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Article

# Detecting the Institutional Mediation of Push–Pull Factors on International Students' Satisfaction during the COVID-19 Pandemic

Dian-Fu Chang <sup>1,\*</sup> and Wen-Ching Chou <sup>2</sup>

<sup>1</sup> Department of Education and Futures Design, Tamkang University, Taiwan; 140626@mail.tku.edu.tw

<sup>2</sup> Department of Education and Futures Design, Tamkang University, Taiwan; sauichou1226@gmail.com

\* Correspondence: 140626@mail.tku.edu.tw

**Abstract:** In this study, we designed a structural model to determine the relationships among push–pull factors, institutional situations, and satisfaction during the COVID-19 pandemic. The 17 selected indicators fell under five domains, namely push factors, pull factors, institutional leadership, international strategies, and satisfaction. Structural equation modeling (SEM) was used to verify the assumptions of the model. Based on 1005 degree-seeking international students' views, this study found that push and pull factors may coincidentally exist, and their functions can be modified by institutional situations. The findings suggested pull factors will, through institutional leadership, impact students' satisfaction, while push factors will not. Moreover, detection of institutional mediation can provide useful information for specific institutes to develop their future recruiting or retaining strategies. These findings enriched our knowledge of the field during the pandemic. For future studies, this design may be useful to interpret the phenomena of global student mobility in higher education settings.

**Keywords:** COVID-19; effects; educational systems; change in higher education; international students; push–pull theory

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## 1. Introduction

In 2020, higher education institutes around the world closed down to control the spread of COVID-19, possibly affecting more than 3.9 million international students studying in OECD countries [1]. Lockdowns have severely affected educational systems around the world, especially for international studies [2]. International students were more vulnerable to the disruptions caused by the pandemic, which determined where and when they could learn. The pandemic not only significantly decreased international student mobility, but is also shifting the mobility flow of international students [3]. The impact of the pandemic in 2019 resulted in a significant decline of inbound and outbound students. In the global context, various studies have found the number of inbound students increased very quickly in the last few decades [4–6]. The number of international students engaged in the process of global mobility is fluctuating. The number of international and foreign tertiary students has grown on average by 4.8% per year between 1998 and 2018 in the OECD [7]. Australia, New Zealand, the United Kingdom, and the United States have a large number of the world's international students. The advantages of international students have been widely discussed; for example, in the European Migration Network's report, the main policy driver for attracting and retaining international students was their contribution to economic growth by increasing the pool of qualified labor [8]. Attracting international students has become an indispensable strategy for national development and global competition. Severe fluctuations in the number of international students may have unexpected consequences. As Rumbley and Altbach argue, the inter-

connection between the local and global is increasingly important to international initiatives, and understanding this relationship is key to comprehending the complex nature of 21st century higher education internationalization [9]. Globalization is both external to education and a threat to local practices, thus requiring a defensive response to the intimidation of global mobility [10], especially during a global influence event, like the COVID-19 pandemic. This study aimed to understand this phenomena, and search for strategies for higher education institutes to ameliorate the worsening learning environment.

This study took Taiwan as an example to explore the decisions of international students and their views on learning during the COVID-19 pandemic. The design of the study was different from a previous single institute survey of non-degree exchange students [11,12]. We considered degree-seeking students, with differences in institutes and the students' countries of origin, based on push-pull theory and the institutional situation. Previous studies did not explore whether there were statistical differences by region of origin or institutional situation, as these factors are ultimately proxies for complex situational/behavioral dimensions. These aspects need more rigorous isolation to be meaningful in the design of research. Moreover, attracting more international students has become a crucial strategy in a declining higher education setting in Taiwan. The Taiwanese Ministry of Education has set an ambitious goal of attracting approximately 130,000–140,000 foreign students by 2020, which equates to 10% of all students in the higher education system [13,14]. Even though the inbound mobility ratio has been increasing steadily and reached 5% in the last decade, this increase would be insufficient to achieve the government's policy agenda of 10% in 2020. We assume that the COVID-19 pandemic will worsen the retaining and recruitment of international students. Therefore, detection of these issues has become an emerging topic. In this study, we proposed a structural model to understand the phenomena. The findings of causal relationships enrich the knowledge of the field. With this purpose, this study explored the following research questions:

- a. What are the influential factors that lead to international students' travel decisions?
- b. Do higher education institutes make a difference in retaining international students?
- c. What kind of structural model can interpret the phenomena during the COVID-19 pandemic?

The rest of the paper will be presented as follows: First, we present a literature review, which includes reviewing previous studies, addressing push-pull theory, analyzing the factors that impact international students, and determining which kind of satisfaction measurement could be carried out. Second, the methodology section includes the definitions of the terms, instruments, sampling, assumptions, and statistical analysis. Third, the results are displayed, including factor analysis and structural equation modeling (SEM). Fourth, the discussion is addressed. Finally, the conclusion is drawn, and we suggest strategies for institutes to attract and retain international students.

## 2. Literature Review

During the COVID-19 pandemic, various studies have focused on the issues related to education settings. For example, the impact on education [15-17], innovative learning technology issues [18-20], and even the impact on international higher education and student mobility [10] have been explored. Studies on international students have not sufficiently explored the effects of situational factors on students' satisfaction. Previous studies have indicated that studying abroad can provide several advantages to students. These include the opportunity to access quality education, to acquire skills, to get closer to job markets, and to improve intercultural sensitivity [21-23]. Students may expect international studies to, for example, expand their knowledge of other cultures, improve their foreign language skills, and improve their employability in increasingly globalized job markets [24-26]. However, the situation has changed, and the learning environment has become uncertain. Students may therefore reconsider their travel decisions during the pandemic recovery. In this study, we considered the push-pull factors and institutional

situation, which may include the leadership and strategies that higher education institutes have provided. Within this framework, student satisfaction could be a crucial indicator that will reflect the learning process.

### *2.1. Impact of Push–Pull Factors*

Previous studies have addressed various issues of international student mobility. Most of the issues relate to inequalities and social mobility. For example, Souto-Otero et al. indicated positive individual motives for studying abroad [27], and some studies have discussed the obstacles embedded in student mobility [28,29]. Within the student mobility literature, push–pull theory is one of the most popular frameworks to explain international student flow. The push factors refer to the negative factors confronted in the original country, while the pull factors refer to the incentives in the destination country. Initially, Ravenstein developed his 'Laws of Migration', and argued that migration is governed by a 'push–pull' process; that is, unfavorable conditions in one place (typically oppressive laws, heavy taxation, etc.) 'push' people out, and favorable conditions in an external location 'pull' them in [30,31]. Based on Ravenstein's theory, Lee further focused on migration between a place of origin and a place of destination, with positive and negative signs signifying push and pull factors, respectively [32]. Between the places of origin and destinations, impact factors may include environmental factors, economic and social factors, and intervening obstacles.

After Lee proposed their theory, it was broadly used in several types of research around issues of international student mobility, including the micro-level factors of the decision-making, involving parents and other relatives. When deciding to study internationally, students might go through four distinct stages: clarifying their intention to study abroad, choosing a country in which to study, selecting a type of institute, and choosing a city [33]. Regarding macro-level factors, the available evidence also suggests a link between the choice of country in which to study and the likelihood of obtaining permanent residency upon graduation [34].

### *2.2. Institutional Mediation for International Students*

COVID-19 has impacted countries that have internationalized their higher education institutes. At the beginning of the crisis, up to 89% of higher education institutes reported a negative impact on international student mobility [35]. According to UNESCO's report, half of all international students go to the United States, Canada, the United Kingdom, New Zealand, and Australia. The remainder may study in Malaysia and South Korea, or favor a destination with a low prevalence rate of COVID-19 [36]. Without a doubt, the future enrollment rates of international students will depend on the measures and policies adopted by the governments of recipient countries in the future. Therefore, institutional mediation could be a crucial factor impacting international students' travel decisions. Institutional mediation may include leadership in institutes, and strategies related to psychological or financial security for students. For example, travel restrictions for international students and deterioration of the determinants that condition international mobility may be taken into account. Moreover, an increase in the offer of virtual cross-border education is another option for higher education institutes.

In China, the Chinese government has initiated a "Study in China" program to increase the number of inbound international students [37]. The central government's ultimate goal for the program is to receive 500,000 international students by 2020, making China the largest recipient of international students in Asia, and a major study destination globally [38]. To achieve this goal, the Chinese government is offering more scholarships to attract overseas students. In 2016, 40% of all new international students received sponsorship from the Chinese government [39]. From the perspective of inbound students, the national policy and institutional strategy to develop soft power and international competitiveness have become the main incentives in the process of internationalization of China's

higher education [37]. Institutional mediation might impact international students' traveling decisions, choice to stay on campus, and their learning satisfaction.

Institutional strategies with cross-border education could be strongly reinforced if the credits will be recognized by the higher education institutions of origin, causing traditional mobility to become less attractive. The virtual mobility model in Europe is an example of this [36]. COVID-19 had increased virtual mobility or collaborative online learning as alternatives to physical student mobility [35]. Studies have found students are generally satisfied with their academic success in the transition to the online learning when studying on a program [40,41]. In this regard, universities should consider virtual mobility programs for international students in the future. This measure has become a decisive factor impacting international students during the pandemic recovery.

### 2.3. Level of Satisfaction

International students may have different expectations, but the aim of enriching their experience through study in a destination country is common. When individual expectations are met, satisfaction will be achieved. Satisfaction can refer to various dimensions of individual life. Widely, life satisfaction could be a crucial indicator to evaluate an individual's contentment with his/her life. It requires a degree of personal judgment to determine whether one's aspirations have been achieved [42]. Life satisfaction may involve one's academic situation, finances, daily life, partnership, and somatic and psychological health [11]. Moreover, previous studies have indicated life satisfaction is a significant indicator to evaluate how well international students have adjusted to their new studying situation [43,44].

Studies have indicated that exposure to an unfamiliar environment can cause anxiety, confusion, and depression, leading to insomnia and physical illness [45]. These experiences have been observed among international students experiencing loneliness or isolation [46-48], with the studies reporting more 'negative' experiences for students from outside Western countries [47-49]. This might limit the experience of studying abroad. In addition, financial concerns and being away from home have been identified as common stressors among international students [50].

Some scholars have focused on positive adjustment among international students to a new study system. Nilsson and Stålnacke's findings suggested that the inbound students had a marginally higher level of satisfaction with their study situation [11]. Therefore, satisfaction can be a useful indicator to evaluate international students' campus life. In this study, we considered satisfaction among international students, focusing on their learning and environment dimensions. Moreover, this study also considered the notion of satisfaction in total quality management, it implied that customers' satisfaction is a crucial indicator of quality assurance in companies. For international students' satisfaction, it can be used to reflect the quality of programs in higher education.

## 3. Method

### 3.1. Design of the Measures

This study employed a self-designed questionnaire to test the proposed model. Bohmstedt suggested the selected measurement items need to be justified to ensure their content validity [51]. Before verifying the proposed model, we carried out reliability and factor analysis to confirm the constructs of the measures. The 17 indicators fell under five domains, namely push factors, pull factors, institutional leadership, international strategies, and satisfaction. All indicators were presented using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), indicating the perception of the international students. The push-pull factors included seven indicators, and asked, "Why have you decided to study at a university in Taiwan?". Questions on institutional leadership and international strategies were designed to ask the participants to indicate their views on their institutions. Seven indicators covered the institutional situation. Satisfaction was determined by actual figures reported by international students, based on the question

“How do you rate your satisfaction?”, for which the weighted levels ranged from very low (1) to extremely high (5). The 17 indicators and their definitions are listed in Table 1.

**Table 1.** Definitions of situational factors and satisfaction.

Domains/indicators	Definitions of indicators
Push factors	
PS1:	Difficulty finding employment in my home country
PS2:	Poor living conditions in my home country
PS3:	Family reasons
PS4:	Political reasons
Pull factors	
PL1:	Study or professional reasons
PL2:	Fondness for Taiwanese life and culture
PL3:	Various opportunities/funding for international students
Institutional leadership	
L1:	My university has competent leadership
L2:	My university is indifferent to international students and Taiwanese students
L3:	My university has collegiality in decision-making processes
International strategies	
S1:	My university has a clear strategy for internationalization
S2:	My university provides various opportunities/funding for international students to undertake study
S3:	My university encourages recruitment of international students from foreign countries
S4:	My university provides funding for international students to attend international conferences abroad
Satisfaction	
Learning:	Your current learning situation
Environment:	Your current overall environment
Overall:	Your overall satisfaction with your current study situation

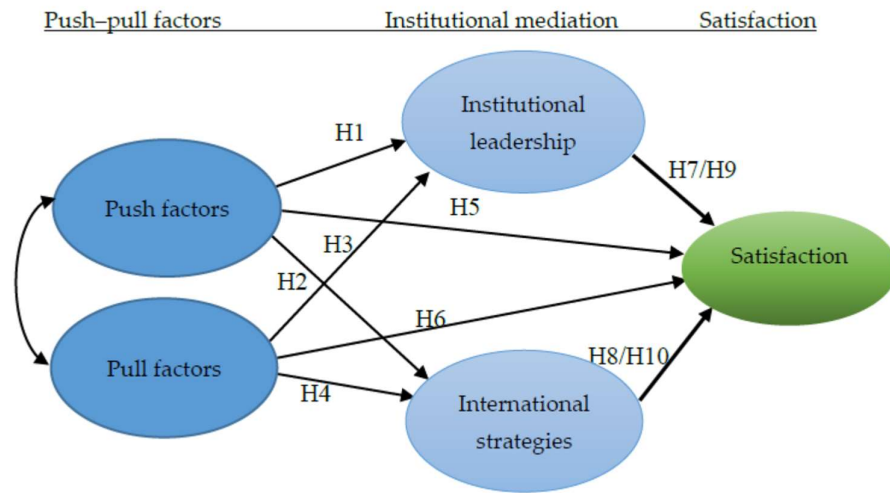
### 3.2. Development of Hypotheses

We developed 10 hypotheses regarding international students' perceptions of push-pull factors linked to the institutional situation and satisfaction. The null hypotheses for testing were as follows:

- H1: There is no relationship between push factors and institutional leadership;
- H2: There is no relationship between push factors and international strategies;
- H3: There is no relationship between pull factors and institutional leadership;
- H4: There is no relationship between pull factors and international strategies;
- H5: There is no relationship between push factors and satisfaction;
- H6: There is no relationship between pull factors and satisfaction;
- H7: Push factors will not, through institutional leadership, impact satisfaction;
- H8: Push factors will not, through international strategies, impact satisfaction;
- H9: Pull factors will not, through institutional leadership, impact satisfaction;
- H10: Pull factors will not, through international strategies, impact satisfaction.

This is a partial mediation model design, because we allowed for the direct impact of H5 and H6. Figure 1 shows the theoretical framework for detecting the effect of push-pull factors, the institutional situation, and satisfaction. SEM was used to verify the assumptions of the model.





**Figure 1.** A framework for detecting the effects of push–pull factors and satisfaction.

### 3.3. Samples

The population of international students in Taiwan was 52,714 in 2020. The fitted samples were collected using the following formula [52]:

$$n = \frac{N}{N \left( \frac{2d}{z_{\alpha/2}} \right)^2 + 1}$$

This study set the confidence level of 95% ( $Z\alpha/2$ ), and the sampling error was controlled within  $\pm 0.03$  (d). The suggested sample was 1066 participants. With permission from the Ministry of Science and Technology, this survey was conducted using the cluster sampling technique, considering higher education sectors and locations, during 2020, and was based on voluntary participation. After deleting uncompleted questionnaires and non-degree seeking international students, we received 1005 valid questionnaires. The distribution of the sample showed 45.8% was male and 54.2% was female. In terms of place of origin, 72.6% were from Asia, 4.3% from Oceania, 3.0% from Africa, 4.9% from Europe, 8.3% from America, and 7% from China. The distribution of the sample was similar to the current picture of international students in Taiwan. Most international students participate in Business, STEM, and Biotechnology programs. A total of 35.8% were studying for a Bachelor degree, 38.8% for a Master degree, and 25.4% for Doctoral degree.

### 3.4. Data Analysis

We carried out a reliability analysis, factor analysis, and SEM. Reliability was used to estimate the internal consistency of the instrument; a Cronbach's alpha  $> 0.6$  can be used as an index of convergent validity [53]. Concerning the factor analysis, we set the criteria for the candidate indicators, and factor loadings of less than 0.50 were omitted [54,55]. The indicators of the push–pull factors and of the institutional situation were justified by the reliability analysis and factor analysis. SEM is a flexible and powerful means of assessing the relationships among latent constructs [56]. IBM SPSS 26 and AMOS 26 (Analysis of Moment Structure) were used to conduct SEM analysis. We assessed the structural relationships among the push factors, pull factors, institutional leadership, international strategies, and satisfaction. The overall model fit in SEM was assessed using the common goodness-of-fit indices, including Chi-square minimum (CMIN), the ratio of Chi-square to degrees of freedom ( $\chi^2/df < 3.0$ ), number of distinct parameters (NPAR), goodness of fit index (GFI  $> .90$ ), adjusted goodness of fit index (AGFI  $> .90$ ), Parsimonious goodness of fit index (PGFI  $> .50$ ), root-mean-square residual (RMR tends to be relatively smaller),

and Akaike Information Criterion ( $AIC = \chi^2 - 2 \times df$ ) [57,58]. Regarding the ratio of Chi-square to degrees of freedom, Wheaton and colleagues suggested 5 or less. Some have suggested as low as "2" or as high as "5" [59], while Byrne et al. indicated that  $\chi^2 / df > 2$  is a bad fit [60]. If the calculated value in the SEM model reaches the ideal criteria, it shows acceptable goodness-of-fit between the hypothetical model and sample data, and the hypothetical model is supported.

**Table 2.** The sample distribution of the international students.

	Classified	Frequency	Percent
Gender	Male	460	45.8
	Female	545	54.2
Origin	Asia	730	72.6
	Oceania	43	4.3
	Africa	30	3.0
	Europe	49	4.9
	America	83	8.3
	China	70	7.0
	Humanities	219	21.8
	Business	208	20.7
Majors	STEM	304	30.2
	Medicine & Bio.	173	17.2
	Others	101	10.0
Degree-seeking	Bachelor	360	35.8
	Master	390	38.8
	Doctor	255	25.4

## 4. Results

### 4.1. Reliability Analysis

In this study, the reliability analysis revealed that all of the indicators have high standardized factor loadings; that is, Cronbach's alpha = .636 on the push-pull scale and .844 on the institutional situation scale. These results imply both scales have convergent validity. The Cronbach's alpha of the entire survey questionnaire, with 17 indicators, was 0.847, which also exceeds the minimum standard of 0.70, as recommended by Hair et al. [61].

### 4.2. Factorial Structure

Among the seven factors related to the push-pull factors, factor analysis indicated Kaiser-Meyer-Olkin's measure of sampling adequacy was .686, and Bartlett's test of sphericity showed that, approximately, the Chi-square was 908.396 ( $p = .000$ ). A targeted 1005 sample was fitted to conduct factor analysis. Table 3 shows the result of factor analysis based on the principal component analysis. The results revealed that "poor living conditions in my home country", "political reasons", "family reasons", and "difficulty finding employment in my home country" were among the push factors; while "study or professional reasons", "fondness for life and culture" and "various opportunities/funding for international students" were among the pull factors.

The factor analysis revealed the seven indicators of the institutional situation scale can be classified into two major factors, namely institutional leadership and international strategies. The total explanation of variance was 64.55%. The results indicated that the Kaiser-Meyer-Olkin's measure of sampling adequacy is .881, and Bartlett's test of sphericity showed the Chi-square is 2479.682 ( $p = .000$ ). Table 4 shows the structure matrix of the institutional situation with principal component analysis and Promax rotation. The construct of the institutional situation scale fits to the requirement of analyzing the latent variables.

**Table 3.** Component matrix of the institutional situation with principal component analysis.

Indicators	Components	
	Push factor	Pull factor
PS2. Poor living conditions in my home country	.720	
PS4. Political reasons	.632	
PS3. Family reasons	.627	
PS1. Difficulty finding employment in my home country	.615	
PL1. Study or professional reasons		.688
PL2. Fondness for life and culture		.538
PL3. Various opportunities/funding for international students		.510

Note: principal component analysis.

**Table 4.** Structure matrix of the institutional situation.

Indicators	Components	
	International strategies	Institutional leadership
S1: My university has a clear strategy for internationalization	.819	
S2: My university provides opportunities/funding for international students to undertake study	.790	
S4: My university provides funding for international students to attend international conferences abroad	.766	
S3: My university encourages recruitment of international students from foreign countries	.764	
L1: My university has competent leadership		.532
L3: My university has collegiality in decision-making processes		.634
L2: My university is indifferent to international students and Taiwanese students		.933

Note. Extraction method: Principal component analysis; Rotation method: Promax with Kaiser Normalization.

#### 4.3. Interpreting the main factors

The results revealed that the international students' perceptions of the pull factors in the destination country was high ( $M = 4.07$ ). The perception of push factors was moderate ( $M = 2.92$ ). The satisfaction levels in learning, the environment, and overall were 3.73, 3.74, and 3.74, respectively. Both institutional leadership and international strategies were relatively high in this survey. The results are listed in Table 5.

#### 4.4. Verification of SEM

The results of the SEM demonstrated the recommended values for the model fit. In this study, we found the CMIN was 554.558 in the default model. According to the  $\chi^2/df$  index, the  $\chi^2 = 554.558$  and  $df = 109$ , the  $\chi^2/df$  index value was 5.09, in the margin. In this case, we were not sure it was a good fit. A previous study argued that it is often easy for  $\chi^2$  to reach statistical significance when the sample is large [62,63]. In this study, the unexpected value might have been caused by the large sample. We assumed our measurement model (the default model in AMOS) to be "not independent" from the data of the observations. We calculated the scaled non-centrality parameter (SNCP) for large samples  $= (\chi^2 - df)/n = (554.558 - 109)/1005 = 0.443$ , indicating a good fit ( $0.443 < 3.00$ ). SEM revealed the NPAR (the number of parameters) was 48. This implies the model can be defined as complex. The results revealed most of the model-fit indices exceeded their respective common acceptance levels, demonstrating that the default measurement model exhibits a good fit with the data collected ( $GFI = .935 > .90$ ,  $AGFI = .909 > .90$ ,  $PGFI = .666 > .50$ ). The AIC in the default model was 650.558, and BIC was 886.370. The estimated and standardized path coefficients and p-values in the proposed model are displayed in Table 6.



**Table 5.** Descriptive statistics for the main factors.

Main factors	N	Mean	Std. Deviation
Push factor	1005	2.92	.809
Pull_factor	1005	4.07	.590
Learning	1005	3.73	.857
Environment	1005	3.82	.814
Overall	1005	3.74	.886
Leadership	1005	3.68	.649
Strategies	1005	3.81	.747

**Table 6.** Estimated and standardized path coefficients and p-values.

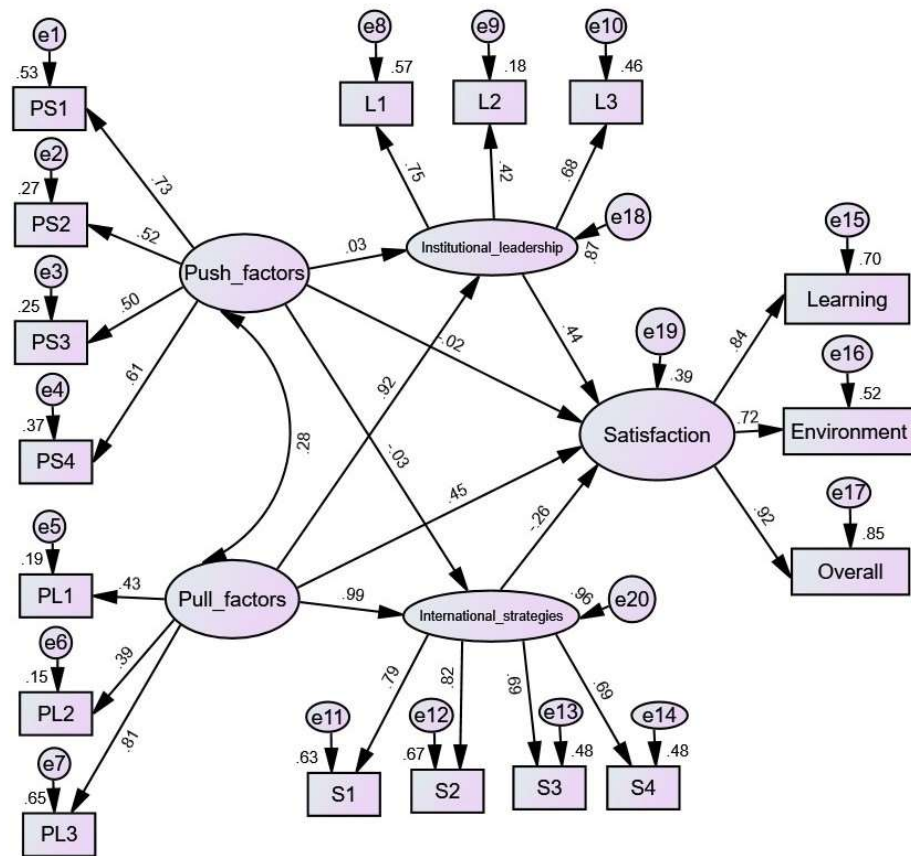
Hypotheses			Estimate	Standardized	p
H1: Institutional leadership	←	Push factors	.06	.03	-
H2: International strategies	←	Push factors	-.04	-.03	-
H3: Institutional leadership	←	Pull factors	1.39	.92	*
H4: International strategies	←	Pull factors	.97	.99	*
H5: Satisfaction	←	Push factors	-.03	-.02	-
H6: Satisfaction	←	Pull factors	.46	.45	*
H7: Satisfaction ← Institutional leadership	←	Push factors	.29/.06	.44/.03	-
H8: Satisfaction ← International strategies	←	Push factors	-.27/-.04	-.26/-.03	-
H9: Satisfaction ← Institutional leadership	←	Pull factors	.29/1.39	.44/.92	*
H10: Satisfaction ← International strategies	←	Pull factors	-.27/.97	-.26/.99	*

Note. \*  $p < .05$ .

Based on Table 5, the results of null hypothesis tests are listed as follows:

- H1: There is no relationship between push factors and institutional leadership (Accept);  
H2: There is no relationship between push factors and international strategies (Accept);  
H3: There is no relationship between pull factors and institutional leadership (Reject);  
H4: There is no relationship between pull factors and international strategies (Reject);  
H5: There is no relationship between push factors and satisfaction (Accept);  
H6: There is no relationship between pull factors and satisfaction (Reject);  
H7: Push factors will not, through institutional leadership, impact satisfaction (Accept);  
H8: Push factors will not, through international strategies, impact satisfaction (Accept).  
H9: Pull factors will not, through institutional leadership, impact satisfaction (Reject);  
H10: Pull factors will not, through international strategies, impact satisfaction (Reject);

The results of SEM for verifying the effect of push-pull factors and situational factors on satisfaction are shown in Figure 2. Pull factors exert more influence on the institutional leadership and international strategies than push factors. Pull factors had a direct impact on satisfaction, while push factors did not have a direct impact on satisfaction in the partial mediation model. This study demonstrated the institutional mediation effect that exists in the SEM model. Specifically, institutional leadership had a stronger influence on international students' satisfaction, while international strategies in institutes did not increase students' satisfaction in this case study. Pull factors can work through institutional leadership to impact satisfaction, while push factors cannot.



**Figure 2.** The result of SEM for the effect of push–pull factors and situational factors on satisfaction.

## 5. Discussion

COVID-19 has caused widespread university system lockdowns during pandemic recovery. Since the interconnection between the local and global is increasingly important to international initiatives, exploring the relationships of student mobility is key to comprehending the increasingly complex nature of 21st century higher education. We agree with the argument of Rumbley and Altbach [9]. This study targeted international students during a time of unique experiences in higher education. Even though this study considered only one case, the findings may provide useful information on higher education.

The findings suggested that international students with strong push factors may find their environment or conditions unsatisfactory in their destination country. Thus, the expected institutional leadership and international strategies might lead to disappointment. International students with strong pull factors may enjoy the institutional leadership and international strategies. The results further suggested that the transformation of international students will depend on the situation of the destination country and their origin countries. Previous studies have discussed the pull factors and obstacles experienced by international students, focusing on specific institutes or countries to interpret the popular phenomena [27-29]. This study extended the push–pull model, realizing the phenomena of student global mobility. Push and pull factors may coincidentally exist, and their functions may be modified by institutional situations.

The SEM model demonstrated the effect of institutional mediation in this study, especially the influence of institutional leadership in the proposed testing model. We found that institutional leadership can make a difference in the case country, while international strategies in the institutes did not. This design can be used to detect similar phenomena

in other higher education settings. We also found a significant effect of institutional mediation. When pull factors are addressed through effective institutional leadership, international students' satisfaction will increase. If the international strategies are not innovative, this could impede the recruitment or retaining international students. Institutional mediation is a variable that higher education institutes can control for specific purposes. For example, Baas indicated that obtaining permanent residency upon graduation may be a strong link between the choice of study and the country [34]. In this study, we found that permanent residency is limited in the case country, so it cannot act as an influence indicator to attract international students. This may be why international strategies in institutes did not contribute much to satisfaction among international students during the pandemic.

Moreover, as UNESCO reported, the virtual mobility model, which has similar benefits for students in the ICT environment without having to travel, could be an alternative tool in the time of the COVID-19 pandemic [36]. During the pandemic recovery, most of the universities in the destination country employed online courses for all students. Research has suggested that international students were satisfied with their academic accomplishments in the transition to an online learning environment. The findings of international students' satisfaction in this study were similar to those of previous studies [40,41]. Enhancing online courses for international students could ameliorate the changes to the learning environment during the pandemic.

We found that levels of overall satisfaction, learning, and environmental satisfaction were all high for the international students. While the SEM model suggested that overall satisfaction explained 85% of the variance, it was weighted higher than the others when compared to their coefficients (see Figure 2). Learning satisfaction was better than environment satisfaction. Improvement of the learning environment for international students is needed during the pandemic. Considering the effect of institutional mediation, we found pull factors will act through institutional leadership to impact students' satisfaction, while push factors will not. Institutional mediation can provide useful information for higher education institutes, and not only those in Taiwan. Moreover, the effect of institutional mediation may reflect system-wide issues in higher education. It can be used to detect the issues in a specific institute or the entire higher education system.

## 6. Conclusion

This study selected specific international students as the research target to explore their traveling decisions, institutional situation, and satisfaction during the COVID-19 pandemic. We employed push-pull theory to verify the relationships among push factors, pull factors, institutional mediation, and satisfaction. This study found SEM to be a useful tool for determining the relationships among the influential factors. SEM can deal with inclusive latent variables, which can shape the patterns of causal relationships. This study assumed both push and pull factors might have various meanings to the international students during the time of a pandemic. Taking Taiwan as an example, we found push and pull factors function in different ways in the proposed model. Regarding international students' satisfaction, the institutional situation can play an important role during the recovery process. We found that institutional leadership can make a difference. By way of virtual courses, even with a partial or entire university lockdown, international students can still fulfill their academic requirements and remain satisfied with the learning process. The study found that push factors and international strategies are weak links in the model. These factors may reflect the issues in current higher education institutes, and should be taken into account in their next initiatives for institutional innovation.

Finally, we suggest that the design of SEM with push-pull factors and related institutional situations could be extended to other higher education settings to detect similar issues. SEM can be used to compare group differences and bootstrapping. For future stud-

ies, we encourage enrichment of the indicators of the research instrument, including related useful factors, for example in national or global contexts, which could extend the validation of the study.

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