private Fund College Transition and Exit Act”.	

Source: Author.

As noted in Table 2, the most important theme of the Taiwanese educational reforms since 1990s would be the university over-sum and subsequent merger problem, in addition to improving the quality and operating environment of schools. For instance, the Ministry of

Education issued the *Education Report on the Republic of China* in 1995 which encouraged some small-scale, low-efficiency, and less competitive schools to seek the feasibility of the strategy of merging with other schools. Ironically, the Taiwan government was still to set up the so-called public universities of local characteristics in the same period. Similar contradictory policies often appeared and the strategies were obviously inconsistent with the reality of the environment.

In the following section, the increasing flow of Taiwan's higher educational institutions over the years, the estimated number of new students, the number of public and private university enrollment ratio and some of the general situation of Taiwan's higher education are summarized. As shown in Table 3, from 1991 to 2009 was the largest period of university expansion, when 41 colleges or universities were established within those 20 years, with the total increasing to 164. Since the Ministry of Education initiated university exit plan in 2011, there were only 6 universities that have merged or exited in four years (2011-2016).

Table 3 Number of Public and Private Universities in Taiwan

Year	National University	City University	Private University	Total
1991	39	2	82	123
2009	52	2	110	164
2015	50	1	107	158

Source: Statistics Office, MOE (author's list).

Table 4 shows that college bachelor's degree and junior freshman students began to grow negative in 2015; up to 2023 (9 years later),

negative growth is estimated about 30%. In the 2016-2020 academic years, it is estimated that 20-30 colleges or universities will face the survival crisis!

Table 4 Estimates of the Number of First-year Students in University and Junior College (Unit: thousand persons)

	Year	No. of 1st-year college students	+/- over the previous year	No. of grand total changing since 2013
<i>Actual/ Estimated</i>	2013	271	--	--
	2014	276	4.7	4.7
	2015	272	-3.3	1.4
	2016	252	-20.5	-19.1
	2017	238	-14.0	-33.1
	2018	250	11.6	-21.4
	2019	241	-8.5	-30.0
	2020	213	-27.8	-57.8
	2021	202	-11.1	-68.8
	2022	189	-13.0	-81.9
	2023	185	-4.7	-86.6

Notes:

1. Students with the number of foreign students, including students for the four-year Bachelor classes, first-year students of two-year college and fourth grade students of five-year program college.
2. Estimated number of students in the first grade by the enrollment scores and registration rates of the schools.

Source: MOE, ROC (author's list).

Particularly, Table 5 indicates that the proportion of bachelor's enrollment in public universities is about 24% while the proportion in private universities is 76% in the academic year 2015. It is foreseeable that the impact of lower birth rate on private schools is very severe.

Table 5 Number and Proportion of Bachelor's Enrollment in Public and Private Universities in the Academic Year 2015

	Public universities		Private fund universities		Total	
	No.	%	No.	%	No.	%
<i>Under-graduate</i>	63,857	24%	203,807	76%	267,664	100%

Source: MOE, ROC (author's list).

4. The Predicament of Declining Birth Rate in Taiwan

As Table 6 and Figure 1 show, the number of births in Taiwan was about 326 thousand per year between 1987 and 1997; but the number of births in 1998 was only about 271 thousand, with a sudden drop by 55,000 people in one year (-20.3%). In 2010, the number of births was about 167 thousand, with the number of newborns decreasing by nearly half in 13 years (1997-2010). Although the number of births in 2015 was slightly increased to about 214,000, its impact on higher education is in fact already happening – college enrollment in 2016 began to grow negatively. In 2028, the number of college students is expected to decrease to almost only half of that in 1997. From the statistical point of view, many universities in Taiwan are facing the urgent transition and exit crisis.

Table 6 Number of Births and Crude Birth Rate in Taiwan³

Statistics by registr. date					Unit: persons; %	
Year		Number of births (persons)			Gender ratio at birth	Crude birth rate (%)
		Total	Male	Female		
民國80年	1991	321,932	168,865	153,067	110.32	15.70
民國81年	1992	321,632	168,488	153,144	110.02	15.53
民國86年	1997	326,002	170,047	155,955	109.04	15.07
民國87年	1998	271,430	141,462	129,968	108.83	12.43
民國88年	1999	283,661	148,042	135,619	109.16	12.89
民國89年	2000	305,312	159,726	145,586	109.71	13.78
民國90年	2001	260,334	135,596	124,738	108.69	11.85
民國91年	2002	247,530	129,537	117,993	109.78	11.02
民國92年	2003	227,070	118,984	108,086	110.08	10.08
民國93年	2004	216,419	113,639	102,780	110.57	9.58
民國94年	2005	205,834	107,378	98,456	109.04	9.08
民國95年	2006	204,439	106,936	97,503	109.65	8.98
民國96年	2007	204,414	106,898	97,516	109.62	8.92
民國97年	2008	198,733	103,937	94,796	109.64	8.84
民國98年	2009	191,310	99,492	91,818	108.36	8.29
民國99年	2010	166,886	87,213	79,673	109.46	7.21
民國100年	2011	196,627	101,943	94,684	107.67	8.48
民國101年	2012	229,481	118,848	110,633	107.43	9.88
民國102年	2013	199,113	103,120	95,993	107.42	8.53
民國103年	2014	210,383	108,817	101,566	107.14	8.99
民國104年	2015	213,598	111,041	102,557	108.27	9.10

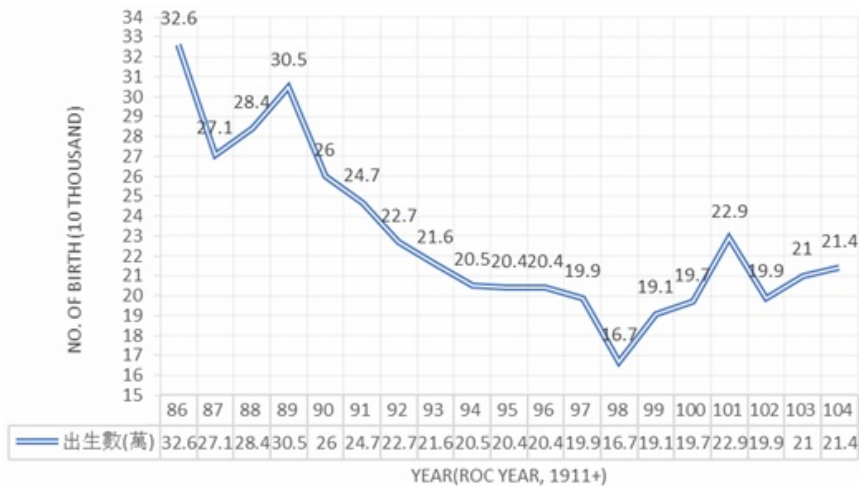
說明：出生嬰兒性比例：每百名出生女嬰兒人數所當出生男嬰兒人數。

內政部戶政司編製

Source: Home Affairs Department of the Ministry of the Interior, ROC; the Ministry of the Interior; Statistics Department.

5. The Current Developing and Implementing Strategies

On December 4, 2015, the Minister of Education Wu Si-hua pointed out that Taiwan's higher education is facing three major challenges, i.e. low birth rate, internationalization, and digitalization. The first challenge is coming from 2016, with fewer children leading to university admissions facing greater competition that will inevitably lead to some school enrollment difficulties. As a result, the Ministry of Education has encouraged universities to consider school transition,

Figure 1 Number of Newborns in Taiwan, 1997-2015 (ROC Year 86-104)

Source: Author.

moderate consolidation, or merging. Some specific strategies include: (1) establishment of the university union for resource sharing; (2) university merging; (3) university transformation and innovation, for example, shifting teaching focus from young people to elderly people, from purely academic personnel training to cooperation with the industry university, and overseas enrollment.⁴ In general, strategies of the Ministry of Education responding to the university crisis in recent years can be summarized as follows: (1) public and private college adjustment in moderate scale; (2) reasonable amount of adjustment of colleges; (3) establishment of university exit mechanism; (4) independent features of enrollment; (5) overseas school or programs; (6) university transformation and management innovation.

However, many commentators believe that the university's management and its exit should be determined by the market mechanism, especially in private universities.⁵ But the problems that may be more complicated for universities and the Taiwanese government include: the right to work of the university faculty and staff while facing transition or exit, the school ownership and asset problem after the dissolution of the school, the education rights of the student, and so on. Thus, in February 2017, the Ministry of Education launched a new version of the "Regulations on the Transformation and Withdrawal of Private Colleges". Yet, the four most important points to question in this document are: first, it lacks accountability mechanism for the exit schools; second, it fails to protect the rights and interests of teachers and students; third, the liquidation of the settlement after the attribution is not stipulated; and the most controversial point is, fourth, the legitimacy of listing 5 billion NT. Dollars of transition fund in 4 years to provide financing interest subsidies in order to accelerate the university transition or exit.

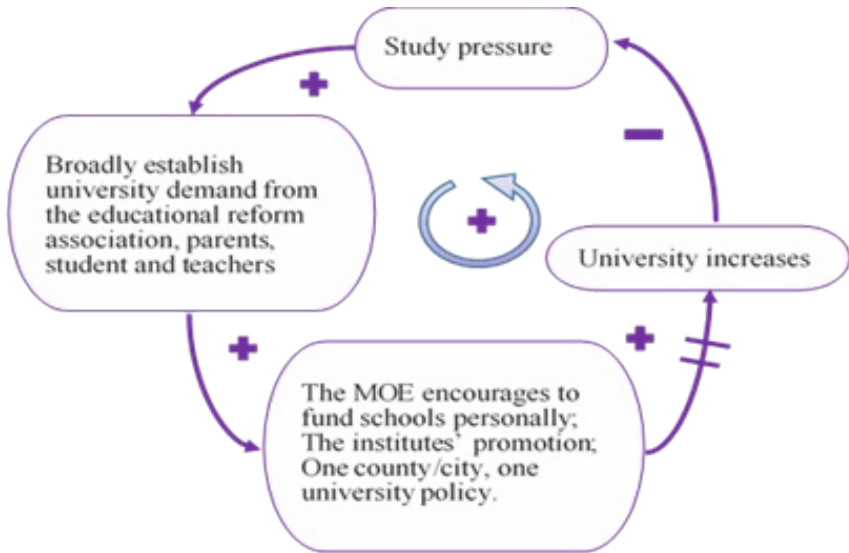
6. Analysis and Discussions

As noted, this paper tries to use Peter Senge's three kinds of system – *Tragedy of the Commons*, *Limits to Growth* and *Fixes and Fail* models derived from the System Archetypes, and based on the *positive feedback loop* diagram, to analyze the impact of the decreasing birth rate upon university education and their management.

6.1. System Archetype of Balancing Loop with Time Delay

A) Situation description:

It overviews the history of expansion of Taiwanese higher education school, being derived from the pressure of schooling. As shown

Figure 2 System Archetype of *Balancing Loop with Time Delay*

Source: Author.

in Figure 2, students, parents and educational reform organizations assembled on the streets and put forward the desire to open the education since the 1980s, and this has caused the government to face great pressure, thus then began to open the pipeline of enrollment, enlarge university capacity, and encourage setting up of private school or college upgrading and restructuring. After a while, the number of schools, colleges and universities increased, and the pressure on the students and parents has gradually reduced. In time delay in the regulation of the loop, the direction of the setting up of colleges and universities was keeping forward. It looked forward to a positive and virtuous circle existing from the beginning, but later, it would find that action has exceeded the target, resulting in a college surplus situation.

B) Early warning signals:

It was in a stage of balance from original thought, but later it was found that action has exceeded the target.

C) Management policy:

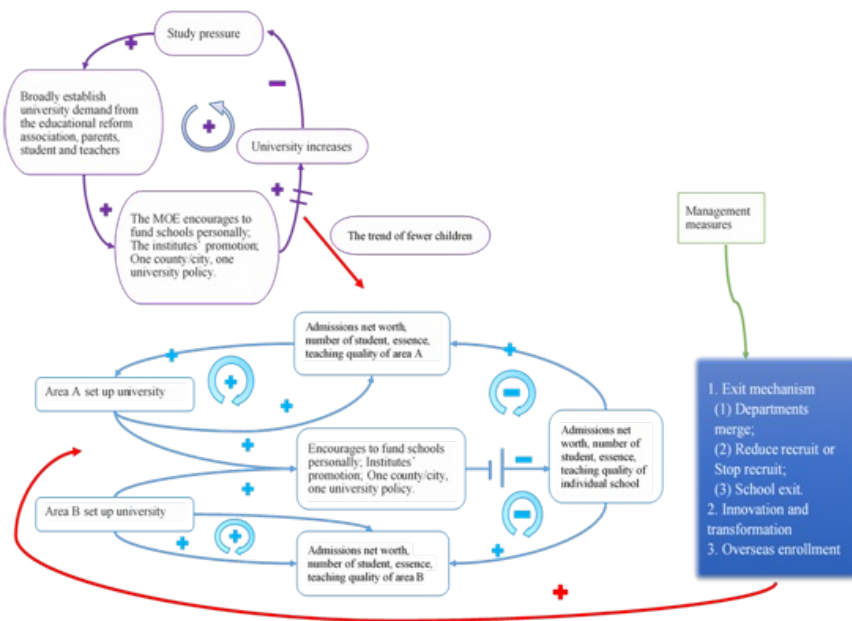
In a need for a long time to continue the action to improve the system, too aggressive and eager action will result in a too much or too little situation. If some enhanced loop in this stage is encountered, such as: many schools to upgrade to colleges, the situation will become more unbalanced, leading to the occurrence of college surplus, finally triggering a crisis of college exit.

Faced with this situation, in the short term, it is necessary to take an incremental and gradual adjustment to find a stable point, but not overkill and lead to the whole system coming into great instability.

6.2. System Archetype of Tragedy of the Commons Model

A) Situation description:

The government began to open school establishment and enrollment pipeline because the quantity of students was adequate. So, the schools at the higher education level gradually expanded, and generate positive feedback loop for higher education system to grow faster and faster. However, the policies of encouraging the setting up of private schools and “one County, one University”, coupled with the fewer children problems – number of births of some 326,000 per year (1987 to 1997) having dropped to only 271,000 in 1998, i.e. plunging by 55,000 in a year, and continually decreasing to about 167,000 in 2010. This is nearly half compared to the number of births 13 years ago! Though slightly rising after that, the number of births totaled only about 214,000 in 2015.

Figure 3 System Archetype of *Tragedy of the Commons*

Source: Author.

Figure 3 shows that source of college students' scarcity has led to universities falling into survival crisis.

B) Early warning signals:

There were abundant and enough resources in the past, but then the situation turned difficult, and it became necessary to work harder to get benefits.

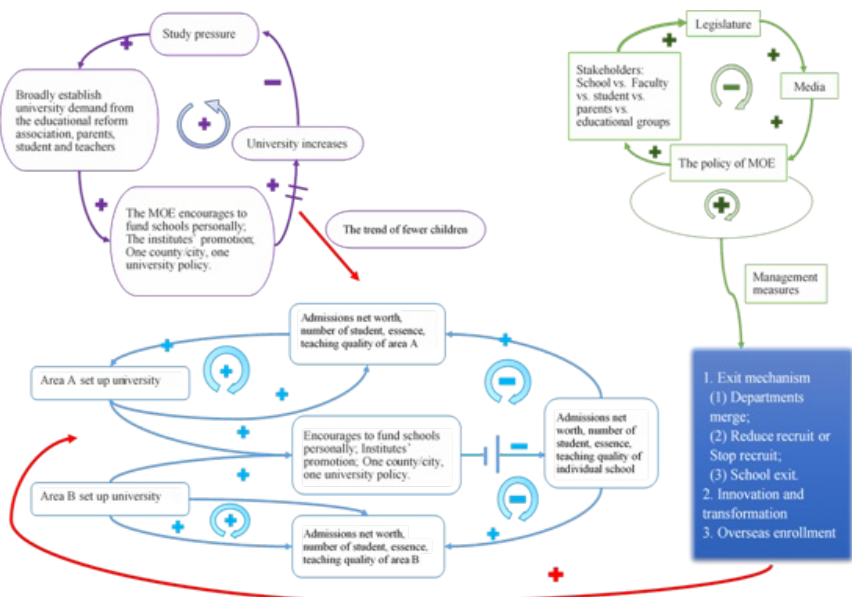
C) Management policy:

There is a need to design a formal regulatory mechanism for the management of common resources through all stakeholders and relevant

interest groups working together. Under the condition of reducing number of students, the education authorities should put forward strategies such as: merging of schools, reduction in the number of or integration of departments/institutes, decreasing or stopping recruitment, and university exit mechanism. From the positive aspects of consideration, the government should encourage universities to seek innovation and transformation, or help universities to advance offshore enrolment and provide overseas programs, and so on. If these strategies could succeed, it may create a positive cycle of system.

6.3. System Archetype of Fixes and Fail model

Figure 4 System Archetype of *Fixes and Fail* model



Source: Author.

A) Situation description:

Each decision has its long-term and short-term effects. Decision makers normally should take a quick response to situations even though they know that it may lead to adverse sequelae. Because if there is no immediate action, some negative effects may be encountered immediately. However, this may only be a temporary relief, the problem will continue to appear, and if the wrong decision is repeated, the situation will be more complex, and more difficult to solve.

Once the Ministry of Education to face the pressure from all parties, then if there is only the first solution to reach short-term remedy (as shown by the blue part in Figure 4) and without clear strategic blueprint, it will probably make the outbreak point delayed, but the situation will be very difficult to deal with once the outbreak point has arrived.

B) Early warning signals:

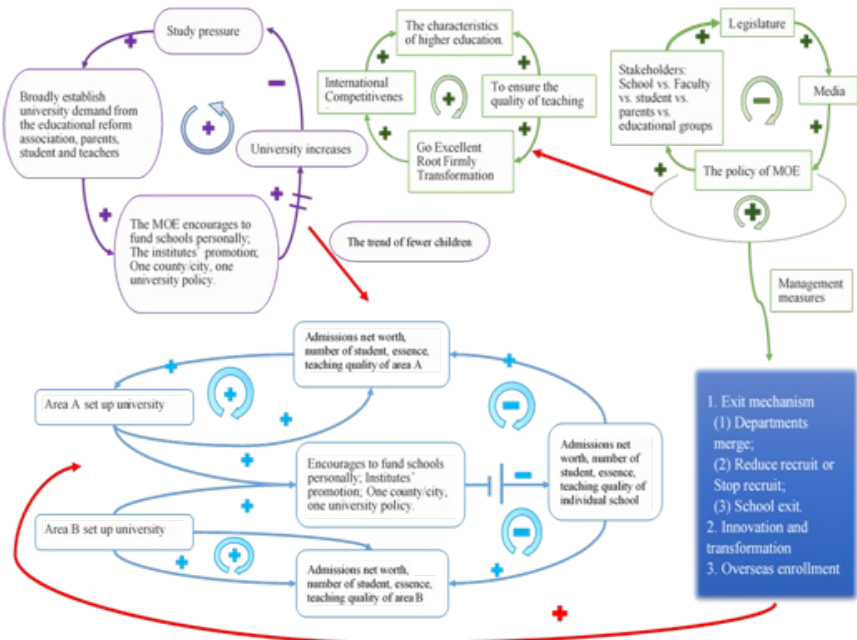
The previous strategy seems to be effective, but now invalid, and things seem to be increasingly complex.

C) Management policy:

The education authorities in Taiwan should be alert to the short-term sequelae of countermeasures, as some countermeasures can only solve the current difficulties, but long-term goals may be harmful. So, it should reduce the frequency of non-systematic countermeasures, and re-focus on the long-term goal and strategy. It needs to re-structure and to find the fundamental problem to seek a proper long-term solution, i.e. stop the university expansion while students are getting less. Moreover, the better way is to gather related stakeholders into the decision-making process and in search of common solution.

6.4. System Archetype of Positive Feedback Loop Diagram

Figure 5 Reinforcing Feedback Loop Diagram



Source: Author.

When the education authorities through coordination process cooperate with the various stakeholders, interested parties, and legislature department, and then set out a feasible long-term vision and goals clearly, try to let policy move towards a consensus among all parties and in the right direction, the system will somehow return to a positive enhanced loop as shown in the middle top of Figure 5.

7. Conclusion and Suggestions

The findings of this study are summarized below:

(1) Lower birth rate and related problems do not occur suddenly, as argued earlier, as the number of newborns in Taiwan of about 326,000 from 1987 to 1997 decreased to approximately 271,000 in 1998, plunging by 55,000 in a year. In 2010, the number of births was about 167,000, nearly half of the number in 1997, reaching a new low in history. On the contrary, colleges and universities have increased by 163 from 1997 to 2006.

Meanwhile, the government has initiated policies such as the establishment of numerous universities and colleges, encouraged private schooling, implemented the “one County, one University” policy, and so on. The contents have involved not only educational reform initiatives but also “political checks”. In 2016, the number of college freshmen began to grow negative, and it will predictably become more severe by 2017. All the data and trends are clear, but higher education policies do not seem to be in the right direction. In fact, the main reason would be to yield to politics and come under the pressure of stakeholders, therefore making “Fixes and Fail” type of policies, eventually resulting in serious consequences.

(2) In respect of the university exit mechanism, the Ministry of Education adopted the *University Law* which in its Article 7 set out the proposal of merger plan for universities on 26 January 2011. On 22 June 2012, the MOE formulated the enactment of the “National University Merger Promotion Scheme”, and then set the implementation of the principle of counseling private institutions to improve and stop to act in September 2013, which is considered as formally starting the university exit mechanism.

According to the plan of the Ministry of Education, there will be about 60 universities which need to be withdrawn in five years. However, there seems to be no consensus on some controversial matters yet, such as the rights of the faculty members that is of concern to the Higher Education Union, and the suspicion that tens of billions of schools' properties may be privatized, etc.

(3) For university innovation and transformation, the “Transitional Program for Higher Education” was issued on March 27, 2015, which was assigned to establish the task force and specific office that will be responsible for handling the university innovation and transformation issues. The office will conduct three missions of the reform and transformation of counseling, teaching quality maintenance, and human resource upgrading. The *Higher Education Innovation and Transformation Act* was then put forward on July 3, 2015. The legislative connotation includes the strategies of “high-level talent promotion”, “consulting for the exited school”, “school remodeling” and “university cooperation and merger”.

Yet, a project developed by MOE in accordance with the above-mentioned Act which is considered the basis of regulation of university transformation was stopped to act on September 29, 2016. Apparently, *The Transformation of Higher Education Innovation Act* seems to be dead. In fact, the policy has not been sustained due to the change of government in 2016, and numerous interested parties and stakeholders have nothing to do with it.⁶

(4) Regarding the university exit mechanism, the new government set up the “Scheme for the Transformation and Exit Fund” which was enacted in 2017. It was proposed to be approved by the “Central Government Special Fund Management Guidelines” and submitted to the Executive

Board for approval. Then, according to Article 4 and Article 21 of the *Budget Law*, the provisions of the fund income and expenditure custody and use were agreed upon.

In February 2017, a new plan was also proposed for the transformation and exit of private educational institutions. However, the draft was highly controversial and criticized. The Anti-Education Commercialization Union questioned about possible malpractice if the private schools exited according to the Scheme could change mode into “other educational, cultural or social welfare institutes”, and if including them into the urban planning lands can also assist in the rapid change. Many criticisms on the university transition indicate that it may easily become a private industry, but other messes would come up with 5 billion NT dollars of national funds to deal with! Thus, the Anti-Alliance suspects and protests against the Private University Transformation and Exit arrangements, and believes that it cannot solve the current higher education crisis in Taiwan.

As a policy analysis article, this research has the following policy suggestions and recommendations:

(1) In response to the trend of fewer children, the Ministry of Education should put forward coping strategies at an early stage, and think of it as a critical governance project. Nevertheless, it seems that the MOE policy initiatives on this serious problem were not given special attention and were not being consistent – as noted, the policy or program swings and is lack of consensus, thus cannot get the trust from people and cannot effectively solve the problem as well. The collapse of higher education is imminent, hence management strategy should be consistent in order to avoid the occurrence of the *Fixes and Fail* dilemma.

(2) The legislation is, in fact, only a supporting measure; the organizations need to take a correct and timely management while the *Tragedy of the Commons* system archetypes occur. Only better management can reduce the impact, and law enforcement is not only solution to the problem; in fact, the process of a positive management is the right way to avoid the wrong cycle of governance.

(3) At present, the theoretical models adopted by the social sciences are mostly from the perspective of linear thinking, but many problems in real life are non-linear in structure. This paper starts from the perspective of system dynamics, hoping to grasp the important factors of mutual interaction and influence in the issue of Taiwanese higher education crisis, and hopefully to find a comprehensive strategy to solve such a critical problem.

Notes

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1. *Now News*, 2011.11.19. See: <http://www.nownews.com/n/2011/11/19/456557>
2. The information is extracted from: Ministry of Education (2001). *Records of review and improvement of educational reform*. (Huang, 2003)
3. Sources are mainly at the Home Affairs Department of the Ministry of the Interior. In addition, the Ministry of the Interior Statistics Department on October 15, 2016, released from January to September birth statistics: 2016 January-September number of births 151,411, compared with the same period in 2015 with reduction of 2,630, or 1.7%; crude birth rate of 8.6 thousand points, slightly less than that in 2015 by 0.5 thousand points, with the estimate that the number of babies born in the year being about 210,000.
4. See Wu Si-hua's proposal reported in 《評鑑雙月刊》第 59 期 [*Evaluation bimonthly*, No. 59], 2016.
5. Opinion of Professor David Rosenbloom in his comments on this paper at the 2017 KAPA Conference.
6. *The United Daily* (聯合報), February 7, 2017 (<https://udn.com/news/story/9/2270757>).

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