Evaluating the Scale of the Second Wave of Taiwan High School Graduates Brain Drain Initiative

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Abstract

Taiwan first wave brain drain of college graduates occurred during from 1962 to 1967, their had 51,218 individuals went abroad to United State from Taiwan . Under long-term economic stagnation and China 31 incentive dual effects , the second wave brain drain of high school graduates in Taiwan initiative after 2018 spring. This study aims to evaluate the scale of Taiwan high school graduates' perspectives of brain drain . With the push and pull theory to validate graduates' aspiration of brain drain , and using exploratory factors analysis to construct factors structure , this scale could effectively provide self-assessment for those high school graduates who are interested in studying abroad. We also create a Brain Drain Ratio(BDR) to validate the extent of graduates' brain drain . By open-ended survey data showed that China has become the second priority of brain drain destination for Taiwanese high school graduates from 2018 .

Key words: brain drain, exploratory factors analysis, the second wave, push and pull factors**,** china 31 Incentives Validating scale

Introduction

Taiwan second wave brain drain initiative

Due to the stagnation of economic development in Taiwan, the external migration of manufacturers getting more seriously. The urban housing prices too high to afford that young people are pessimistic about the future prospects, and also the average starting monthly salaries for university graduates reached a peak of NT$28,116 (US$963) last June in 2017[1]. , and youths net wages in Taiwan have struggled to keep pace over the past two decades[2]. . So flipping dilemma for achieve better future become most of Taiwan youths' visions of reality . Meanwhile China released favorable policies (*China's 31 Incentives)* that especially advantageous for Taiwan youths on the February 2018, significantly reduced the application standards of China elite universities for Taiwan high school graduates. Both low tuition and same language advantages were also actually encouraged lots of Taiwan high school graduates. A poll survey from *Taiwan public opion foundation* showed that there're 40% among youths between the ages of 20 and 24 , and 38% respondents those with higher education both thought *China 31 Incentives* good for their future development[3] .

Studying abroad is no longer a top-notch patent for a few elites in Taiwan since *China 31 incentives* revealed. It really encouraged more middle-class graduates to pursuit going abroad for better future that leading the second wave of brain drain initiative in Taiwan.

[1]Timothy Ferry (2018) Taiwan Competes for Talent and Manpower *Taiwan Bussness Topics*
[2]Ralph Jennings(2018) Why Taiwan's Wages Are Low For A Developed Asian Economy Forbes
[3]Elizabeth Hsu(2018)CNA Six in 10 Think China's Incentives Could Lure Taiwanese: Poll Taiwan Competitiveness Forum

The Theory Framework

Classic approach to the migration is push-pull theory. This theory proposed by Ernest Ravenstein who analyzed internal migration in England during 1870s[4]. Ravenstein believed that pull factors play a more important role than push factors causing migration. He also acknowledged that the most important factor motivating people to migrate is a desire to improve their lives rather than away from disappointed original. Then in terms of studying the causes of population mobility, the most important macro-collection theory in demography is the push-pull theory. The first to put forward this theory is D.J.Bagne, He believed that both the outflow and inflow land have both tension and thrust, and at the same time supplement the third factor: the intermediate obstacle factor. The intermediate obstacles mainly include the distance, the material barriers, the difference in language and culture, and the value judgment of the immigrants on these factors. Population mobility is the result of a combination of these three factors.[5]

Everett Lee make more definitions to push factors. Lee proposed the impact factors which is intervening obstacles have on the migration process.[6] Factors such as distance, physical and political barriers, also influenced the willing of original migration . Lee emphasized that the migration causing factors diversified as age, gender, and social class respond to people push-pull factors of migration. Furthermore, personal factors such as school education, family and friend connection that also the factors involved.

The rapid change in the globalization and science technology fast innovation caused no more clear employment prospects for graduates in most disciplines ,[7] and apparently trying to pursuit well-to-do life, self – realization and being demanded are common for everyone .[8]

Globalization is primarily manifested in the possibility of educational mobility , and diversified learning and competition are the key to success in globalization.[9] According Mazzarol research indicated that there were six 'pull' factors have been found to influence student selection of a host country . The first is pursuit better quality educationand knowledge, second is the outflow destination decision influenced by parents and relatives recommended. Third is expect lower tuition fees in the host education, forth is expect lower travel costs. Fifth is expect lower cost of living, and last is expect to have more job opportunities in the host. Obviously those pullfactors just as Ravenstein proposed that more practical and positive to graduates.[10] Both push and pull factors are external forces which impact on graduates' behavior and choices, but much depends on the personal characteristics of the graduates. These characteristics include socio-economic status, academic ability, gender, age, motivation, and aspiration .[11]

Purposes Recently Taiwan graduates are looking at options other than the United States for study abroad opportunities. Some of the main reasons are economical. In fact, the number of Taiwan graduates in the United States had been declining gradually ever since it peaked in the mid-1990s .[12] Graduates from middle-class families are now more likely to consider possibilities other than the United States to reduce the cost. For the long-term low wages and soaring housing prices that causing most of Taiwan youths worried about the future of life. After China 31 incentives policies announced on February 2018 , the number of Taiwanese high school graduates applying to China universities has increased significantly .[13] This article hopes to design a scale to evaluate more high school graduates who eager to study abroad earlier at this critical moment.

Research limitations

Since Taiwan ruling authority kept hostile with China, most of recruited high school administrators hoped there were no negative description about home situations to avoid unnecessary trouble . So the push factors of this scale were being limited to represent and only could describe indirectly to evaluate graduates perspectives of source disadvantages . Therefore, the push factors must be modified and recoding to present what their truely implication

[4] E. G. Ravenstein(1885) The Laws of Migration Vol. 48(2) p.199
[5] Donald.J Bagne (1969) *Principles of Demography* New York : Johnson Wiley and Sons
[6] Everett S. Lee (1966) A Theory of Migration *Demography* Vol.3,(1) p.48
[7] Hong T. M. Bui, Hoa T. M. Nguyen, Doug Cole(2019) Innovate Higher Education to Enhance Graduate Employability: Rethinking the Possibility p.159
[8] Zhatkanbaeva (2012) The Impact of Globalization on "Brain Drain" in Developing Countries.p.1493
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[11] Mei-Li, Mark Bray (2007) Cross-border flows of students for higher education: Push–pull factors and motivations of mainland Chinese students in Hong Kong and Macau p.794
[12]Carol Chen (2016/08/15) The Continuing Attraction for Taiwanese of Study Abroad *Taiwan Business Topics* https://topics.amcham.com.tw › 2016/08 › continuing-attract
[13] Rachel Lin, Jennifer Huang, Su Meng-chuan and William Hetheri(2018) China targeting students using Stipends *Taipei Times* Apr 03, 2018 . p. 3

Methods

This validation scale included four-part questionnaires-- Part A, B and C were close-ended surveys , Part D was open-ended survey . Part A included four items to recognize graduates' background and BDR (Brain Drain Ratio) (see Table 1). Part B comprised ten push factors items regarding graduates' perspectives of home disadvantages . For meaning and clarity, we used a five-point Likert scale to classify intensions and recode their exact meanings (5=strongly agree,4=somewhat agree, 3=neutral, 2=somewhat disagree, 1=strongly disagree). Scale scores were analyzed with descriptive statistics rankings (Table 2a), and examined by Exploratory Factor Analysis (EFA), as interrelated identifying items[14](Yong, Pearce 2013) (see Table 2b). Part C has ten pull factors items regarding graduates' perspectives of host advantages. Scale scores were also analyzed with descriptive statistics rankings (see Table 3a), examined by Exploratory Factor Analysis (EFA), as interrelated identifying items (see Table 3b). We used a five-point Likert scale to classify intensions and recoded them for their exact meaning. We created a variable (BDR) to represent the intensity of graduates' perspectives of brain drain. It consists of pull factors scores integrated A with push factors integrated B, and A/B represent BDR. If the BDR is greater than one, means graduates more wish to brain drain than stay home and vice versa. We especially designed Part D open-ended items that could more valid and more reliable with unbiased reponse of brain drain preferences . .

Participants

A total of 230 high school graduates participated scale validation. By way of sending email to pursuit principals' helping to explain the scale contents and purposes, and class tutors recruit student volunteer to complete thisscale validation. For survey research intended to represent all schools , a response rate above 80 % is expected[15]This scale survey Effective responses are 92.7 % (230 of 248) .

Instruments

A 24-item close-ended scale and 2-item open-ended survey were developed based on literature review and consultation with three scholars and four high school counseling experts. We created a four domain subscales to validate high school graduates' perspectives of brain drain. Item A (1 to 4) is graduates' background andcharacteristics, item B (1 to 10) is brain drain push factors. Item C (1 to 10) is brain drain pull factors, item D (1 to 2) designed to confirm graduates' brain drain preferences . SPSS software (version 22.0) was provided for descriptive analysis, T test and one-way analysis of variance (ANOVA) were used to examine graduate' background and brain drain ratio (BDR) relationships. Exploratory factor analysis (EFA) were used to reduce the items of this scale to five sub-constructs , and to measure high school graduates' psychological traits such as attitudes, motivations, or abstract concept of intention. DeVellis(2003) proposed that rarely studies using less than 150 samples for EFA.16 We recruited 230 high school graduates from nationwide to represent their perspectives of brain drain . This article of Scale Content Validity provided from three professors and four high school experts, and Content Validity Index (CVI) divide into content suitability and text clarity . Content suitability scores from 0.86 to 0.97, and text clarity scores from 0.83 to 1 that indicated the scale appropriateness and importance.[16]

Table 1 High School Graduates Background & Characteristics and BDR (4 Items)(N= 230)

Variable	N	%	BDR(Mean±SD)	F	P
Gender				F=4.859	0.028*
Male	123	53.5%	1.289±0.367		
Female	107	46.5%	1.254±0.259		
Subject				F=4.567	0.034*
Science	142	61.7%	1.289±0.350		
Social	88	38.3%	1.248±0.268		
Growing Region				F=2.703	0.010*
Northern Urban	61	26.5%	1.249±0.275		
Northern Rural	49	21.3%	1.299±0.305		
Central Urban	22	9.6%	1.371±0.559		
Central Rural	16	7%	1.344±0.265		
Southern Urban	24	10.4%	1.276±0.310		
Southern Rural	27	11.7%	1.173±0.172		
Eastern Urban	23	10%	1.261±0.362		

[14]Yong & Pearce(2013) A Beginner's Guide to Factor Analysis: Focusing on Exploratory Factor Analysis *Tutorials in Quantitative Methods for Psychology* Vol. 9(2) p. 83

[15]Jack E. Fincham(2008) Response Rates and Responsiveness for Surveys, Standards, and the *Journal m J Pharm Educ* Vol 72(2) p. 43

[16]Robert .F.Devellie(2003) Scale Development Theory and Applications (2nd ed.) p. 49

Family Economic				F=0.662	0.576
Middle class	27	11.7%	1.263±0.353		
Well-Off	177	77%	1.275±0.317		
Needy	14	6.1%	1.276±0.357		
Others	12	5.2%	1.257±0.308		

Table 2a Push factors analysis (10 Items)

1. Factor 1: Source Socioeconomic Advantages (Item 6.7.8.9)
2. Factor 2: Source Sociopolitical fare system (Item 1.2.3.4.5.10)

Item	Content	Mean	SD	Fac1	Fac2
6	Domestic well health care system	4.11	0.879	0.003	**0.826**
8	Social stable inviorment	3.45	0.984	0.171	**0.772**
7	Stabilized domestic goods price	3.13	0.869	0.403	**0.667**
9	Familiar learning & employment	3.66	0.983	0.302	**0.612**
4	Reasonable labor rights	2.71	0.914	**0.771**	0.184
2	Optimistic domestic economic	2.63	0.805	**0.769**	0.110
5	Domestic fair progression system	2.66	0.995	**0.720**	0.093
3	Domestic stable politics	2.65	0.975	**0.635**	0.262
10	Domestic well innovation	3.34	0.850	**0.518**	0.282
1	Domestic university excellent quality	3.35	0.757	**0.468**	0.447
Sum of squared loading (Eigenvalue)				4.047	1.253
Percentage of variance explained (%)				40.47	12.53
Cumulative percentage of variance (%)				53.01	12.53
Cronbach'α				0.726	0.766

Note: KMO=O.85333 Fac=Factor

Table 2a Summary of item of Brain Drain Scale of push factors for high school graduates (N=230)

			Extreme group comparison Top 27% group		Bottom 27% group				Homogeneity test Item-total
Item	Mean	SD	Mean	SD	Mean	SD	T	P	correlation
Push factors	3.90	0.53							
1 Domestic university excellent quality	3.35	0.757	3.75	0.542	2.96	0.863	12.18	0.01	0.501
2 Optimistic domestic economic	2.63	0.805	3.22	0.570	2.01	0.606	12.89	0.00	0.500
3 Domestic stable politics rights	2.65	0.975	3.28	0.750	2.01	0.606	10.67	0.00	0.505
4 Reasonable labor rights	2.71	0.914	3.35	0.578	1.89	0.711	14.25	0.00	0.611
5 Domestic fair progression system	2.66	0.995	3.42	0.826	1.96	0.878	10.76	0.00	0.505
6 Domestic well health care system	4.11	0.879	4.74	0.441	3.37	0.837	13.13	0.00	0.425
7 Stabilizied domestic goods price	3.13	0.869	3.86	0.685	2.55	0.685	12.24	0.00	0.571
8 Social stable enviorment	3.45	0.984	4.30	0.601	2.65	0.688	16.29	0.00	0.480
9 Familiar learning & employment	3.66	0.983	4.36	0.713	2.99	0.804	11.54	0.00	0.511
10 Domestic well innovation	3.34	0.850	3.81	0.601	2.88	0.877	7.83	0.00	0.393

Table 3a Pull factors analysis (10 Items)

1. Factor 1: Source weak economic development (Item 6.7.8)
2. Factor 2: Host culture education Advantages (Item 3.4.5.9.10)
3. Factor 3 : family peers incentive (Item 1.2)

No	Content	Mean	SD	Fac1	Fac2	Fac3
1	Parents incentive influence	3.53	0.945	0.113	0.093	**0.881**
2	Teachers or peers encouragement	3.53	0.838	0.112	0.341	**0.778**
4	Yearning for foreign culture	4.07	0.780	0.054	**0.833**	0.168
3	Media network impact	3.63	0.838	0.086	**0.786**	0.197
5	Yearing for foreign talented pools	4.11	0.821	0.361	**0.781**	0.067
9	Yearing foreign flexible learning system	4.08	0.845	0.517	**0.552**	0.167
10	Yearing foreign diversified employment	3.75	0.864	0.418	**0.513**	0.227
7	Domestic lower wages	4.14	0.797	**0.860**	0.193	0.097
8	Domestic declining employment	3.85	0.887	**0.836**	0.073	0.047
6	Domestic economic stagnation	3.99	0.851	**0.830**	0.218	0.124
Sum of squared loading (Eigenvalue)				4.490	1.482	1.001
Percentage of variance explained (%)				44.89	14.82	10.01
Cumulative percentage of variance (%)				44.89	59.71	69.73
Cronbach'α				0.627	0.814	0.702

Note: KMO=O.834 Fac=Factor

Table 3b Summary of item of Brain Drain Scale of pull factors for high school graduates (N=230)

			Extreme group comparison Top 27% group		Bottom 27% group				Homogeneity test Item-total
Item	Mean	SD	Mean	SD	Mean	SD	T	P	correlation
Pull factors	3.899	0.533							
1.Parents incentive influence	3.53	0.945	4.36	0.569	2.74	0.612	18.42	0.15	0.333
2. Teachers or peers encouragement	3.53	0.838	4.24	0.603	2.95	0.565	14.81	0.00	0.484
3.Media network impact	3.63	0.838	4.36	0.626	3.05	0.575	13.21	0.00	0.499
4. Yearning for foreign culture	4.07	0.780	4.71	0.457	3.49	0.626	13.51	0.00	0.529
5 Yearing for foreign talent pools	4.11	0.821	4.83	0.379	3.37	0.635	16.95	0.00	0.683
6 Domestic economic stagnation	3.99	0.851	5.00	0.000	3.60	0.827	18.52	0.00	0.619
7 Domestic lower wages	4.14	0.797	5.00	0.000	3.84	0.792	15.98	0.00	0.636
8 Domestic declining employment	3.85	0.887	5.00	0.000	3.39	0.784	22.35	0.00	0.441
9 Yearing foreign flexible learning system	4.08	0.845	4.82	0.423	3.27	0.692	16.32	0.00	0.655
10 Yearing foreign diversified employment	3.75	0.864	4.50	0.683	3.04	0.538	14.51	0.00	0.579

Table 4 Open-ended survey of the graduates' Brain Drain preferences (2 Items)(N=230)

Item	male No.(%)	female No.(%)	science subject No.(%)	social subject No.(%)
Destination				
U.S.A	62 (53.4%)	36 (37.1%)	64 (66%)	33 (34%)
China	17 (14.7%)	17 (17.5 %)	18 (14%)	16 (19.3%)
Japan	20 (17.2%)	11 (11.3%)	21 (16.3 %)	10 (12 %)
U.K	5 (4.3%)	16 (16.5%)	9 (7%)	12 (14.5%)
Hong Kong	4 (3.4%)	9 (9.3%)	9 (7 %)	4 (4.8%)
German	6 (5.2%)	4 (5.2%)	4 (3.1%)	7 (8.4%)
Total	123	107	142	88
Pursuit Goal				
More development	58 (47.2%)	30 (28 %)	69 (48.6 %)	24 (27.2 %)
Culture	32 (26 %)	35 (32.7%)	34 (23.9 %)	28 (31.7 %)
Talent pools	16 (13 %)	16 (15%)	19 (13.4 %)	13 (14.8%)
Creative	11 (9 %)	16 (15%)	12 (8.5 %)	15 (17.2%)
Lower tuition	3 (2.4%)	5 (4.7%)	2 (1.4%)	6 (6.9%)
Familiar Enviorment	2 (1.6%)	4 (3.7%)	5 (3.5%)	1 (1.1%)
Lower admission criteria	1 (0.8 %)	1 (0.9%)	1 (0.7%)	1 (1.1%)
Total	123	107	142	88

Results

Part A High School Graduates Background & characteristics and Brain Drain Ratio (BDR)

According Table 1 showed, We found that male BDR significant than female (P=0.028<0.05), means male 10 graduates more desiring to brain drain . Science subject graduates BDR significant than Non-science subject (P=0.034<0.05) , means science subject graduates more desiring to brain drain . From different growing region BDR data that central urban and central rural graduates have higher BDR than others , and significant than other regions (P=0.010<0.05) . We realized that test graduates from central region are elite high schools' graduates so that having higher BDR seems to be granted. Data also revealed that family economy seemed not bother graduates' outflow aspiration (P=0.576>0.05) .

Part B Push factors analysis

As Table 2a showed, the validity using Exploratory factor analysis managed push factors extract to two factors. Most researchers tend to include items with higher loadings (at least **0.5**) into the final scale (Schaufeli et al, 2002),[17] Factor 1 represent Host Sociocultural Advantages, and each item factor loading from **0.468 to 0.771.** Factor 2 represent Home weak economy compare Host merits, and each item factor loading from **0.612 to 0.826 ,** indicated well extent to each item has discriminated between the high scorers and low scorers on the test. for exploratory factor analysis; KMO value is **0.853**, indicated samples are adequate and significant (p<0.01) (Brace et al,2006)[18] ; Cronbach's alpha value of factor 1 is **0.726** and Factor 2 is **0.766** , which indicates a high level of internal consistency for the scale with these specific samples . Table 2b showed push factors item- total correlation value of Factor 1 from **0.393 to 0.611**, Factor 2 is from **0.425 to 0.571** , which indicated the item appropriate for the construct .

Part C Pull factors analysis

Table 3a showed the validity using Exploratory factor analysis managed pull factors extract to three factors . Factor 1 represents source disadvantages and loading values are from **0.830 to 0.860 .**

[17] Rubio et al(2003)Objectifying content validity: Conducting a content validity study in social work research *Social Work Research*, Volume 27(2), pp.94-104

[18] Schaufeli et al (2002) The Measurement of Engagement and Burnout: A Two Sample Confirmatory Factor Analytic Approach *Journal of Happiness Studies* 3: pp71–92

Factor 2 represents host advantages and loading values are from **0.513 to 0.833 .** Factor 3 represents family peers incentive and loading values are from **0.778 to 0.881 .** which indicated well extent to each item has discriminated between the high scores and low scores on the test. These three factors contributed a total **69.73 %** of variance explained , and KMO value is 0.834 , also indicated samples are adequate and significant ($p<0.01$) (Brace et al,2006) .And Cronbach's alpha value of factor 1 is 0.627 and factor 2 is 0.814 , factor 3 is 0.702 . Which all indicated a well internal consistency for the scale with these specific samples . According to the literature, the corrected item-total correlation should be > 0.3 (Groleger Sršen K, Vidmar G, Zupan A, 2015), As Table 3b showed pull factors item- total correlation value of Factor 1 from 0.441 to 0.636, Factor 2 is from 0.499 to 0.683 , Factor 3 are 0.333 and 0.484 **,** which indicated the item appropriate for the construct .

Part D Open-end survey of the graduates' first choice brain drain destination and pursuit goal

From our scale data showed (Table 4) that U.S.A is still the first priority for Taiwan graduates' choice to study abroad . Male graduates choosed U.S.A for brain drain destination up to **53.4%** , more than female(**37.1%**) , and science subject graduates(**66%**) more than social subject(**33%**) . If we add the number of graduates who choose China and Hong Kong , then China apparently upgraded to be the second priority , male graduates have **18.1**% and female graduates have **26.8 %** , and science subject graduates have **21%** that less than social subject (**24.1 %**) . According Mainland Affairs Council datas , the number of graduates to China from 2011 to 2017 are **1433** to **2567** , and proportion from **4.7**% to **7.9%** .[19] Comparing with above datas that the nimber of graduates willing to study in China almost triple as before . We also found that the first prority for graduates' pursuit goal of brain drain is more development , male graduates have **47.2 %** much more than female (**28 %**) , science subject graduates have **48.6 %** compare with non-science subject (**27.2 %**) . Better future seemed to be more attractive for Taiwan graduates than lower tuition and familiar enviorment .

Conclusion

In the spring of 2018, mainland China announced the China 31 incentives, which only for Taiwanese students to lower the admission criteria of Chinese elite universities. It did attract great attention and interests from high school students all over Taiwan. As a rising powerful dominant country , China has become a magnet for the world's talent pool . For having the chance to learn with world talent , the number of applicants for Chinese elite universities from Taiwan various places has increased significantly. Due to the long-term low wages and higher housing prices in Taiwan, most young people are simply unable to afford the general expenses of normal lifestyle. Lowering the admission standards had really encouraged many disqualified middle-level students dare to pursue the dreams that they never have . This study designed a scale of brain drain feasibility assessment for many Taiwan high school graduates who eager to study abroad . Helping more graduates who are interested in further study for better future development with this scale to confirm their intentions and the feasibility of studying abroad . We also expect to help teachers and counselors to acknowledge the actual demands of many potential students in a timely and appropriate manner based on this scale collecting datas . The data we collected from the scale found that the vast majority of high school graduates want to study abroad. More than half of the graduates studying abroad just for pursuing greater development. We realized that the second wave brain drain of Taiwan initiative .

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