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Push Factors Influencing Migration Intentions of Bangladeshi Students for Higher Education Abroad Using a Structural Equation Modeling Framework

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Abstract

This study investigates the push factors influencing Bangladeshi university students' intentions to migrate abroad for higher education, using an extended Push-Factor Framework tested via Partial Least Squares Structural Equation Modeling (PLS-SEM), corroborated with OLS regression and Artificial Neural Network (ANN) validation. Data were collected from 366 university students across Bangladesh using a structured questionnaire on a five-point Likert scale. The measurement model demonstrated strong convergent and discriminant validity (KMO = 0.940; all AVE > 0.50; all HTMT < 0.90). Results show that Social and Cultural Factors and Educational Factors are the strongest direct predictors of migration intention, with Political Instability and Social Pressure operating as significant upstream drivers of social-cultural dissatisfaction. Research Opportunity was the dominant driver of the educational pathway, while perceived Quality of Education had no significant effect on it. Notably, Economic Factors — despite being significantly predicted by both Unemployment and Investment Opportunities — did not significantly predict migration intention directly, indicating that economic strain functions as a background condition rather than a direct trigger for this student population. These findings were consistent across PLS-SEM, OLS, and ANN estimation, lending robustness to the conclusions. The study suggests migration intention among Bangladeshi students is driven more by socio-political dissatisfaction and academic/research aspirations than by immediate economic calculus.

1. Introduction

According to Chowdhury and Kaiser (2023), despite the university boom in Bangladesh between 2008 and 2023, Bangladeshi students' migration has been trebled during the last fifteen years for higher education. In 2008, 16,609 students migrated to other nations to pursue higher education whereas in 2022 the number of migrated students was 49,151 according to the UNESCO Institute for Statistics (UIS). The government has established 43 new public universities and approved 107 new private universities bringing the total to 150 universities in Bangladesh combined public and private universities since the establishment of Dhaka University in 1921 according to the University Grants Commission (UGC) in Bangladesh (Al Masud et al., 2023). Most Bangladeshi students prefer to go to developed countries such as the United States which is the most alluring country, 13,563 Bangladeshi students have been studying in the USA according to the Open Doors report to the Institute of International Education (IIE) followed by the United Kingdom 6,586 students, Canada 5,835 students, Malaysia 5,714 students, Germany 5,046 students, Australia 4,987 students and Japan 2,082 students according to the UNESCO Institute for Statistics (UIS), 2022. Bangladeshi students are also highly interested in migrating for higher education to China, South Korea, Russia, the United Arab Emirates (UAE), and other EU countries (Arif, 2023).

Over 6.4 million students migrate internationally for higher education, a number comparable to El Salvador's population (Moreno-Fernández et al., 2024). According to UNESCO, student migration has tripled in the last two decades, with major destinations including the U.S., Germany, Canada, and the U.K. Over 60% of these students come from middle-income countries, with China and India leading, sending nearly 1.5 million students combined (Glass & Cruz, 2023). Bangladesh student migration began in 1834 under British colonial rule, which structured access to Western-style higher education institutions for the Indian subcontinent (Momen et al., 2024), eventually allowing Bangladeshi students access to U.K. universities.

Bond (2022) argued that migration is influenced by push and pull factors, with individuals moving due to better opportunities or forced displacement. Frustration over job shortages and weak local attachment also contribute to youth migration. As global education demand rises, understanding the motivations and impacts of student migration remains essential for shaping future academic and policy frameworks (Rahman et al., 2024).

Excessive migration derived brain drains in which Bangladesh lost intellectual capital and educational investment (Chen, Wong, & Law, 2023). As a result, Bangladesh loses an estimated $3.1 billion annually, according to Transparency International Bangladesh (TIB). Considering the current context, firstly this study's aim is to discover underlying motivations and forces that drive Bangladeshi students to migrate abroad for higher education (Zaman et al., 2023). Secondly, the aim is to explore which factors have a greater influence on student's motivations for migration decisions (Hossain, et al., 2024). Moreover, they can understand what encourages and pushes students to move overseas, as they can develop better education models for the countries. Furthermore, understanding the underlying motives behind students' migration can inform more targeted and effective migration management strategies.

In Bangladesh, urban-focused development policies have turned cities into centers of trade and industrialization, generating significant employment and livelihood opportunities (Mohammadzadeh, 2022). Recently, scholars have begun exploring non-economic push factors, such as crime rates and political freedom, alongside conventional economic drivers when studying student migration decisions. These studies reveal the social, cultural, and demographic reasons for migration and add to the existing economic explanations of migration processes. Though a lot of work on the behavioral and psychological theories of migration has already been done, migration intention of university students has never before been thoroughly analyzed with the use of a mediation-based structural model (Bekaert et al., 2024). This research contributes to filling the gap in the literature by using one tested structural model which includes all the educational, economic, and socio-cultural push factors as opposed to considering them separately and unrelated. Previous research on Bangladeshi student migration focused mostly on individual push factors and descriptive analysis of the same (Zaman et al., 2023), while this research uses the mediation approach to test the relationships between the factors as pathways toward migration intention (Hossain et al., 2024). A similar analysis is carried out in the third sub-section.

In contrast to existing research studies conducted on migration of Bangladeshi students that have considered push factors either descriptively or separately (Zaman et al., 2023; Faruq, 2021), the current research study adds value in three major ways. First, it examines a mediation-based structural model whereby economic, educational, and socio-cultural variables serve as mediators for the relationship between antecedent variables and migration intention, rather than assuming the influence of push factors as an independent predictor variable. Second, it differentiates the path through education by considering that research opportunity, rather than overall education quality, plays the crucial role in determining the migration intention. Third, it triangulates findings by using Partial Least Squares Structural Equation Modeling (PLS-SEM), Ordinary Least Squares regression modeling, and Artificial Neural Network (ANN).

RQ1: To examine how excellent education, long-term professional, economic, and social prospects drive Bangladeshi public and private university students to migrate for higher education.

RQ2: To evaluate how economic, educational, and socio-cultural factors interrelate as mediated pathways converging on Bangladeshi students' migration intention.

RQ3: To examine the mediating role of Educational Factors and Social and Cultural Factors in the relationship between the upstream push dimensions and Migration Intention

RQ4: To validate the structural model's predictive robustness by comparing the linear (PLS-SEM) and non-linear (ANN) modeling approaches

2. Literature Review

According to Loomans et al. (2024), migration has significantly impacted various aspects of life in both the migrants' home countries and the host countries. The patterns of migration, in terms of quantity and direction, have never been uniform. The upcoming sections will review the most notable literature on this topic, written by various scholars who have explored different aspects of migration (Dimitriadis, 2022). Migration can be seen as an investment in human capital, similar to education and job training, assuming that individuals act as rational agents seeking to maximize their expected lifetime earnings. Migration is frequently perceived as a distinct decision undertaken by individuals seeking to optimize their utility. In essence, pull factors—like democratic governance, economic prosperity, and job availability—attract people to new destinations, while push factors—such as poverty, political instability, and religious intolerance—drive them to leave their current locations (Bond, 2022).

2.1 Migration Intentions

According to De Jong (2021), mass media communication has turned into an essential aspect of the relocation method. Emigrants strive to maintain contact with friends and family in their home country while also establishing and nurturing social networks in their new environment. Since the late 1970s, Bangladeshi university students have been moving abroad in pursuit of higher education and better prospects (Rahman et al., 2024). The United States, Australia, and the United Kingdom have traditionally been the most favored destinations for Bangladeshi students. However, in two decades, Malaysia has emerged as a leading destination for international students (Harnani et al., 2022). The number of Bangladeshi students enrolling in higher education institutions abroad increased significantly from 37,235 in 2013 to 57,675 in 2017. Out of a total of 57,675 Bangladeshi students studying abroad, 2,311 were in Germany. Between 2017 and 2018, the number of Bangladeshi students at German universities increased by 34%. According to recent UNESCO (2020) data, Germany has become the fifth most popular destination for Bangladeshi students worldwide, following the United States, Australia and the United Kingdom (Li & Shao, 2023). The tuition-free policy of German universities has made them particularly attractive to students from Bangladesh. Individuals from Bangladesh's northeast and southeast regions have various compelling reasons for immigrating to Britain (Wan & Abdullah, 2021).

2.2 Push Factors

A push factor denotes conditions that drive persons to depart from their country or area of residence. Often associated with negative implications, push factors typically involve difficulties, distressing situations, and failures in political or economic systems (Nandi & Nedumaran, 2021). Unlike pull factors, which attract people to new locations, push factors influence migration by creating circumstances that compel individuals to abandon their native country. These factors might be classified as economic, social, or political (Qi & Bircan, 2023).

Table 1
Push factors affect migration intentions

Name	Reasons	Description
Push Factor	Deficiency of excellent education	I anticipated having access to various facilities, including a classroom, certified educators, and internet access, but these services were not provided (Borah, 2022).
	Unemployment	Although they possess considerable talent, Bangladeshis are not obtaining appropriate employment opportunities (Ho, 2024).
	Lack of effective government, political stability, and freedom of expression	Education holds no value if I'm unable to express myself (Bhuiyan, 2023).
	Discrimination	Women are often judged based on their perceived inability to achieve certain tasks. Furthermore, in Bangladeshi universities, academic background and physical appearance also play significant roles (Alam, 2020).
	Environmental Issues	The salinity had a profound impact on our soil.
	Corruption	Securing employment or starting a business is nearly impossible without resorting to bribery (Bhuiyan, 2023).

The literature on homeland return decisions is primarily focused on economic, educational, and social/cultural factors (Bekaert et al., 2024). We proposed that situational push incentives, influenced by the surrounding environment, play a significant role, particularly the challenges immigrants' encounter in their host country (Lacroix, 2022). Additionally, students often move owing to 'push reasons' such as unemployment, poverty, and hunger. When people cannot obtain a livelihood in their native villages, they are compelled to migrate to adjacent or distant towns.

2.3 Educational Factors

According to Mahbub (2021), the quality of education in Bangladesh is inferior to that of many other emerging economies, particularly regarding access to higher education. As a result, numerous students aim to seek higher education elsewhere to benefit from more extensive academic programs. Several participants in our study shared their views on this issue, emphasizing their aspiration to acquire international degrees and engage with diverse educational settings (Karim et al., 2023).

Research is a significant career path often pursued through opportunities available abroad. Students with degrees from top global institutions find that their research prospects expand considerably. Students graduating from leading institutions in the world have higher chances of attaining research careers. Firstly, leading research institutions around the world are ready to welcome them (Murray & Gray, 2023). Secondly, through studying abroad, students will get an opportunity to participate in research in reputable firms like Microsoft, Google, or Apple.

2.4 Economic Factors

Owing to the country's high unemployment rate, many students find themselves forced to migrate to developed countries. An analysis conducted by the Bangladesh Institute of Development Studies (BIDS), reported by The Business Standard, shows that 66 percent of the graduates from National University remain unemployed (Borah,

2022). Moreover, most students in Bangladesh graduate from these universities, where two-thirds of them fail to find jobs. Through feedback obtained from our respondents, Western countries seem to provide more career prospects than those in Bangladesh (Alam et al., 2024). One respondent expressed concerns about the job opportunities that exist in their specialty (Hof & Tseng, 2020). Studies on international migration emphasize the importance of economic factors in decision-making process.

Economic factors are the primary drivers for individuals to leave their home country or region in search of better investment opportunities. While health and safety concerns also play a significant role, a lack of transparency can hinder the ability to capitalize on these opportunities (Mohammadzadeh, 2022).

2.5 Social and Culture Factors

Research on the social pressures experienced by international students has identified several obstacles that may result in students departing the host country post-studies. These obstacles encompass homesickness, solitude, stress, depression, culture shock, and food concerns (Bekaert et al., 2024; Cao et al., 2021). Additionally, factors such as cultural adjustment, language barriers, racial discrimination, and insufficient financial support also influence students' decisions to pursue studies elsewhere or influence their experience in the host nation (Loomans et al., 2024).

Political concerns are a significant factor driving brain drain. Political strife and tyranny, which signify political instability, are major reasons why highly educated individuals leave their home countries (Hossain et al., 2024). Political instability refers to conditions, actions or patterns of political conduct that pose a risk of undermining of modifying the democratic system in an unlawful manner. In this context, political instability in home countries leads individuals to lose faith in their governments and their prospects for a better future, especially those who face challenges due to their ethnic, cultural, or religious affiliations or their involvement in opposition political groups (Ali et al., 2024).

2.6 Research Hypotheses Development

2.6.1 Economic difficulties push Bangladeshi students to migrate

An unstable economy keeps a country stagnant; progress, growth, and motivation to improve one's standard of living deteriorate over time (Bhuiyan, 2022). Bangladesh had been facing economic difficulties since 2019. Moreover, rising income inequality was rocketing the crime rate forcing Bangladeshi students to migrate. Since the 1990s, industrialization in Bangladesh has been concentrated in only one garment sector, higher educated students couldn’t find available industrial sectors to work on. Even if they found a favorite sector to work in, industries did not have enough capability to fulfill their pay demand compared to overseas countries (Hof & Tseng, 2020).

H1: Economic Factors are positively associated with students’ migration intention.

2.6.2 Education quality and facilities have always been a great attractor of quality students.

To operate universities spontaneously as a center for academic autonomy some accommodations like a favorable setting for coaching and teaching, sovereignty coupled with responsibility, etc. are essential (Slaatto et al., 2023). However, in the absence of universities' satisfactory resources, which make them solely dependent on the government. Students are going abroad to seek higher education which leads to migration (Murray & Gray, 2023).

H2: Educational Factors are positively associated with students' migration intention.

2.6.3 Better opportunities for investment and life attract Bangladeshi students to migrate

Better and secure investment opportunities attract students to migrate as well as invest. Bangladesh often has a monopoly, scam, security concern, syndicate, and political influence on investment which forces them to think twice about investing in Bangladesh. Besides, Bangladesh does not have enough variety of investment options and facilities (Duan et al., 2023).

H3: Investment Opportunities are positively associated with Economic Factors.

2.6.4 Political instability has a significant impact on migration intention

Conflict

, harassment, and the absence of political truths are the major political issues in migration. National oppression involves the persecution, discrimination, and torment of the public who are upset with their administration or have alternative spiritual principles or cultural circumstances (Ali et al., 2024). As situations in their country are hazardous, these individuals are forced to migrate to peaceful countries. Recent students' unrest and political instability will motivate more Bangladeshi students to migrate.

H4: Political Instability is positively associated with Social and Cultural Factors.

2.6.5 Poor education demotivates quality students to continue their education in Bangladesh.

The quality of higher education in Bangladesh does not meet international standards, which is a critical shortfall given the importance of preparing graduates for future global challenges (Yusuf & Mohd, 2023). Numerous academics have found that the quality of advanced education is gradually declining. To some extent, public universities have been slow to update time-sensitive course curricula, as faculty members have limited engagement with applied fields and the international academic community. Additionally, academics have lacked a supportive environment for delivering time-demanding courses or topics (Yusuf & Mohd, 2023).

H5: Quality of Education is positively associated with Educational Factors.

2.6.6 Intellectual students are attracted to research opportunities in other countries.

According to Gebrewold (2024), global cooperative research involves cross-country teams that share research interests, operate research, and encourage research results to advance knowledge and endorse positive changes in practice. A growing number of Bangladeshi scholars believe that studying overseas will enhance their employability and improve their career prospects (Mahbub, 2021). Access to international research collaboration allows students to advance professionally, develop personally, and gain a competitive edge in the job market.

H6: Research Opportunity is positively associated with Educational Factors.

2.6.7 Inability to provide security and safety leads to migration intention.

One of the variables of social and cultural factors is life dissatisfaction. Life satisfaction is an aspect of subjective well-being and psychological stability. It predicts negative health consequences, signs of depression and suicide (Akter, et al., 2024). Present students of Bangladesh have been observing social, cultural, and political unrest which has a direct impact on their mentality and emotions that is fueling their intention to migrate. Moreover, higher-educated students tend to go abroad and settle there, which is becoming a cultural trend that cultural factors also influence students to migrate (Constant, 2021).

H7: Social and Cultural Factors are positively associated with students' migration intention.

2.6.8 Enormous economic inequalities put immense pressure on migration.

Social migration pressure refers to the growing forces in the global economy that create increasing demands for labor movement from poorer to richer countries due to income gaps, demographic trends, and economic disparities. Corruption, income inequality, rising crime rate, disturbances in law and order, and heavy corruption within law enforcement forces are building pressure on Bangladeshi students to migrate (Bhuiyan & Akter, 2024).

H8: Social Pressure is positively associated with Social and Cultural Factors.

2.6.9 Unemployment has fueled students' intention to migrate to other countries

According to Bhuiyan (2023), the lack of better job opportunities is heavily tied to government jobs, which are also competitive and scarce, forcing students to seek better options outside the country. Employment scarcity in Bangladesh pushes quality students to migrate and demotivates them from staying in their home country. However, developed countries offer better opportunities and lifestyles, which increases migration intention.

H9: Unemployment is positively associated with Economic Factors.

2.6.10 Mediation Hypotheses

Beyond the direct effects proposed in H1 through H9, this study theorizes that Economic Factors, Educational Factors, and Social and Cultural Factors do not merely predict Migration Intention directly, but also function as mediating mechanisms that transmit the influence of their upstream antecedents onto migration intention. This

mediation-based reasoning follows recent calls in the migration literature for models that move beyond simple bivariate push-factor associations toward multidimensional, pathway-based explanations (Bekaert et al., 2024; Duan et al., 2023). Specifically, Social Pressure and Political Instability are theorized to shape migration intention not only directly through their downstream effect on Social and Cultural Factors, but indirectly, with Social and Cultural Factors carrying (mediating) that influence through to Migration Intention. Similarly, Investment Opportunities and Unemployment are theorized to influence migration intention indirectly through Economic Factors, and Quality of Education and Research Opportunity are theorized to influence migration intention indirectly through Educational Factors. These mediated pathways are formalized in the following hypotheses:

H10: Social and Cultural Factors mediate the relationship between Social Pressure and Migration Intention.

H11: Economic Factors mediate the relationship between Investment Opportunities and Migration Intention.

H12: Educational Factors mediate the relationship between Quality of Education and Migration Intention.

H13: Educational Factors mediate the relationship between Research Opportunity and Migration Intention.

H14: Economic Factors mediate the relationship between Unemployment and Migration Intention.

H15: Social and Cultural Factors mediate the relationship between Political Instability and Migration Intention.

Source: Author's work

Push Factors: Push Factors highlights the limitations and challenges within Bangladesh that motivate student to seek education abroad.

3. Methodology

3.1 Method Selection

In this study, a quantitative research approach with an explanatory correlational design was adopted to ensure a large sample size was obtained. Using qualitative research which focused on describing the significance of experiences based on an online questionnaire survey for data collection (Sohel et al., 2024). The research used both primary and secondary data. To collect primary data, a construction questionnaire was developed which students completed in groups of their choice. Secondary data was assembled from various sources, including books, journals, publications, research projects, articles, and websites, to support the study's objectives (Leo et al., 2023). This method recognized the persistence to discover the main backgrounds of higher education intention in extraneous countries.

3.2 Instrumental Development and Research Design

A representative sample was selected for analysis using a random selection technique. To gather primary data, a questionnaire aligned with the research objectives was administered (Hof & Tseng, 2020). The questionnaire was designed in an objective format using a five-point Likert scale (Alabi & Jelili, 2023). The questions focused on collecting basic demographic information about the students and measuring the ten push constructs examined in this study: Economic Factors, Educational Factors, Investment Opportunities, Migration Intention, Political Instability, Quality of Education, Research Opportunity, Social and Cultural Factors, Social Pressure, and

Unemployment. Each construct was measured using multiple indicator items adapted from prior migration and higher-education literature (Alabi & Jelili, 2023). Participants provided their responses on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores suggested a stronger intention to migrate abroad, though no specific cutoff was defined (Lu et al., 2023).

3.3 Survey and Sampling Techniques

Since no single standardized instrument was available to measure all constructs of interest, items were adapted and validated from established scales in prior migration and higher-education research to identify each latent variable through its observable indicators. A simple random sampling technique was employed to select participants across multiple public and private universities in Bangladesh, and this strategy was applied consistently throughout data collection. Participation was voluntary and anonymous; no personally identifying information was collected, and respondents were free to withdraw at any point during the survey. After screening for incomplete responses and validating item loadings, the final sample consisted of 366 student participants. Table 2 presents the demographic profile of the respondents. Descriptive statistics, such as frequencies and percentages for categorical variables and means and standard deviations for continuous variables, were calculated to describe demographic and key outcome variables, with a particular focus on the intention to migrate abroad. Data modeling was conducted using the PLS-SEM method, chosen for its suitability with moderate sample sizes and its capacity to simultaneously estimate multiple structural paths (Bhuiyan et al., 2023). Reliability was assessed using SmartPLS through Cronbach's alpha and composite reliability metrics.

3.4 Ethical Approval

and Informed Consent

This research was conducted following established ethical standards to ensure integrity, transparency, and academic honesty, consistent with recommended practices for ethical research participation (Bredal et al., 2024). Formal ethical approval was obtained from the Research Ethics Committee, Department of Management Information Systems (MIS), Begum Rokeya University, Rangpur, Bangladesh (Approval No. BRUR/MIS/REC/2025/213), and all procedures involving human participants were carried out in accordance with the ethical guidelines and regulations of the said Research Ethics Committee and with the principles of the Declaration of Helsinki. Written informed consent to participate was obtained from all respondents prior to participation.

Table 2
Demographic Profile of Respondents

Variable	Category	n	%
Gender	Male	194	53.0
	Female	172	47.0
Age	Less than 18 years	2	0.5
	18–21 years	87	23.8
	22–24 years	80	21.9
	25–28 years	127	34.7
	29 years or above	70	19.1
Educational Qualification	SSC	4	1.1
	HSC	106	29.0
	Bachelor's Degree	173	47.3
	Master's Degree	83	22.7
Purpose of Higher Education	Higher Education and Migration	181	49.5
	Higher Education Intention	77	21.0
	Migration Intention	20	5.5
	Secured Job Life	46	12.6
	Peaceful Life	42	11.5
Total		366	100.0

Note. N = 366. Percentages are rounded to one decimal place and may not sum exactly to 100% due to rounding.

3.5 Data Analysis Method

After the process of data collection, the original questionnaire papers were discarded, and the results recorded anonymously in the SPSS file. Data entry was done using Microsoft Excel to improve coding accuracy and increase the validity of survey results. Afterward, the data was transferred to SPSS for analysis. To check for the significance of the study hypotheses on the path model, bootstrapping was done to create additional samples with a similar size. Intentions to leave the country upon completion of studies were tested using the R square test to identify correlations among different variables at a p-value of less than 0.05. Structural relations were tested using a non-parametric bootstrapping approach at a 0.05 significance level. The collected data were analyzed using SmartPLS 4.0 and SPSS 27. Structural Equation Modeling (SEM) was done using the partial least squares (PLS) method, while descriptive statistics were done using SPSS. Moreover, a custom approach was used to analyze the data (Akter et al., 2023).

4. Data Analysis and Results

The correlation tests on the items, with a KMO index of 0.940 surpassing the threshold of 0.5 and nearing the ideal value of 1, along with Bartlett's test showing a significant result (P < 0.05), confirm the data's suitability for factor analysis (Bartlett, 1937; Hair, 2009; Kaiser, 1974). Table 3 represents the suitability of data for factor analysis (KMO and Bartlett's Test).

Table 3
Suitability of data for factor Analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.940
Bartlett's Test of Sphericity	Approx. Chi-Square	7892.940
	df	666
	Sig.	0.000

*Note. KMO value > 0.5 (ideally approaching 1.0) and Bartlett's test significance at p < 0.05 indicate the data is suitable for factor analysis (*Kaiser, 1974; Bartlett, 1937*).*

A Harman's single-factor test was conducted to assess the potential for common method bias, given that all constructs were measured using a single self-report questionnaire administered at one point in time. All measurement items were entered into an unrotated exploratory factor analysis using principal axis factoring. The analysis extracted six factors with eigenvalues greater than 1, and the first (largest) unrotated factor accounted for 36.66% of the total variance, well below the commonly accepted 50% threshold (Podsakoff et al., 2003). This result suggests that common method bias is unlikely to be a serious concern in this dataset.

Table 4
Total Variance Explained (Harman's Single-Factor Test, Unrotated Factors with Eigenvalues > 1)

Factor	**Eigenvalue**	**% of Variance**	**Cumulative %**
1	14.015	37.878	37.878
2	3.034	8.201	46.079
3	1.804	4.876	50.955
4	1.603	4.331	55.286
5	1.204	3.254	58.540
6	1.085	2.933	61.473

*Note. Extraction method: Principal Axis Factoring, unrotated solution. Six factors had initial eigenvalues greater than 1. The first factor accounted for 37.878% of variance before extraction and 36.66% after extraction, both below the 50% threshold indicating common method bias is not a serious concern (*Podsakoff et al., 2003).

4.1 Validation of the Structural Model

Convergent validity and internal consistency reliability analysis

This study employed Partial Least Squares in Structural Equation Modeling (PLS-SEM) to validate the measurement model, since the proposed hypotheses are exploratory and do not follow robust theoretical foundations (Hair et al., 2017). Internal consistency reliability and convergent validity were assessed using factor loading, average variance extracted (AVE), composite reliability, and Cronbach's alpha, adhering to established guidelines (Hair Jr et al., 2023). However, all values in Table 5 met the threshold of above 0.70 for factor loading (Hair, 2009), composite reliability (Hair et al., 2010), and Cronbach's alpha (Cronbach, 1951), as well as above 0.50 for AVE (Fornell & Larcker, 1981), indicating excellent internal consistency reliability and convergent validity. The exceptions were indicators RO3 and SCF1, which were subsequently removed.

Table 5
Convergent validity and internal consistency reliability analysis

Construct	Indicators	Convergent Validity		Internal Consistency Reliability	
		Factor loading	AVE	Composite Reliability	Cronbach's alpha
Economic Factors	ECF1	0.831	0.696	0.902	0.855
	ECF2	0.845			
	ECF3	0.82			
	ECF4	0.842			
Educational Factors	EDF1	0.821	0.657	0.884	0.825
	EDF2	0.808			
	EDF3	0.84			
	EDF4	0.771			
Investment Opportunities	IO1	0.734	0.683	0.865	0.769
	IO2	0.88			
	IO3	0.858			
Migration Intention	MI1	0.851	0.797	0.94	0.915
	MI2	0.907			
	MI3	0.928			
	MI4	0.883			
Political Instability	PI1	0.856	0.721	0.912	0.871
	PI2	0.823			
	PI3	0.872			
	PI4	0.844			
Quality Education	QE1	0.798	0.677	0.863	0.774
	QE2	0.857			
	QE3	0.812			
Research Opportunity	RQ1	0.817	0.654	0.850	0.752
	RQ2	0.809			
	RO4	0.8			

*Note. Accepted thresholds: Factor loading > 0.70 (Hair, 2009); Composite Reliability > 0.70 (*Hair et al., 2010); *Cronbach's alpha > 0.70 (*Cronbach, 1951*); AVE > 0.50 (Fornell & Larcker, 1981). All constructs met these thresholds, confirming acceptable convergent validity and internal consistency reliability. Indicators RO3 and SCF1 were removed prior to final analysis due to insufficient loadings.*

Social Cultural Factors	SCF2	0.742	0.641	0.843	0.801
	SCF3	0.834			
	SCF4	0.822			
Social Pressure	SP1	0.868	0.589	0.85	0.765
	SP2	0.839			
	SP3	0.832			
Unemployment Problem	UP1	0.804	0.665	0.856	0.749
	UP2	0.847			
	UP3	0.794			

*Note. Accepted thresholds: Factor loading > 0.70 (Hair, 2009); Composite Reliability > 0.70 (*Hair et al., 2010); *Cronbach's alpha > 0.70 (*Cronbach, 1951*); AVE > 0.50 (Fornell & Larcker, 1981). All constructs met these thresholds, confirming acceptable convergent validity and internal consistency reliability. Indicators RO3 and SCF1 were removed prior to final analysis due to insufficient loadings.*

4.2 Discriminant Validity

However, HTMT values nearing 1 signify discriminant validity, while higher values suggest a deficiency in discriminant validity, typically with a threshold of 0.90 (Gold et al., 2001; Henseler et al., 2015; Teo et al., 2008) or 0.85 (Clark & Watson, 2016; Kline, 2023). Hence, all the threshold values (Table 6) are within the cutoff range, ensuring excellent discriminant validity.

Table 6
Heterotrait-Monotrait ratio of correlations

ECF	ECF	EDF	IO	MI	PI	QE	RO	SCF	SP	UP
EDF	0.766									
IO	0.631	0.558								
MI	0.531	0.621	0.425							
PI	0.789	0.648	0.502	0.578						
QE	0.409	0.426	0.593	0.150	0.284					
RO	0.646	0.777	0.705	0.391	0.564	0.792				
SCF	0.757	0.813	0.573	0.665	0.775	0.401	0.650			
SP	0.831	0.660	0.672	0.599	0.821	0.346	0.609	0.723		
UP	0.724	0.743	0.701	0.429	0.608	0.517	0.776	0.648	0.704	

Note. Accepted threshold: HTMT values below 0.90 (liberal criterion; Gold et al., 2001; Henseler et al., 2015; Teo et al., 2008).

Assessing discriminant validity is crucial for comprehending the relationships among reflectively measured constructs, with commonly used methods including the Fornell-Larcker criterion, analysis of cross-loadings, and the HTMT criterion (Hair et al., 2019; Kline, 2023; Sarstedt et al., 2014). Hence, discriminant validity was assessed using the Fornell-Larcker criterion (Fornell & Larcker, 1981) and the Heterotrait-Monotrait ratio (Henseler et al., 2015) of correlations analysis. The Fornell-Larcker criterion stipulates that the square root of the average variance extracted by a construct should exceed the correlation between the construct and any other construct (Fornell & Larcker, 1981). Consequently, all values (Table 7) satisfied this criterion, indicating good discriminant validity.

Table 7
Discriminant validity through Fornell-Larcker criterion

ECF	ECF	EDF	IO	MI	PI	QE	RO	SCF	SP	UP
	0.835									
EDF	0.645	0.810								
IO	0.520	0.456	0.827							
MI	0.470	0.542	0.359	0.893						
PI	0.681	0.552	0.413	0.516	0.849					
QE	0.352	0.364	0.456	0.137	0.245	0.823				
RO	0.533	0.638	0.527	0.343	0.469	0.585	0.756			
SCF	0.627	0.663	0.453	0.570	0.648	0.330	0.514	0.846		
SP	0.668	0.527	0.510	0.506	0.675	0.262	0.455	0.569	0.767	
UP	0.584	0.586	0.540	0.354	0.495	0.402	0.584	0.505	0.531	0.815

4.3 Hypothesis Test

Table 8 shows the proposed hypothesis for the proposed research model. H1 evaluates whether ECF has a significant positive effect on MI. The result revealed that ECF had a positive but statistically non-significant effect on MI ($\beta = 0.088$, $p = 0.262$). Hence, H1 was rejected. H2 evaluates that EDF has a significantly positive impact on MI ($\beta = 0.257$, $p < 0.000$). Therefore, H2 was accepted. H3 shows that IO has a significantly positive influence on ECF ($\beta = 0.289$, $p < 0.000$). Consequently, H3 was accepted. H4 revealed that PI has a significantly and positively effects on SCF ($\beta = 0.484$, $p < 0.000$). Thereby, H4 was accepted. H5 evaluates whether QE has a significant positive impact on EDF; the effect was negative and statistically non-significant ($\beta = -0.014$, $p = 0.748$). As a result, H5 was rejected. From Table 8, H6 evaluates that RO has a positive and significant impact on EDF ($\beta = 0.646$, $p < 0.000$). Thus, H6 was accepted. H7 showed that SCF has a significantly positive influence on MI ($\beta = 0.344$, $p < 0.000$). Accordingly, H7 was accepted. Similarly, H8 evaluates SP has a positive significant effect on SCF ($\beta = 0.242$, $p < 0.000$). Accordingly, H8 was accepted. H9 revealed that UP has a significant positive impact on ECF ($\beta = 0.428$, $p < 0.000$). Therefore, H9 was accepted.

Table 8
Hypothesis Test

Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decision
ECF -> MI	0.088	0.090	0.078	1.122	0.262	Rejected
EDF -> MI	0.257	0.257	0.072	3.576	0.000	Accepted
IO -> ECF	0.289	0.290	0.059	4.890	0.000	Accepted
PI -> SCF	0.484	0.480	0.059	8.193	0.000	Accepted
QE -> EDF	-0.014	-0.011	0.043	0.321	0.748	Rejected
RO -> EDF	0.646	0.647	0.055	11.691	0.000	Accepted
SCF -> MI	0.344	0.340	0.079	4.369	0.000	Accepted
SP -> SCF	0.242	0.248	0.059	4.105	0.000	Accepted
UP -> ECF	0.428	0.428	0.061	7.002	0.000	Accepted

Note. Accepted criterion: t-statistic > 1.96 and p-value < 0.05.

4.4 Mediation Impact

H10 evaluates the impact of SP on MI through SCF was found to be positive and significant (β = 0.083, p = 0.002). Therefore, H10 was accepted. H11 showed that the effect of IO on MI through ECF was not significant (β = 0.025, p = 0.303). Consequently, H11 was rejected. H12 revealed that the negative indirect impact of QE on MI through EDF was insignificant (β = -0.004, p = 0.758). Hence, H12 was rejected. H13 evaluates that the mediation effect of EDF on the relationship between RO and MI was positive and significant (β = 0.166, p = 0.001). Therefore, H13 was accepted. H14 revealed that the indirect effect of UP on MI through ECF was found to be insignificant (β = 0.038, p = 0.261). As a result, H14 was rejected. H15 showed that the mediation effect of SCF on the relationship between PI and MI was positive and significant (β = 0.167, p < 0.001). Accordingly, H15 was accepted. Table 9 represents the test result of the mediation hypothesis.

Because the structural model does not specify a direct path from Social Pressure, Political Instability, Investment Opportunities, Unemployment, Quality of Education, or Research Opportunity to Migration Intention, conventional Variance Accounted For (VAF) ratios — which require a modeled direct effect alongside the indirect effect — are not computable for H10 through H15. Instead, following Zhao, Lynch, and Chen (2010), each mediated path is classified according to whether the indirect effect itself is statistically significant. Where the indirect effect is significant and no competing direct path is modeled, the result constitutes indirect-only (full) mediation, meaning the entire modeled effect of the antecedent on Migration Intention operates through the mediating construct. This describes H10 (SP → SCF → MI), H13 (RO → EDF → MI), and H15 (PI → SCF →

MI). Where the indirect effect is non-significant, as in H11 (IO → ECF → MI), H12 (QE → EDF → MI), and H14 (UP → ECF → MI), no mediation effect is present, rather than a partial one.

Table 9
Mediation Impact

Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decision
SP -> SCF -> MI	0.083	0.084	0.027	3.035	0.002	Accepted
IO -> ECF -> MI	0.025	0.027	0.025	1.031	0.303	Rejected
QE -> EDF -> MI	-0.004	-0.003	0.011	0.308	0.758	Rejected
RO -> EDF -> MI	0.166	0.166	0.049	3.368	0.001	Accepted
UP -> ECF -> MI	0.038	0.038	0.033	1.124	0.261	Rejected
PI -> SCF -> MI	0.167	0.163	0.043	3.857	0.000	Accepted

4.5 Robustness Check: Ordinary Least Squares (OLS) Regression Analysis

To complement the PLS-SEM findings reported in Table 8 and Table 9, an Ordinary Least Squares (OLS) regression analysis was conducted as a robustness check, using composite mean scores for each construct (N = 366). Four regression models were estimated, mirroring the structural paths identified in the hypothesis testing: Model 1 examined Economic Factors (ECF) as predicted by Investment Opportunities (IO) and Unemployment (UP); Model 2 examined Educational Factors (EDF) as predicted by Quality of Education (QE) and Research Opportunities (RO); Model 3 examined Social and Cultural Factors (SCF) as predicted by Political Instability (PI) and Social Pressure (SP); and Model 4 examined the final outcome, Migration Intention (MI), as predicted by the three mediating constructs (ECF, EDF, SCF).

Table 10
OLS Coefficient Results (Across Four Models)

Model	Dependent Construct	Predictor Construct	B	SE	Std. β	t-value	p-value	R^2	Decision
Model 1	Economic Factors (ECF)	Investment Opportunities (IO)	0.257	0.046	0.271	5.563	< 0.001	0.378	Significant
Model 1	Economic Factors (ECF)	Unemployment (UP)	0.394	0.045	0.428	8.794	< 0.001	0.378	Significant
Model 2	Educational Factors (EDF)	Quality of Education (QE)	0.061	0.050	0.070	1.215	0.225	0.362	Not significant
Model 2	Educational Factors (EDF)	Research Opportunities (RO)	0.529	0.056	0.550	9.487	< 0.001	0.362	Significant
Model 3	Social & Cultural Factors (SCF)	Political Instability (PI)	0.431	0.049	0.477	8.859	< 0.001	0.422	Significant
Model 3	Social & Cultural Factors (SCF)	Social Pressure (SP)	0.214	0.051	0.224	4.165	< 0.001	0.422	Significant
Model 4	Migration Intention (MI)	Economic Factors (ECF)	0.101	0.061	0.094	1.646	0.101	0.373	Not significant
Model 4	Migration Intention (MI)	Educational Factors (EDF)	0.335	0.067	0.294	5.026	< 0.001	0.373	Significant
Model 4	Migration Intention (MI)	Social & Cultural Factors (SCF)	0.339	0.061	0.310	5.539	< 0.001	0.373	Significant

Note. B = unstandardized coefficient; SE = standard error; Std. β = standardized beta coefficient. Significance threshold: $p < 0.05$.

Table 11
Model Fit Summary

Model	Dependent Construct	N	R^2	Adjusted R^2	F-value	Model p-value
Model 1	Economic Factors (ECF)	366	0.378	0.375	110.372	< 0.001
Model 2	Educational Factors (EDF)	366	0.362	0.358	102.812	< 0.001
Model 3	Social & Cultural Factors (SCF)	366	0.422	0.419	132.782	< 0.001
Model 4	Migration Intention (MI)	366	0.373	0.368	71.714	< 0.001

Note. Accepted criterion: Model p-value (ANOVA F-test) < 0.05 indicates the overall regression model is statistically significant in explaining variance in the dependent construct. R^2 and Adjusted R^2 indicate the proportion of variance explained; values above 0.30 are generally considered moderate explanatory power in social science research (Cohen, 1988).

As illustrated in Table 10, the findings from OLS mostly coincide with those of PLS-SEM that were presented earlier. In Model 1, Investment Opportunities (β = 0.271, p < 0.001) and Unemployment (β = 0.428, p < 0.001) were significant predictors of Economic Factors, supporting the acceptance of H9 (UP → ECF) and H3 (IO → ECF), with Unemployment proving to be the stronger predictor. In Model 2, Research Opportunities were significant predictors of Educational Factors (β = 0.550, p < 0.001), confirming H6 (RO → EDF); however, Quality of Education did not prove to be a significant predictor (β = 0.070, p = 0.225), just like in PLS-SEM (β = -0.014, p = 0.748). In Model 3, both Political Instability (β = 0.477, p < 0.001) and Social Pressure (β = 0.224, p < 0.001) significantly predicted Social and Cultural Factors, consistent with H4 and H8. Finally, Model 4 (Table 10) showed that Educational Factors (β = 0.294, p < 0.001) and Social and Cultural Factors (β = 0.310, p < 0.001) significantly predicted Migration Intention, while Economic Factors did not reach significance (β = 0.094, p = 0.101) — a pattern consistent with the PLS-SEM result, where ECF → MI was also non-significant (β = 0.088, p = 0.262). Taken together, the convergence between the PLS-SEM and OLS estimates across three of the four models lends additional statistical confidence to the structural findings.

4.6 Pearson Correlation Matrix

Table 12
Construct-Level Pearson Correlation Matrix

QE	QE	RO	EDF	UP	IO	ECF	SP	PI	SCF	MI
	1									
RO	.691	1								
EDF	.451	.599	1							
UP	.454	.576	.583	1						
IO	.494	.539	.443	.526	1					
ECF	.416	.500	.637	.570	.496	1				
SP	.355	.459	.525	.532	.517	.670	1			
PI	.326	.452	.552	.490	.414	.677	.672	1		
SCF	.402	.503	.664	.503	.452	.620	.567	.650	1	
MI	.209	.319	.544	.360	.361	.464	.503	.520	.572	1

Note. All correlations significant at p < 0.01 (two-tailed). N = 366. Source: Author's computation (SPSS v.27).

As shown in Table 12, all ten constructs were positively and significantly intercorrelated ($p < 0.01$), with no coefficient exceeding the 0.80–0.90 multicollinearity threshold, confirming that the constructs are related yet empirically distinct — consistent with the discriminant validity results reported earlier via the HTMT and Fornell-Larcker criteria (Table 6 and Table 7). Migration Intention correlated most strongly with Social and Cultural Factors ($r = 0.572$) and Political Instability ($r = 0.520$), and most weakly with Quality of Education ($r = 0.209$).

Figure 3 portrays these connections through a highly interconnected framework, where most pairs of variables exceed the threshold of $|r| > 0.20$. EDF and ECF play central roles in this framework due to their role as intermediaries between the upstream variables (QE, RO, UP, IO) and the downstream social political variables (SP, PI, SCF) to finally lead to MI.

With all other constructs controlled for, the partial correlation network depicted in Fig. 4 ($|\text{partial } r| > 0.15$) is noticeably sparser than the raw correlation network in Fig. 3 by focusing on only the unique direct correlations. Importantly, EDF remains the most highly connected construct, being directly linked to RO, UP, SP, SCF, and MI even when accounting for the common variance between the constructs. The QE-RO connection continues to be the strongest in Fig. 4, implying that the two constructs have a very strong direct relationship regardless of the other constructs, in agreement with their being both antecedents of Educational Factors in Model 2 (Table 10).

4.7 Artificial Neural Network (ANN) Prediction Analysis

To further confirm the results of the regression analysis through a non-parametric method, a Multi-Layer Perceptron (MLP) Artificial Neural Network was developed for each of the four models with a 70/30 train/test split ($N_{(train)} = 256$, $N_{(test)} = 110$).

Each of the four models utilized one hidden layer with automatically determined number of nodes (range of values: 1–50 nodes), hyperbolic tangent activation function at the level of the hidden layer, and identity

activation function at the level of the output layer according to common MLP settings for the continuous variable prediction task (IBM SPSS Statistics, Neural Network module). Training process was carried out with batch training approach combined with scaled conjugate gradient optimization procedure. Because the latter is an adaptive second-order optimization technique (as opposed to standard gradient descent method), it does not require the setting of any specific learning rate parameter. The obtained neural network architectures included 2 nodes for the Economic Factors model (predictors: Unemployment, Investment Opportunities), 3 nodes for the Educational Factors model (predictors: Quality of Education, Research Opportunity), 4 nodes for the Social and Cultural Factors model (predictors: Social Pressure, Political Instability), and 3 nodes for the Migration Intention model (predictors: Economic Factors, Educational Factors, Social and Cultural Factors).

In Fig. 5, it can be seen that R^2 values of ANN models were mostly similar to those of their corresponding OLS models, being slightly less — for Model 1 (ECF) about 0.34, for Model 2 (EDF) about 0.43, for Model 3 (SCF) about 0.34, and for Model 4 (MI) about 0.41. Model 2 (Educational Factors) demonstrated the best performance and even improvement on test data, while Model 3 (SCF) demonstrated the biggest train/test discrepancy, suggesting some greater sensitivity of political-instability/social pressure pathway to samples' characteristics.

Residual plots for all four models are shown in Fig. 6, where each plot is centered at about zero with approximately symmetrical distribution, which implies no serious bias in prediction. Residuals of Model 4 (MI) and Model 2 (EDF) have the closest to normal distribution in the proximity to zero, whereas residuals of Model 1 (ECF) and Model 3 (SCF) have fatter tails, which is in line with their lower quality fit compared to that of Models 4 and 2. The congruence of the non-parametric predictions by ANN with those of OLS and PLS-SEM validates the robustness of the postulated push-factor structures.

5. Discussion

This current study was meant to analyze the push factors behind the migration plans of Bangladeshi university students for studying overseas, making use of an expanded Push Factor Framework complemented with PLS-SEM, OLS regression, correlation network analysis, and ANN machine learning validation. In this study, there were two main aims: to analyze what motivates Bangladeshis to migrate due to education, economy, and social-cultural aspects (RQ1) and to analyze the relationships among the push dimensions as mediated pathways leading to Migration Intention (RQ2). This conceptual framework is based on the migration push factor paradigm (Bond, 2022; Lacroix, 2022), which was expanded in the current study through the inclusion of Research Opportunity, Unemployment, and Social Pressure as independent factors affecting the three mediators: Economic Factors (ECF), Educational Factors (EDF), and Social and Cultural Factors (SCF). These studies help to better understand the present status of Bangladeshi students' migration intention, giving an empirically based explanation of the motivation and driving force behind students who choose to migrate abroad to pursue higher education. Social factors, such as political instability and social pressure, play the major role in Bangladeshi students' migration intention, while the influence of educational factors is ambiguous, with research opportunities being much more significant than the overall quality of education (Zaman et al., 2023).

5.1 Economic Factors Pathway

PLS-SEM analysis verified that Unemployment had a statistically significant impact on Economic Factors (H9: β = 0.428, t = 7.002, p < .001), and Investment Opportunities had a statistically significant effect on ECF (H3: IO → ECF, β = 0.289, t = 4.89, p < .001). These results correspond to the results of the OLS robustness test, which yielded nearly identical coefficients (UP → ECF: β = 0.428, t = 8.794, p < .001; IO → ECF: β = 0.271, t = 5.563, p < .001), thus providing strong methodological evidence for this relationship (Table 13). This finding corroborates a number of previous studies: Bhuiyan (2023) and Hof and Tseng (2020) found labor market shortage as the closer economic migration motivator than investment environment, whereas Borah (2022) stressed employment-unrelated distress migration in South Asian regions. Notably, Unemployment (β = 0.428) exerted a stronger influence on ECF than Investment Opportunities (β = 0.271–0.289), suggesting that immediate livelihood insecurity may be more salient to Bangladeshi students than longer-term investment prospects, consistent with the interpretation that perceived investment scarcity functions more as background dissatisfaction than as an active migration trigger.

5.2 Educational Factors Pathway: Research Opportunity versus Education Quality

H6 and H5 tested the Educational Factors pathway. While H6, which postulated the existence of a positive effect of Research Opportunity on Educational Factors, received very strong support (β = 0.646, t = 11.691, p < .001) and was corroborated almost identically by the OLS regression model (RO → EDF: β = 0.550, t = 9.487, p < .001), H5, which suggested the predictive effect of Quality of Education on Educational Factors, was falsified in both PLS-SEM (β = -0.014, t = 0.321, p = .748) and OLS models (β = 0.070, t = 1.215, p = .225). The partial correlation network depicted in Fig. 4 further validated the marginal, peripheral status of QE in relation to RO once shared variance had been controlled for. Based on the opinion of Harvey (2022), the education quality is one of the factors of primary importance regarding migration intention to pursue higher education, however, Bangladeshis are more concerned about research opportunity than the quality of education in their top choice of migrating destination countries, as can be seen from the triangulated null effect of QE and dominant RO effect in Table 13. Such an outcome is based on, but at least partly differs from, past literature: Murray and Gray (2023) also posited that access to high-level research infrastructure, not the general level of education quality perception, plays the crucial role motivating top-performing individuals to study abroad, thus confirming the current RO hypothesis. Nevertheless, the lack of influence of the QE variable is contrary to the argument put forth by Mahbub (2021) that perceived poor education quality is one of the main reasons behind emigration. An explanation, supported by the findings of Serhiienko (2021), might be the fact that in light of the development of quality private universities in Bangladesh, the country has been compensating for quality problems, while those related to the availability of research infrastructure facilities persist (Gazi et al., 2023). The aforementioned multi-method approach, taking into account the congruence between PLS-SEM, OLS, and partial correlation network models, is capable of making such conclusions more confidently than a one-method approach. Overall, the findings suggest that for the current sample, academic motivations are working through the research opportunity route.

5.3 Social and Cultural Factors Pathway

H4 and H8 investigated the path for Social and Cultural Factors. While H4 hypothesized that Political Instability positively predicts SCF and received strong support (β = 0.484, t = 8.193, p < .001), H8 posited that Social Pressure positively predicts SCF (β = 0.242, t = 4.105, p < .001), and received strong support as well. Again, both paths proved themselves highly reproducible in the OLS model (PI → SCF: β = 0.477, p < .001; SP → SCF: β =

0.224, p < .001), with Political Instability serving as a key social-cultural predictor for both methods. All of the above is highly corroborated with previous empirical studies on this topic, with Hossain et al. (2024) and Khan et al. (2023) identifying political dysfunction and institutional distrust as the main push factors in South Asia migration context, while Ali et al. (2024) reported perceived national oppression and conflict as factors increasing migration aspiration. The mediation analysis reported in Table 9 further revealed that the indirect path from Political Instability through Social and Cultural Factors to Migration Intention was significant (β = 0.167, p < .001), reinforcing Fontaine et al. (2023), who argued that corruption and governance failure operate on migration intention substantially through eroded social trust rather than through direct economic channels alone.

5.4 Direct Paths to Migration Intention and the Economic-Intention Paradox

On the other hand, H1, H2, and H7 investigated the direct structural effects on Migration Intention. While H2 (EDF → MI) and H7 (SCF → MI) were confirmed (β = 0.257, p < .001; β = 0.344, p < .001, respectively), the same was true in the OLS (EDF → MI: β = 0.294, p < .001; SCF → MI: β = 0.310, p < .001), with SCF turning out to be slightly more significant predictor in both frameworks. By comparison, H1 (ECF → MI) was not supported by either PLS-SEM analysis (β = 0.088, p = .262) or OLS (β = 0.094, p = .101). Indeed, in the case of ECF → MI there is no compensating non-linear relationship detected in the ANN residual diagnostics (Fig. 6). This is a rather unexpected outcome, as it contradicts a number of classical theories in the migration studies field — namely, the findings of Bond (2022) and Mohammadzadeh (2022) regarding the role of economic disparities in migration theory. A logical hypothesis here, in light of Harvey's (2022) findings regarding Bangladeshis' prioritization of research over material considerations, is that for the current university-age sample of respondents, intentions to migrate might be more motivated by aspirational and identity-related reasons, such as avoidance of social and political dysfunction and pursuit of prestige in the academic sphere, rather than being the result of economic calculation, an idea which may or may not hold true for labor-migrants, for whom economic push factors play a dominating role (Borah, 2022). As was mentioned above, the indirect effects found above (see Table 9) serve to support this point: although both Social Pressure and Political Instability mediated Social and Cultural Factors on Migration Intention (β = 0.083, p = .002 and β = 0.167, p < .001, respectively), neither of the two indirect effects from Investment Opportunities or Unemployment through Economic Factors onto Migration Intention was significant, thus showing once again that the economic route, despite its ability to robustly predict ECF (H9, H3) in turn, does not produce Migration Intention – an indirect-effect pattern previously unestablished so clearly in the Bangladeshi migration literature. Notably, Unemployment remained the strongest single predictor of Economic Factors (β = 0.428 in both PLS-SEM and OLS), and yet this economic dissatisfaction did not translate into migration intention — suggesting economic strain functions as a background condition rather than a direct migration trigger (Hill, 2023).

5.5 Methodological triangulation (ANN)

To extend these findings beyond the PLS-SEM/OLS linear framework, an Artificial Neural Network (MLP) was trained on a 70/30 split to predict each of the four endogenous constructs. ANN test set R^2 estimates proved generally similar but slightly more conservative compared to their OLS equivalents (ECF ≈ 0.34, EDF ≈ 0.43, SCF ≈ 0.34, MI ≈ 0.41), with Model 2 (EDF) being the best-performing and most consistently generalizing (as it was also the best-fitting linear model; see Fig. 5). The agreement between the PLS-SEM, OLS, and ANN findings is in line with the logic behind the SEM-ML triangulation approach described in the relevant literature (Hair Jr et al.,

2023): since the probability of observing spurious relations between constructs diminishes substantially when several different estimation procedures show similar results, variance-based, linear, and non-parametric approaches should be used together in order to increase validity. When the ANNs produced somewhat different findings compared to the linear models (wider train-test differences for the ECF and SCF models compared to EDF and MI; see Fig. 6), this suggests that there might be some slight non-linearity or threshold effects in those two pathways (for instance, political instability may have no effect until the perceived severity of the threat passes a certain point).

6. Implications

6.1 Theoretical Implication

In terms of the contribution to theory regarding push factors, this research helps show that all push factors are not created equally and that many assumptions about them do not hold empirical weight upon testing. Using the triangulated data, one can see that Social and Cultural Factors, predominantly Political Instability, serve as the clearest predictor of migration intentions. This supports the idea that institutional distrust and a sense of governance failure influence migration intention through a lack of faith in social and cultural structures rather than material considerations alone (Fontaine et al., 2023; Lacroix, 2022). The current research adds an additional layer to the existing push-factor tradition (Bond, 2022), where socio-economic and socio-political push factors have been seen as relatively equal in the past; currently, the latter is more dominant among students.

Additionally, the current paper makes contributions to the theory regarding the link between educational quality and migration. While in previous studies the notion of "education quality" was always presented as a coherent and obvious important push factor (Mahbub, 2021), the results of the analysis have identified Research Opportunities as the underlying mechanism in question, without any impact of Quality of Education when controlled for. This finding corroborates the work by Murray and Gray (2023), who claim that the availability of research resources rather than general perceptions about the quality of education determines the attraction of top-performing students to foreign educational establishments.

Undoubtedly, the most theoretically interesting results come from the finding of no effect for the direct relation between Economic Factors and Migration Intention. As both Unemployment and Investment Opportunities proved to be strong predictors of Economic Factors in the same way, and as Unemployment was shown to be the strongest predictor in the entire model, economic dissatisfaction in this particular context did not affect migration intention. In this case, findings contradict the human capital approach to migration and its focus on economic differences as one of the key drivers (Mohammadzadeh, 2022). On the contrary, for university students, economic dissatisfaction can play the role of the condition that affects the formation of general dissatisfaction without being the reason for migration decisions (Hill, 2023).

6.2 Practical Implication

Implications of this study can be deduced directly from the key empirical findings of the study and not from the general thematic literature. In light of the strong link between Political Instability and Social Pressure and their association as the most important predictors of students' decision to migrate, it is most probable that measures taken to decrease migration among students will have the best chances of success if they take into account

factors like governance, institutional and social stability, and not only economic factors (Khan et al., 2023; Ali et al., 2024). This conclusion is supported by the findings from the mediation model, where the indirect effect of Political Instability through Social and Cultural Factors was shown to be significant, whereas the indirect effects through Economic Factors – non-significant.

Second, in the context of Research Opportunity being the driving factor for the educational path, rather than a generalized perception of education quality, those universities and policymakers who wish to retain the talents of these individuals should focus on investing in research opportunities, international research collaborations, and advanced academic resources (Gazi et al., 2023). It is a more specific recommendation compared to the generalized "improve education quality" recommendation which used to be offered in previous policy discussions.

Third, in light of the lack of significance of the relationship between Economic Factors and migration intention, it appears that employment- and investment-friendly policies, despite being valuable, will have little effect on preventing the student migration unless they will be complemented by improvement in governance, political climate, and university research facilities. This means that the issue of unemployment (Borah, 2022; Bhuiyan, 2023) still remains an important economic issue but cannot be used to reduce migration intention in this case without other measures.

7. Limitations and Future Study

According to Bauer et al. (2023), it is essential to acknowledge the limitations of this study, including the inability to verify whether respondents' intentions to relocate for academic purposes were realized and to understand the reasons behind any changes in their final decision-making (Nandi & Nedumaran, 2021). Despite these limitations, it provides valuable, current insights into the factors influencing Bangladeshi students' migration decisions (Sohel et al., 2024). Consequently, this research can assist local NGOs and INGOs, corporations, government agencies, policymakers, educational institutions, and businesses in designing and implementing strategies to address and lessen student migration (Al Masud et al., 2023).

Finally, bigger, more representative Bangladeshi student samples could be studied across a wider range of institutions (Duan et al., 2023). To better understand and expand on the findings, further research is needed. Increasing the sample size, selecting a broader range of study subjects, and including a diverse group of students from these institutions would enable more extensive research in the future (Wan & Abdullah, 2021).

8. Conclusion

This study has looked at the push factors that influence Bangladeshi university students' decision to migrate for education abroad through the use of PLS-SEM, OLS regression, and ANN analysis for testing nine direct effect hypotheses and six mediation hypotheses.

The result shows that Social and Cultural Factors were the strongest determinant of migration intention, mainly due to Political Instability and to some extent, due to Social Pressure, implying that distrust in institutions and social strain are the key factors, instead of direct economic means. Educational Factors were also found to be a determinant of migration intention; however, the determination was made mainly due to Research Opportunity and not due to Quality of Education as such. On the other hand, Economic Factors were not a strong

determinant of migration intention, although both Unemployment and Investment Opportunity were good determinants of Economic Factors.

The findings from the mediation analysis clearly reflect this trend since the fact that no direct connection between the antecedent constructs and Migration Intention was specified means that the significant mediation effects observed with Social Pressure, Research Opportunity, and Political Instability through their mediator variables are full indirect mediations, whereas no such significant mediation effect was detected for Investment Opportunities, Quality of Education, and Unemployment.

Overall, migration intention of Bangladeshi students seems to be more influenced by socio-political dissatisfaction and academic ambitions than by current economic difficulties – which means that any policies aimed at job creation or investments in the country would be largely useless to stop student migration without accompanying changes in governance and development of research capabilities.

The current study is based on subjective intention and not on the actual outcome; furthermore, due to its cross-sectional nature it cannot reveal how migration intentions change over time. The future research should follow up migration decisions of students longitudinally and test non-linear relationships in the political instability and social pressure paths.

Declarations

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Authors' individual contribution:

Conceptualization — R.H.; Methodology — M.M.I. and M.K.; Software — M.M.I., S.U. and F.S.; Validation —R.H. and M.M.I.; Formal Analysis — S.U. and F.S.; Investigation — M.S.A., M.K. and F.S.; Resources — M.M.I.; Data Curation — M.S.A., R.H. and S.U.; Writing — Original Draft — M.M.I., R.H. and M.K.; Writing — Review & Editing — R.H., M.K. and F.S.; Visualization — M.M.I. and R.H.; Supervision — M.R.I.B..; Project Administration — M.M.I. and R.H.

Declaration of conflicting interest

No conflict of interest among authors for conducting this study.

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Ethical approval

This research was conducted following the highest ethical standards to ensure integrity, transparency, and academic honesty. Formal ethical approval was obtained from the Research Ethics Committee, Department of

Management Information Systems (MIS), Begum Rokeya University, Rangpur, Bangladesh (Approval No. BRUR/MIS/REC/2025/213). All procedures involving human participants were carried out in accordance with the ethical guidelines and regulations of the said Research Ethics Committee and with the principles of the Declaration of Helsinki.

Consent to participate

Freely given, informed consent to participate in the study was obtained from all respondents prior to their participation.

Consent to publish

Not applicable. This manuscript does not contain any individual person's data in any form (including images, videos, or identifiable case details).

Clinical Trial Number

Not applicable.

Data availability statement

Data will be available upon the reasonable request from the corresponding author.

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Figures

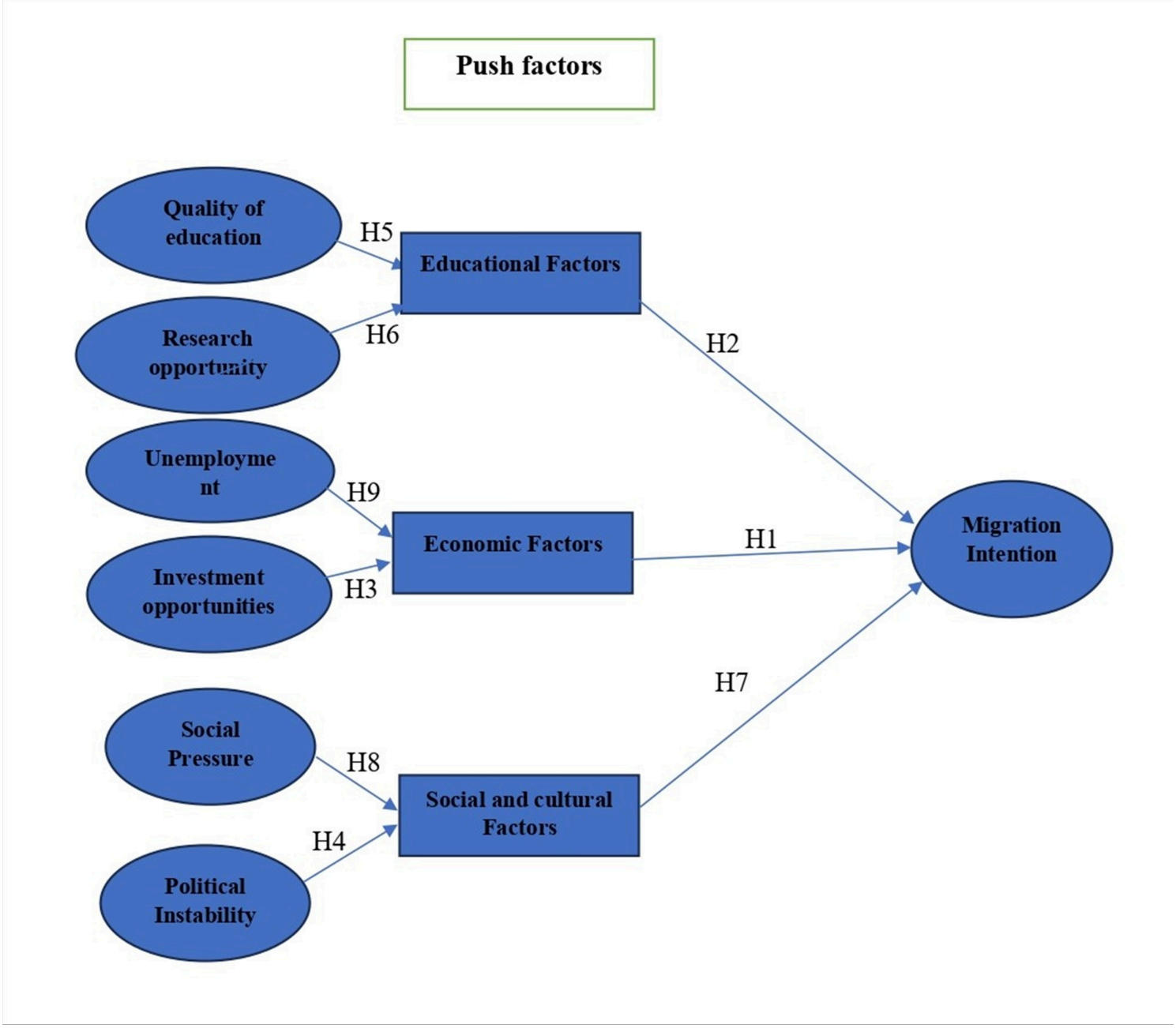


Figure 1

Education, Economic and Social & cultural sub-factors that influence migration intension.

Source: Author's work

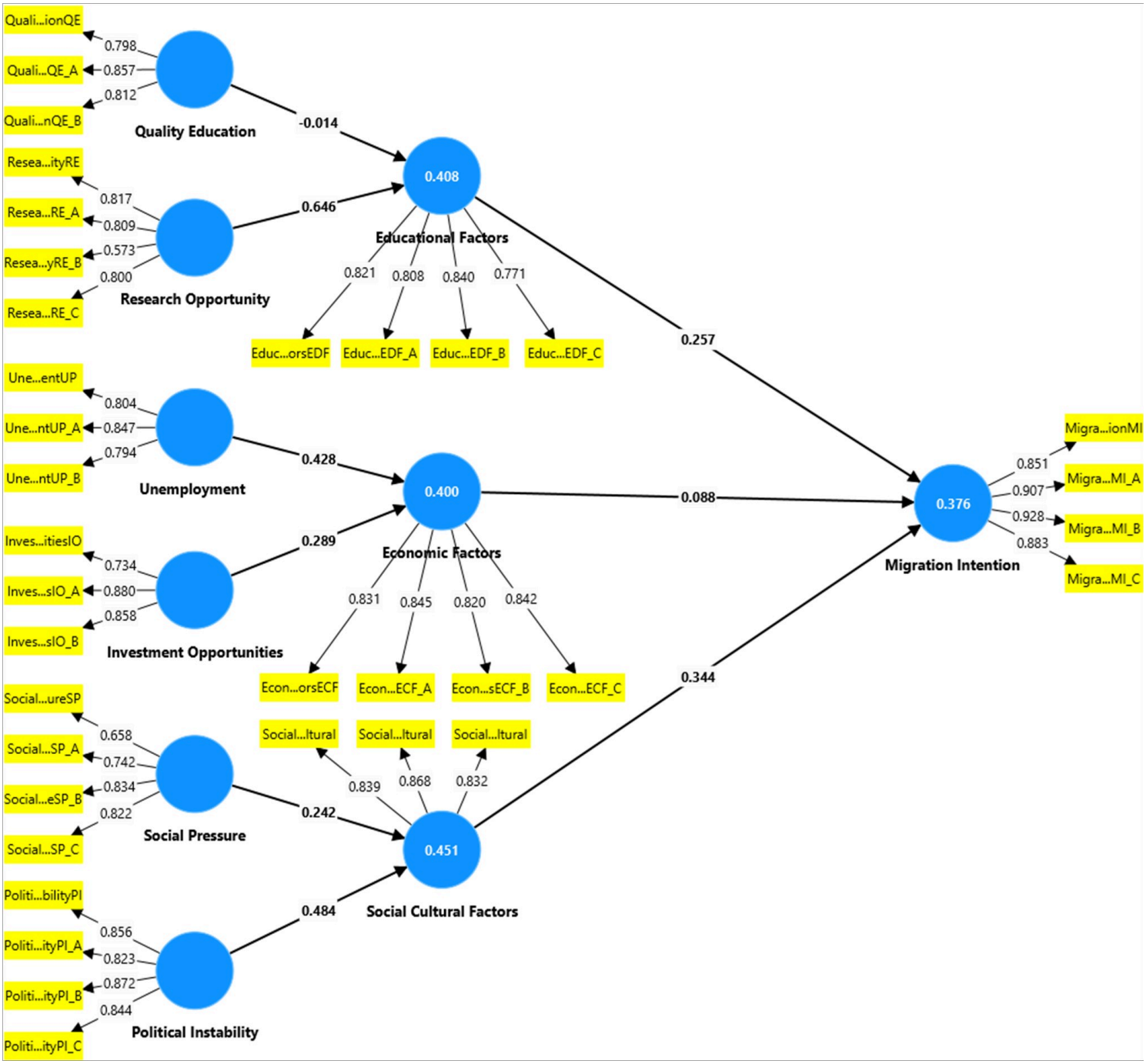


Figure 2

Result of SmartPLS (Structural Model)

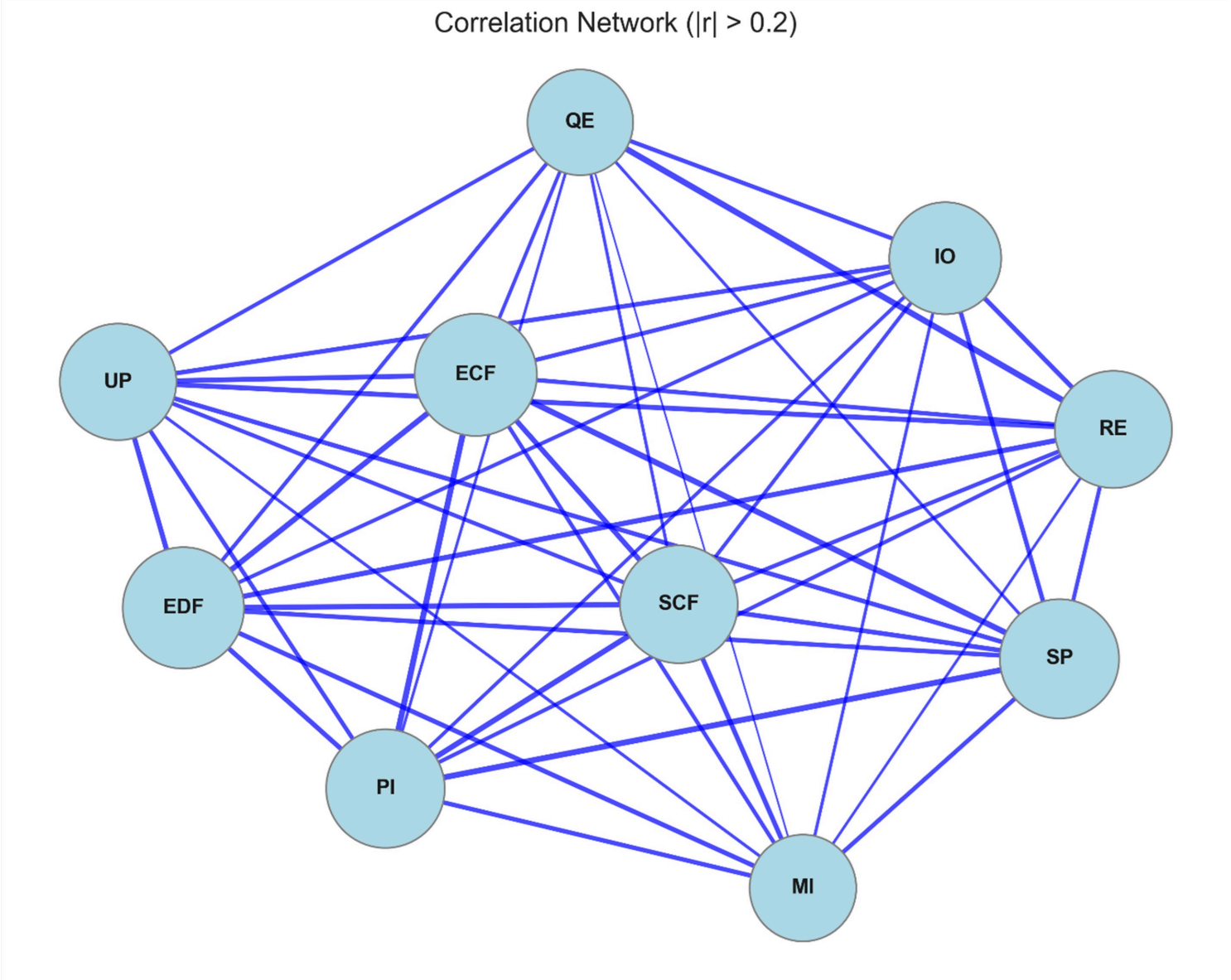


Figure 3

Correlation Network of Study Constructs

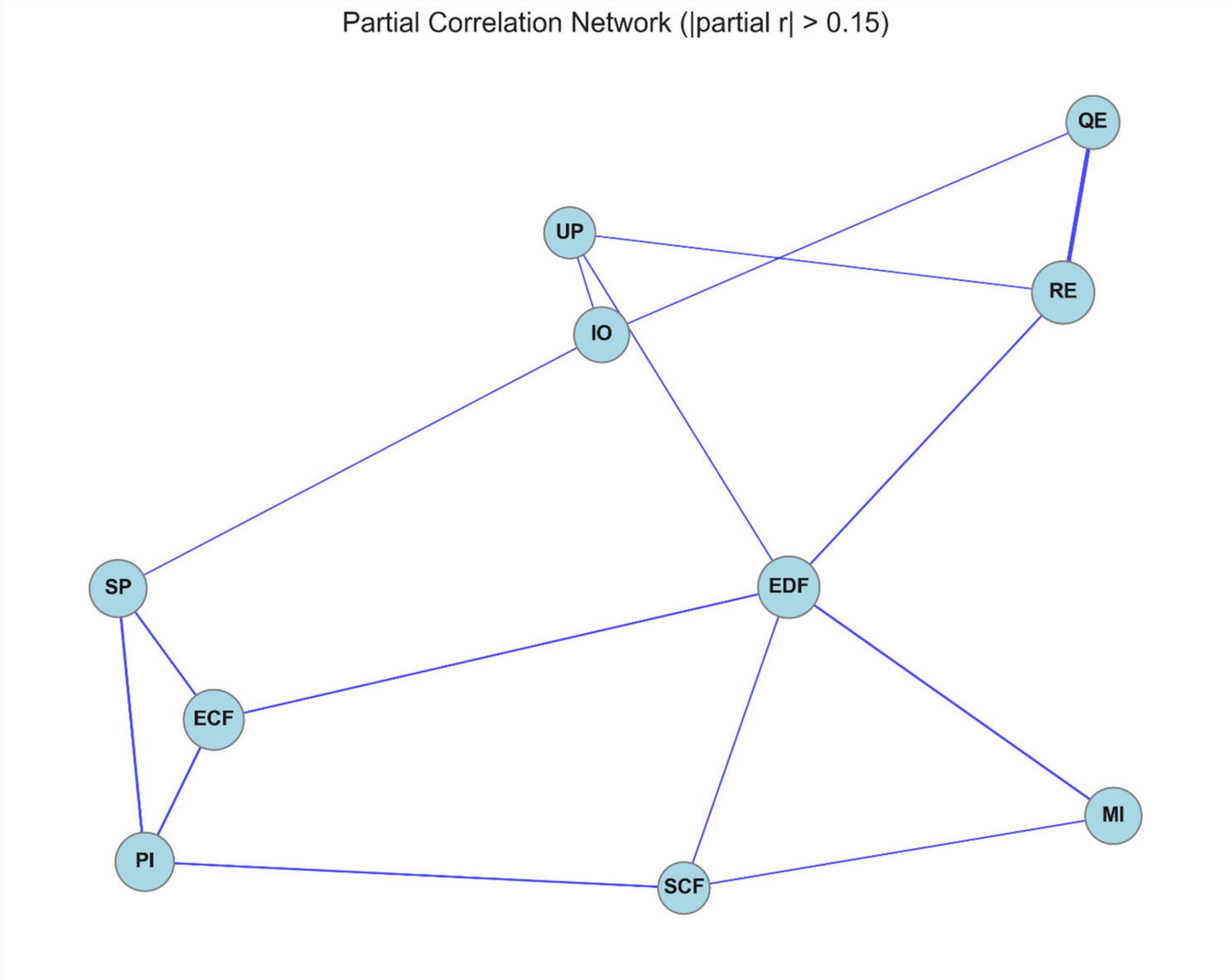


Figure 4

Partial Correlation Network of Study Constructs

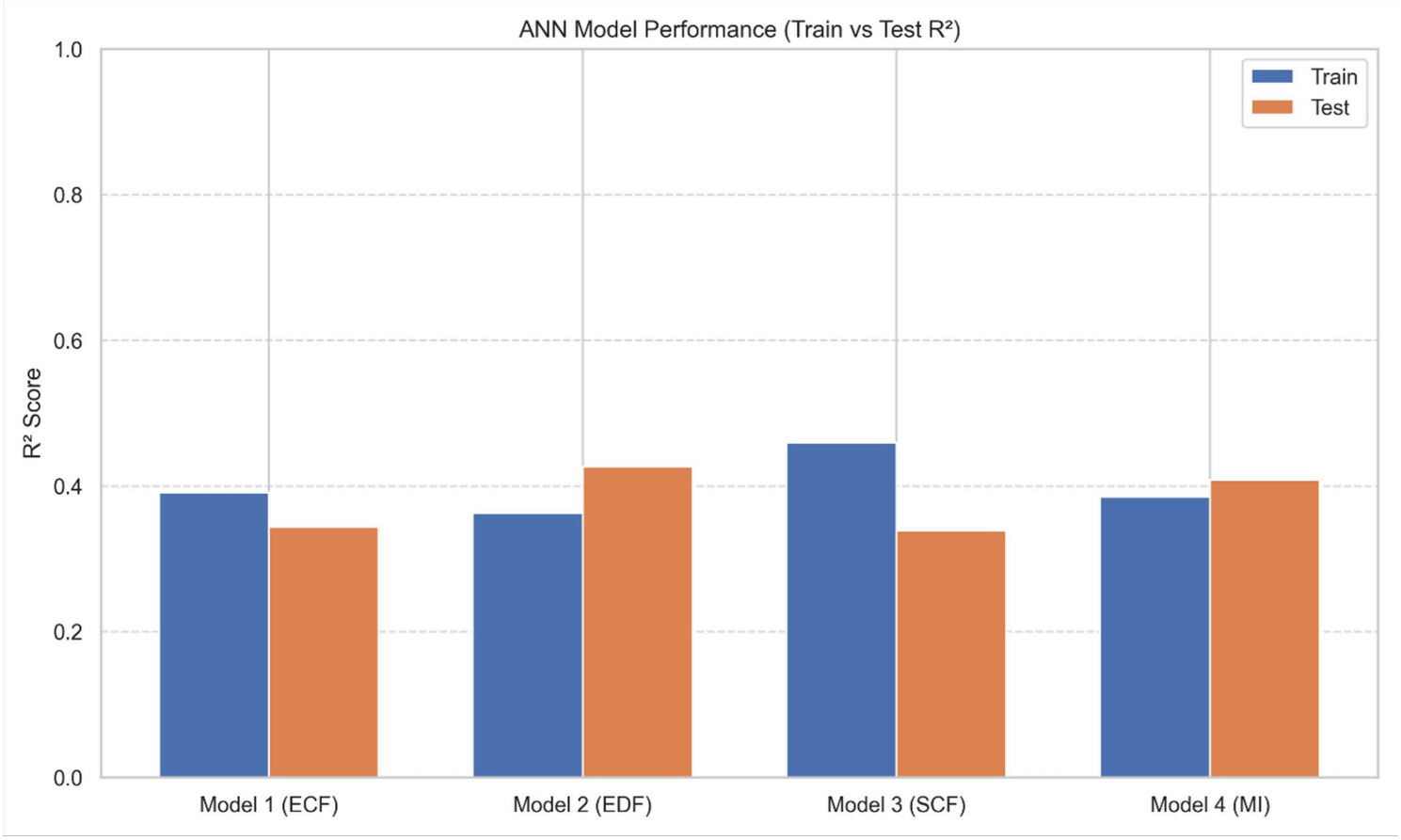


Figure 5

ANN Model Prediction Performance (Train vs. Test)

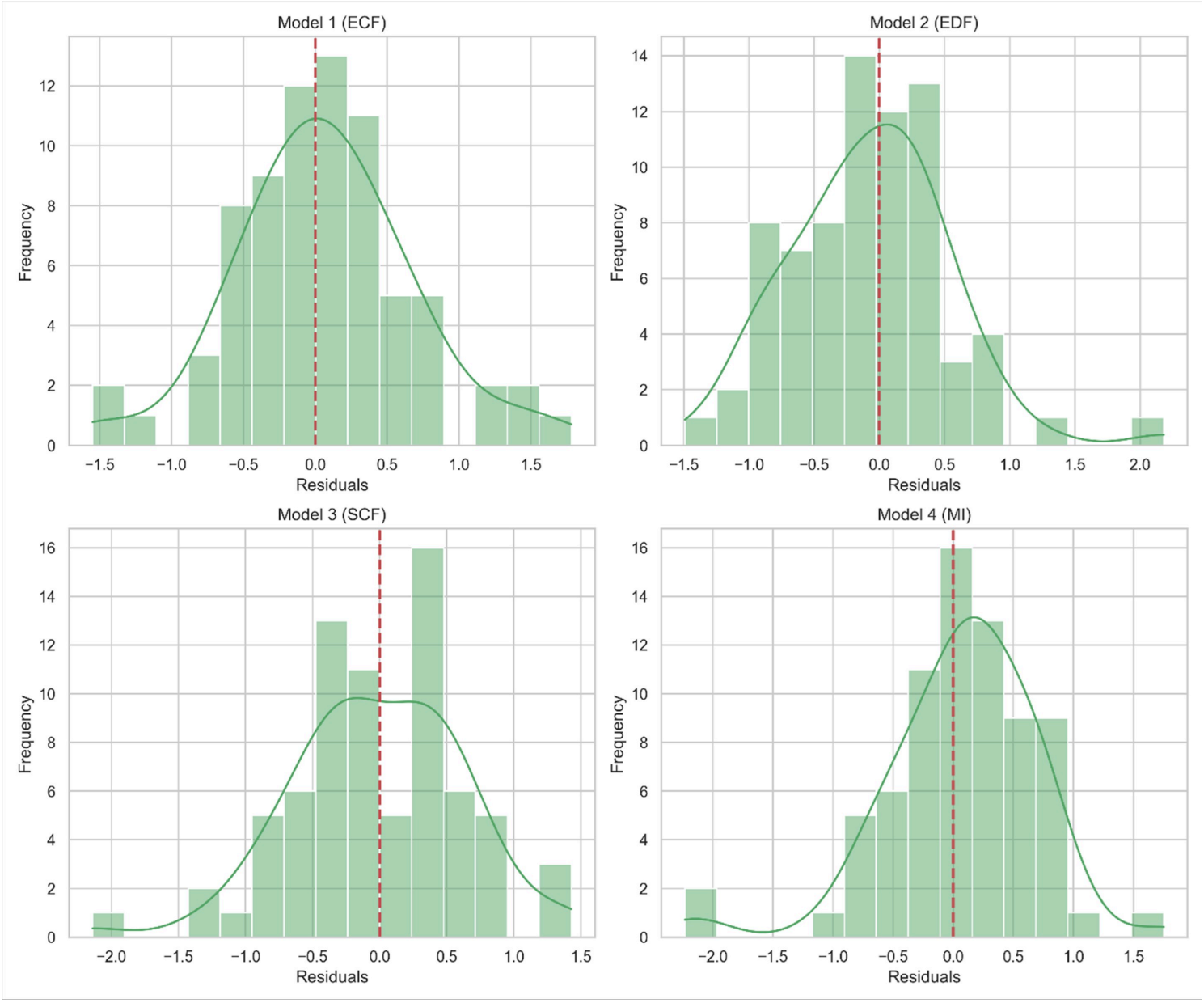


Figure 6

ANN Residual Distribution (Test Set)