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Determining the social exclusion levels of international students from different regions using the MAIRCA and TOPSIS method

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ABSTRACT

This study aims to determine the regions of Turkey in which visiting international students experience the highest levels of social exclusion. Based on non-numerical data and expert opinions, in order to help researchers and policymakers to understand this sector is considered the most significant contribution of this study to the field. According to the results obtained in the study, it was determined that the primary group of students coming from the Latin America region, with those from Asia coming in secondarily, experienced the highest levels of social exclusion. Therefore, universities and NGOs should consider forming groups to reduce the social exclusion of Latin America students. Programmes that help international students from Latin America, Asia, and Africa adjust to culture can also reduce social exclusion. In addition, non-governmental groups and formal institutions introducing geographical awareness into scholarship programme planning would reduce international students' economic exclusion. Housing and transportation costs, in addition to tuition or programme fees, are expensive for students from this region and compound their economic exclusion. Institutional measures to reduce sociocultural exclusion are vital for Asia and Africa students because discrimination against international students from this region requires a culturally-sensitive response that involves cooperation between the university and civic society.

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International students; social exclusion; various region; fuzzy MAIRCA

Introduction

In the modern sense, social exclusion is a concept used to describe people excluded from the Bismarck insurance system, in addition to exclusion by the state's administrative system. These people, outside the state's organisational design, expanded over time to include different groups. When used in France for the first time, it was defined as those outside the social protection system. After the 1970s, a large mass, including the disabled, single parents, uninsured, unemployed, and young people, were stated as excluded. Today, it is used for groups that concern large masses, such as isolated individuals, discouraged youth, and the unemployed. At the same time, it has become a concept valid for the underclass debates and the poor that emerged in post-industrial societies after the 1990s. (Agulnik 2002; Byrne 2005).

In fact, social exclusion is associated with economic, social-cultural, and political dimensions (Daly 2006). For all three dimensions of social exclusion in the literature, there are factors relating to the international student situation: financial deprivation, food, housing, financial risk or economic challenges, which is considered to be economic exclusion (Lightman and Good Gingrich 2018; Liu-Farrer

2009; Nyland et al. 2009; Renahy et al. 2012). According to the literature, scholarship opportunities, tuition or programme fees, accommodation, transportation costs, stationery, and other expenses are economic exclusion criteria. The socio-cultural exclusion is more likely to result in stigma, discrimination, marginalisation, racism, and nationalism and is expressed based on the viewpoint, conduct, and experience of international students (Hashim 2003; Quinton 2020; Yao, George Mwangi, and Malaney Brown 2019). In addition, language, discrimination, Turkish lifestyle, lack of orientation and adaptation to the university (including lack of social support and activities). Moreover, in terms of the international political student, political exclusion is reflected by the borders drawn by the strict nation-state with citizenship status and the quotas imposed by the governments for students to come to the country or to be registered as students in the school. Finally, the exclusionary attitudes of conservative views in terms of political regime, (Chiou 2017; Islam 2019; Pottie-Sherman 2018; Sá and Sabzalieva 2018), government policies, relations with public institutions, visa requirements and safety and security are among many political exclusion factors.

Higher education is the portion of the education system that has changed the most over the past fifty years, with the majority of nations with globalisation processes having had a profound effect on national higher education systems (Knight 2008). These changes reveal distinctions in the cultural, political, and economic structures of the nations. In this context, the situation of international students in Turkey is framed by the Ottoman era, the Republican era, and the most recent events. The situation of international students in Turkey has a lengthy history that cannot be confined to recent years (Baş 2021). Madrasas were responsible for higher education in the Ottoman Empire: the content of education and training was based on the concept of mass education in the Ottoman Empire and other Islamic states, and this concept continued after the establishment of Enderun School (Akkutay 1984). In the Ottoman state, however, in addition to numerous levels of education, higher education activities consisted of higher institutions and Dar-ül Fünun (Doğan 1997). During the Republican era, new institutions were established in the field of higher education, and reform made it possible for foreign experts and faculty members to lecture at universities. At the same time that foreign faculty members and experts came to Turkey, Turkish students were also sent abroad, resulting in unilateral student mobility during the Republican period (Bazarbayeva and Rahimov 2020). With the dissolution of the Soviet Union in 1989, higher education has taken on a global dimension with the introduction of the 'Great Student Project' in 1992, which aimed to provide education in Turkey to students from the Turkic Republics. The accumulation of internationalisation is a concurrent dimension of the globalisation phenomenon. In this regard, the phenomenon of international students in Turkey is relatively new in comparison to global trends, and the existence of institutions is gaining popularity due to socioeconomic, political, and cultural factors (Şimşek and Bakır 2016). In the long and short term, the globalisation of higher education is applicable to both Turkey and the rest of the world. Specific to Turkey, long-term access is provided through four distinct channels: Those who come with Turkey scholarships, those who come with their own funds, funding through the Islamic Development Bank, funding through the Turkey Diyanet Foundation, and support of other NGOs or university scholarships. However, there are numerous public and private institutions in Turkey that serve international students. YTB (Republic of Turkey Presidency for Turks Abroad and Relative Communities), YOK (Higher Education Board), KYK (Higher Education Credit and Hostels Institution), and NGOs (Non-Governmental Organisations) can be counted among these institutions (Akgül 2017). Nonetheless, short-term mobility, which is one of the most fundamental norms of internationalisation policies in Turkey, particularly in higher education, has attained a significant milestone over the past two decades. In light of Turkey's internationalisation strategies in higher education and its geographical and geopolitical position, it can be asserted that international students prefer Turkey as a destination rather than a transit country. (Figure 1).

The above chart illustrates the change in the number of international students in Turkey over the past fifteen years. If we observe the position of international students within the higher education system in Turkey, according to the most recent data, there are a total of 6,950,142 students in higher

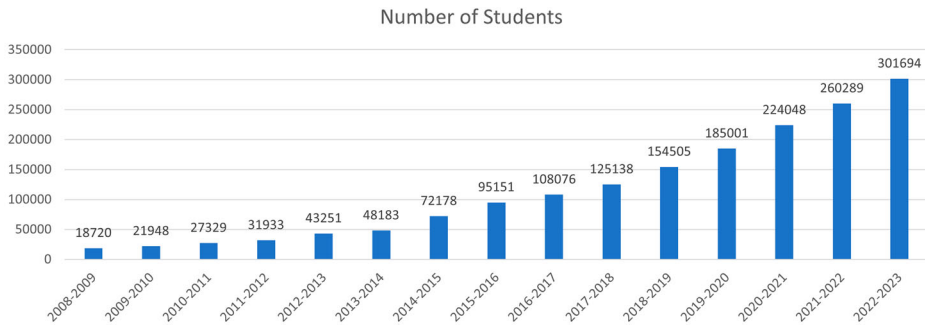


Figure 1. Number of International Students.

education, with international students making up 4.34 percent of the total. Despite the fact that it appears to be relatively low, it is expected that the number of international students will progressively increase, and the rate will quickly approach that of the most popular countries.

International education often reflects the student's goal of pursuing higher education outside of their home country. Yet, students often face a different economic structure, socio-cultural life, and policy practices in the country they travel to, especially if the country they are travelling to is more developed than their own country. Entering into any university involves a level of adaptation related to school education and structure, but in the case of these students, it also includes the influence and attitudes of the public institutions, especially in reference to the student's accommodation, adaptation to social and cultural life, visa, and right to work. These situations reflect three different dimensions of social exclusion and may apply to international students as well. Therefore, it is inevitable that such inequalities will arise even if the student is in a different country for educational purposes. Thus, social exclusion theory is used directly and indirectly to distinguish and measure educational disparities in both national higher education and international education. For the international student, the experience of a different country is considered important in terms of twenty-first-century skills. Being in a different country – for example, a developed country – is a different experience for the student. However, as seen in the literature, culture shock, adaptation, etc., are quite common for international students and often correspond to a dimension of social exclusion (Brown and Jones 2013; Paltridge, Mayson, and Schapper 2014; Tannock 2007; Zhou et al. 2008). Culture shock has evolved to a different point for international students, particularly with perceptions of racial hierarchy and new nationalism tendencies (James and Derrick 2020; Lee 2017; Lee, Jon, and Byun 2017; Ritter 2016). The economic structure of a country may likely create fragility, resulting in economic exclusion for international students (Crossman and Clarke 2010; Fang and Gunderson 2015; Nyland et al. 2009). And, although this is not true for any international student, it is possible for international students with non-citizenship status to view laws, regulations (health insurance, visa, work permit), and other regulations as political exclusion.

Specifically, international students' feelings of social exclusion in Turkey differs according to the region. This study aims to determine from which region international students from various regions feel the greatest levels of social exclusion in Turkey. In recent years, the number of international students has significantly increased. Notably, it is seen that certain regions and countries are at the top of the preferences. Due to the growing number of international students, it is crucial to minimise social exclusion concerning this purpose. For this reason, we did an extensive literature review in this study. Then, we identified criteria based on the economic, sociocultural, and political dimensions of social exclusion, using analysis from experienced experts' opinions.

Much of the research employs econometric models that have limitations since non-numerical data cannot be utilised. Therefore, this is a negative situation for international students. The non-numerical aspects of this study are evaluated using MAIRCA (MultiAttribute Ideal-Real

Comparative Analysis), a multi-criteria decision-making technique, and by soliciting experts' opinions with both numerical and non-numerical variables. Thus, recommendations that are more practical and specific for policymakers would be obtained.

This paper contains four parts. The introduction follows the review of the literature. In the second part, there is a comprehensive assessment of the relevant literature. The approach and practical applications are then outlined in depth. In conclusion, there is a discussion and conclusion made by examining the region's ranking derived from the MAIRCA technique and our strategies.

Literature review

Many studies directly or indirectly address international students' social exclusion. In this framework, research that highlights economic, sociocultural, and political settings comes to the fore. Güçlü (1996) examined international students' adjustment challenges and coping mechanisms at Pitt. Five hundred students from ninety countries participated. The study found that gender and education level affected financial and language challenges. Li and Pitkänen (2018) used qualitative interviews with thirty Chinese students to assess integration's academic, social, economic, and cultural factors. Accordingly, language is the main barrier to academic interaction, and intercultural social contacts can promote China's international student integration into the host country.

Poloma's (2017) doctoral thesis investigates internationalisation based on academic capitalism, and social exclusion was essential to the thesis's theory. International students endure social exclusion due to public and private colleges' institutional climate and lack of internationalisation culture. Depending on the outcome, mental health problems may increase. Institutional exclusion contributes to the perception of overseas students as underqualified and underperforming, thereby deepening a students' isolation. Arber (2010) studied social exclusion discourse in British education in Australia. In the study, identity, language, diversity, and cultural orientation hinder international students' access to the globalised world.

O'Connor (2015) studied how interaction and university affect international students' inclusion and exclusion. In the study, he pointed out the socio-spatial divergence of international students and the impediments to their intercultural engagement. He disclosed the issue of social exclusion from its socio-cultural component. Additionally, Hopkins (2011) examined Muslims' inclusion and exclusion. The study focused on religious practices and media discourses in universities and revealed differing public and university perspectives.

In a similar study, Andersson, Sadgrove, and Valentine (2012) examined international students' experiences at an English university. Geographic contact experiences of students and staff reveal that the college environment and commercial power centres encourage exclusivity in certain students. Sherwani (2015) examined whether international students at Sabancı University in Turkey and Turkish students are socially excluded.

Nyland et al. (2009) rated international students' acceptance of inadequate working circumstances as negligence. Waters (2012) argues that international education promotes social inequities and engages international students in developing countries. Lee and Rice (2007) highlighted international students' discriminatory perceptions. White international students didn't have negative criticism regarding race and culture, but eastern students did.

Valdez (2015) examined Chinese international students' views of social exclusion in the classroom. He advocates internationalising identity formation to solve this challenge. Tabora (2020) highlighted social exclusion and inequality among international F-1 students due to US employment and immigration rules. As such, the theory focuses on political and economic exclusion. Thirty-eight students and twenty-two international student advisors were interviewed. Highly restrictive immigration regulations harm international F-1 students' livelihoods, generate exclusion and exploitation, force students into the informal workforce, and cause financial hardships. Baş and Eti (2020) concluded in their research that 274 international students experience social exclusion at the point of access to employment in Turkey.

Zhao (2017), who studies the association of art with social media, considers social media to be a modern necessity. The study evaluates the daily experiences of international students in their home countries using social media. Based on these analyses, a strategic fight against social exclusion is conceivable. Sherry, Thomas, and Chui (2010) drew attention to international students' issues adapting to a new culture, language, and finances and understanding the university. The study covers socio-cultural and economic dimensions of social exclusion. Waters (2006), who stresses the effect of social transformation in distinct international education geographies, shows that 'Western education' causes geographies of social exclusion for cultures that send students. In his study on the linguistic ideology of overseas students in Hong Kong for university education, Sung (2022) found that local language preferences led to social isolation in classroom debates. Negative opinions of overseas students due to their experiences materialise as economic and socio-cultural exclusion. (Jones 2017; Matsuzuka and Gérard 2022; Nachatar Singh 2018).

In contrast, different experiences, views, and attitudes towards social exclusion have occurred during the Covid-19 period and continue to emerge. Cohen, Hoyt, and Dull (2020) found that the health crisis produced by the pandemic, and the fear of the virus that people carry, exacerbates cultural discrimination and leads to the social exclusion of international students. Hasnain and Hajek (2022) thematically evaluated the commitment or disengagement of international students who were believed to be adversely influenced by Covid-19 in their research. According to the study's findings, social, cultural, and political topics are enumerated that, while not directly related to the social exclusion of international students, are strongly correlated with it. Rzymiski and Nowicki (2020) uncovered the socio-cultural exclusion resulting from rising prejudices towards international students of Asian heritage studying in Poland.

In a similar study, Lai et al. (2021) found that Chinese international students studying in the United States and the United Kingdom voiced numerous concerns, including a lack of social support, bias, and academic achievement worries. Eventually, these findings play a significant role in the socio-cultural dimension of social exclusion. In this regard, Cheng (2020) and Chen et al. (2020) observed that discriminatory attitudes in the form of micro-aggressions result in the socio-cultural exclusion of international students. In conclusion, the pandemic period is depicted as a time in which international students of Asian ancestry faced increasing problems and social rejection. The lack of social support, financial difficulties, and social exclusion (in terms of economic and sociocultural factors) drew the attention of all international students, particularly those who had to remain in the host country due to the closure of the borders.

In analysing country selection factors for international students, Baş and Eti (2022) concluded that legal regulations and compelling government policies were important criteria in their study. These criteria are aimed at minimising the political dimension of social exclusion and are evaluated holistically within the internationalisation strategies of higher education systems. Alpar (2022) conducted his research with 490 international students studying at Istanbul University and focused on the factors affecting their quality of life during the restrictions of COVID-19. Half of the international students stated that their quality of life has decreased and that there are severe problems in decreasing income level, accommodation, passport, visa, and residence permit expiry and renewal. These results are related to almost all dimensions of social exclusion discussed in this study. Thies and Falk (2023) conducted a study based on the data of a panel study across Germany aimed at increasing international students' sense of university belonging. In the study, it was concluded that the increase in participation in non-university activities strengthens the sense of belonging and facilitates academic integration. This result reflects a framework for minimising and improving the socio-cultural consequences of social exclusion. Hastings et al. (2023) measured the results of financial and employment insecurity in two different cities before and during the pandemic, two areas that have become increasingly precarious for international students in Australia, especially in the last decade. As a result, it has been revealed that the resulting vulnerability is related to factors such as international students coming from low-income countries, working-class families, and being without a scholarship. Wilson et al. (2022) focused on the effects of financial

stress experienced by international students and pointed out that the financial stress of students from low-gross national income countries is higher; access to paid employment does not reduce this stress; and there is a need for tools and policies to combat financial stress, especially due to the destructive effects of the need for housing. Student experiences regarding the socio-cultural dimension of social exclusion are quite extensive. For example, the fact that an international student from a very different culture can receive positive support and feedback from a lecturer or family member strengthens their harmony (Li and Han 2023). Or, when viewed from the health dimension, socio-cultural adaptation and empowerment can be a direct factor in terms of mental health (Razgulin, Argustaitė-Zailskienė, and Šmigelskas 2023). Inability to adapt to the new education system, language barriers (Zhou 2023), and acculturation stress can be factors that make socio-cultural adaptation difficult (Kristiana et al. 2022) and increase the exclusion factor.

Methodology

Fuzzy Shannon's entropy

The Entropy Method is a multi-criteria decision-making method developed in 2001, inspired by Shannon's second law of thermodynamics. In this method, the decision matrix is used to calculate the weights of the criteria. The advantage of the method is that a separate evaluation matrix is needed when determining the criterion weight in multi-criteria decision making methods used for weighting, while the criterion weights can be calculated with the decision matrix created in the entropy method. Following are the phases of the fuzzy Shannon's Entropy approach (Madenoglu 2021):

Step 1: Creating a primary linguistic decision matrix (DL) in which alternatives are evaluated linguistically based on predetermined criteria. In the case of k experts evaluating m options based on n criteria, the DL matrix is constructed with the aid of the Equation (1).

$$D_L = \begin{bmatrix} L_{11}^1, \dots, L_{11}^k & \dots & L_{1n}^1, \dots, L_{1n}^k \\ \vdots & \ddots & \vdots \\ L_{m1}^1, \dots, L_{m1}^k & \dots & L_{mn}^1, \dots, L_{mn}^k \end{bmatrix} \quad (1)$$

In this instance, it refers to the linguistic evaluation of the m .th alternative by the k .th expert based on the n .th criterion. In this evaluation, the expressions in Table 1 are used. (Gul and Ak 2020; Kutlu and Ekmekçioğlu 2012) (Table 2).

Step 2: the decision matrix (D) is computed with the help of equation 2 by averaging the primary fuzzy decision

$$\tilde{D} = \begin{bmatrix} \tilde{A}_{11} & \dots & \tilde{A}_{1n} \\ \vdots & \ddots & \vdots \\ \tilde{A}_{m1} & \dots & \tilde{A}_{mn} \end{bmatrix} \quad (2)$$

Where calculate with $\tilde{A}_{11} = \frac{L_{11}^1 + L_{11}^2 + \dots + L_{11}^k}{k}$

Table 1. Linguistic expressions.

Linguistic Expressions	Triangular Fuzzy Numbers (l,m,u)
Very low	(0,0,1)
Low	(0,1,3)
Slightly Low	(1,3,5)
Middle	(3,5,7)
Little bit high	(5,7,9)
High	(7,9,10)
Very high	(9,10,10)



Table 2. Decision matrix.

	C1			C2			C3			C4			C5			C6			C7			C8			C9			C10			C11			C12			C13				
	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m
Africa	9,00	10,00	10,00	4,67	6,00	7,33	5,67	7,33	8,67	1,67	2,67	4,33	2,67	4,00	5,67	4,67	6,00	7,00	3,33	4,67	6,00	1,33	2,67	4,33	3,33	5,00	6,67	5,00	6,67	8,00	3,33	4,67	6,00	2,67	4,00	5,67	4,00	5,67	7,33		
Asia	6,33	7,67	8,33	6,33	8,33	9,67	2,33	4,33	6,33	0,00	0,33	1,67	1,00	2,00	3,67	4,67	6,00	7,33	6,33	8,00	9,33	2,67	4,00	5,67	2,67	4,33	6,33	4,67	6,00	7,33	3,33	4,67	6,00	5,00	7,00	8,67	6,33	8,33	9,67		
Europe	5,00	6,67	8,00	6,33	8,00	9,00	5,67	7,33	8,67	1,00	2,00	3,67	3,33	4,33	5,33	4,67	5,67	6,67	5,67	7,67	9,33	6,33	8,33	9,67	7,00	9,00	10,00	4,67	6,00	7,33	4,67	6,00	7,33	4,67	6,00	7,33	5,00	7,00	8,67		
Balkans	7,67	9,00	9,67	4,67	5,67	6,67	5,33	6,67	7,67	1,67	2,67	4,33	6,33	7,67	8,33	7,67	9,33	10,00	8,33	9,67	10,00	10,00	4,67	6,33	7,67	4,00	5,67	7,33	8,33	9,67	10,00	4,00	5,00	6,00	7,67	9,33	10,00	7,67	9,33	10,00	
North America	6,00	7,00	7,67	6,33	7,67	8,33	3,33	4,33	5,33	3,00	3,67	4,67	5,00	6,67	8,00	2,67	4,33	6,33	4,67	6,33	7,67	2,67	4,33	6,33	4,33	6,33	8,33	4,00	5,33	6,67	3,33	5,00	6,67	4,33	6,33	8,33	3,67	5,67	7,67		
Latin America	5,67	7,33	8,33	3,33	5,00	6,67	4,33	6,33	8,00	0,33	1,33	3,00	3,33	4,67	6,33	4,00	5,33	6,67	2,33	3,33	4,67	2,67	4,33	6,33	2,00	3,67	5,67	2,67	4,00	5,67	1,67	2,33	3,67	1,67	2,33	3,67	5,67	7,67	9,33		
Middle East	8,33	9,67	10,00	7,67	9,00	9,67	7,67	9,00	9,67	1,00	1,67	3,00	6,33	8,00	9,33	5,67	7,33	8,33	7,67	9,33	10,00	3,33	4,67	6,33	3,33	4,67	6,33	5,00	7,00	8,67	2,00	3,67	5,67	4,33	6,33	8,00	7,00	8,67	9,67		
Turkic Republics	9,00	10,00	10,00	7,67	9,33	10,00	7,67	9,33	10,00	0,33	1,33	3,00	7,67	9,00	9,67	7,67	9,00	9,67	9,00	10,00	10,00	4,00	5,67	7,33	4,67	6,33	7,67	8,33	9,67	10,00	5,00	6,67	8,00	8,33	9,67	10,00	8,33	9,67	10,00		
Far East	8,33	9,67	10,00	5,67	7,67	9,33	4,33	6,33	8,00	1,67	2,33	3,67	1,00	2,33	4,33	4,67	6,00	7,33	5,67	7,33	8,33	3,33	5,00	6,67	3,33	5,00	6,67	4,67	5,67	6,67	3,33	4,67	6,33	3,00	5,00	7,00	5,67	7,67	9,33		

Step 3: D matrix is normalised by Equation (3). Where $\tilde{A}_{ij} = (l_{ij}, m_{ij}, u_{ij})$ is a triangular fuzzy number.

$$\tilde{z}_{ij} = \left(\frac{l_{ij}}{\sum_{i=1}^m l_{ij}}, \frac{m_{ij}}{\sum_{i=1}^m m_{ij}}, \frac{u_{ij}}{\sum_{i=1}^m u_{ij}} \right) \quad (3)$$

Step 4: With help of Equation (4), vector of fuzzy Shannon's entropy $\hat{e} = (\hat{e}_1, \hat{e}_2, \hat{e}_3)$ is computed.

$$\tilde{e}_j = \left(-\frac{1}{\ln(m)} \sum_{i=1}^m l_{ij} * \ln l_{ij}, -\frac{1}{\ln(m)} \sum_{i=1}^m m_{ij} * \ln m_{ij}, -\frac{1}{\ln(m)} \sum_{i=1}^m u_{ij} * \ln u_{ij} \right) \quad (4)$$

Step 5: Fuzzy diversification vector (d) is completed by Equation (5).

$$\tilde{d}_j = 1 - \hat{e}_j = \left(1 - \frac{1}{\ln(m)} \sum_{i=1}^m l_{ij} * \ln l_{ij}, 1 - \frac{1}{\ln(m)} \sum_{i=1}^m m_{ij} * \ln m_{ij}, 1 - \frac{1}{\ln(m)} \sum_{i=1}^m u_{ij} * \ln u_{ij} \right) \quad (5)$$

Step 6: Fuzzy criterion weights (w) are calculated by Equation (6).

$$\tilde{w}_j = \frac{\tilde{d}_j}{\sum_{j=1}^n \tilde{d}_j} \quad (6)$$

Step 7: The fuzzy weights

$$w_j = \frac{1}{4} * (w_{lj} + 2 * w_{mj} + w_{uj}) \quad (7)$$

Fuzzy MAIRCA

Multi Attribute Ideal Real Comparative Analysis (MAIRCA) is one of the multi-criteria decision making techniques employed to rate the alternatives. The method in question was created based on a comparison of ideal and actual evaluations. The overall gap for each observed alternative is equal to the sum of the gaps for each criterion value. The option with the biggest of these total discrepancies is deemed the most distant from the ideal estimations (Chatterjee, Pamucar, and Zavadskas 2018).

The usage of fuzzy number sets in multi-criteria decision making procedures has increased in recent years (Candila et al. 2021; Saqib et al. 2021; Yumashev and Mikhaylov 2020). Multi-criteria decision making techniques are one of the most frequently used methods to determine the optimal options and the best alternative (Khan et al. 2021; Li et al. 2022). It has been noted that fuzzy sets produce more accurate findings for analysis (Ersin, Dinçer, and Yüksel 2019). Following are the phases of the fuzzy MAIRCA approach (Boral et al. 2020):

Step 1: In this step, preferences are identified based on the selection of PAi options. It indicates that the decision maker is indifferent to the choice of an alternative, assuming that each alternative has an equal probability of being selected. PAi values are calculated using an Equation (8).

$$P_{A_i} = \frac{1}{m}; \sum_{i=1}^m P_{A_i} = 1 \quad (8)$$

Step 2: The elements of the fuzzy theoretical evaluation matrix (\widetilde{T}_{PA}) are computed by multiplying the alternatives' preferences and criterion weights. The equation for this calculation

is (9).

$$\tilde{T}_{PA} = \begin{bmatrix} \frac{1}{m} \tilde{w}_1 & \cdots & \frac{1}{m} \tilde{w}_n \\ \vdots & \ddots & \vdots \\ \frac{1}{m} \tilde{w}_1 & \cdots & \frac{1}{m} \tilde{w}_n \end{bmatrix} = \begin{bmatrix} \tilde{t}_{p11} & \cdots & \tilde{t}_{p1n} \\ \vdots & \ddots & \vdots \\ \tilde{t}_{pm1} & \cdots & \tilde{t}_{pmn} \end{bmatrix} \tag{9}$$

Step 3: In the second step, the matrix is normalised to produce a normalised fuzzy decision matrix. Equation (10) is utilised for this purpose. The greatest benefit of this normalisation is that it is independent of whether the criterion is cost or benefit.

$$\begin{aligned} n_{ij}^l &= \frac{a_{ij}^l}{\sqrt{\sum_{i=1}^m [(a_{ij}^l)^2 + (a_{ij}^m)^2 + (a_{ij}^u)^2]}} \\ n_{ij}^m &= \frac{a_{ij}^m}{\sqrt{\sum_{i=1}^m [(a_{ij}^l)^2 + (a_{ij}^m)^2 + (a_{ij}^u)^2]}} \\ n_{ij}^u &= \frac{a_{ij}^u}{\sqrt{\sum_{i=1}^m [(a_{ij}^l)^2 + (a_{ij}^m)^2 + (a_{ij}^u)^2]}} \end{aligned} \tag{10}$$

Step 4: The elements of the actual evaluation matrix (\tilde{T}_{rA}) are computed. Equation (11) is used which.

$$\tilde{T}_{rA} = \begin{bmatrix} \tilde{t}_{r11} & \cdots & \tilde{t}_{r1n} \\ \vdots & \ddots & \vdots \\ \tilde{t}_{rm1} & \cdots & \tilde{t}_{rmn} \end{bmatrix} = \begin{bmatrix} \tilde{n}_{11} * \tilde{t}_{p11} & \cdots & \tilde{n}_{1n} * \tilde{t}_{p1n} \\ \vdots & \ddots & \vdots \\ \tilde{n}_{m1} * \tilde{t}_{pm1} & \cdots & \tilde{n}_{mn} * \tilde{t}_{pmn} \end{bmatrix} \tag{11}$$

Step 5: This stage involves calculating the difference between the theoretical and real evaluations of each alternative according to each criterion. The gap between and values corresponds to the distance between and values. Using Equation (12), the distance (g_{ij}) between these two numbers is computed.

$$g_{ij} = \sqrt{\frac{1}{3} [(t_{pji} - t_{rji})^2 + (t_{pjm} - t_{rjm})^2 + (t_{pju} - t_{rju})^2]} \tag{12}$$

Step 6: According to each criterion, the gap values for each alternative are summed. The final values (Q) of the criterion functions are derived using Equation (13). The final values are then sorted in ascending order, and the alternative with the lowest Q value is chosen to be the best.

$$Q_i = \sum_{j=1}^n g_{ij} \quad i = 1, 2, \dots, m \tag{13}$$

Implementation

The opinions of three experts in the field were collected. For the selection of experts contributing to the study, three provinces in Turkey with the highest number of international students were determined. In these provinces, experts with at least 10 years of experience in non-governmental organisations in the field of international students were selected. Detailed information about the study was given to these people, and afterwards, the results were calculated with an objective method utilising their expertise. With the help of Table 1 and Equation (2), the decision matrix was created.

With the help of Equation (3), the decision matrix for the Fuzzy Entropy method is normalised. The normalised matrix is given in Table 3. By Equations (4) and (5), e and d vectors are calculated. The Results of equations are shown in Table 4. By Equations (6) and (7), final weights are calculated. The weights of criteria are given in Table 5. (Tables 6–9).

According to Table 5, the most important criterion was ‘Stationery and other costs’, while the least important criterion was ‘Scholarship opportunities.’ Then, the theoretical evaluation matrix was produced in steps 1 and 2 in Fuzzy MAIRCA. For this, Equations (8) and (9) were applied. Using Equation (10), the normalised matrix was generated in step 3 in Fuzzy MAIRCA. Then, the TrA matrix was calculated by Equation (11). Equation (12) was used to calculate the difference between the actual evaluation matrix and the theoretical evaluation matrix. The g_{ij} items are displayed in the table after this calculation. Equation (13) was then used to generate the Q scores, which are the sum of the gap values, and the ranking of the regions. The outcomes are presented in Table 10.

Accordingly, while the most suitable region was Turkic Republics, the region that experienced the most exclusion problems was Latin America. Asia took second place with a total gap value of 7.052. In addition, F-MAIRCA results were compared with the results of the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method. According to the comparison, while the first two rows were the same, only the 3rd and 4th rows differed according to the TOPSIS method. In other rankings, both methods have the same result.

Conclusion and discussions

The aim of this study is to determine which international students from different regions of the globe experience the highest levels of social exclusion in Turkey. Based on the literature, we determined thirteen criteria for this framework and applied the fuzzy MAIRCA and TOPSIS methods. According to the study’s findings, Latin America was the region with the highest rate of social exclusion, while the Turkic Republics was the most suitable.

According to the findings of this study, international students from Latin America had the greatest levels of social exclusion across all three dimensions. Students from outside hail from Latin America, Africa, Asia, the Far East, North America, Europe, the Middle East and the Balkans. In this context, universities and non-governmental organisations might establish a variety of organisations to lessen the social exclusion of students from the Turkic Republics. For instance, where international students from Latin America study, the availability of programmes that expedite sociocultural adaptation in universities would lessen social exclusion, in this regard.

Additionally, expanding geographical understanding for non-governmental organisations and formal institutions into their scholarship programme planning will lessen the economic exclusion of international students from this region. For students from this region, the cost of housing and transportation, in addition to tuition or programme fees, is economically burdensome and exacerbates their sense of economic exclusion.

Moreover, institutional efforts to decrease socio-cultural exclusion become crucial for international students from Asia because discrimination against international students from this region is an issue for which a different strategy must be designed within the cultural context. This requires university and civil society cooperation. In addition, it is of the utmost need to examine scholarship regulations in order to create educational opportunities with affordable education or programme prices that can attract a more significant number of international students from Asia.

When compared to the TOPSIS technique, however, the identical regions occupy the top two positions. In the fuzzy MAIRCA technique, the Middle East is ranked third and Europe is ranked fourth; however, in the TOPSIS method, these two regions switch positions, while the ranking of the remaining five regions remains unchanged.

The results of this study are parallel to many studies in the literature. According to the results of Eynulleva et al.’s (2021) study of the adaptation of international students studying in Turkey to Turkish culture, the general adaptation level of the students is moderate. However, in this study,

Table 3. Normalised matrix for fuzzy entropy.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13																										
Africa	0,14	0,13	0,12	0,09	0,09	0,10	0,12	0,12	0,12	0,16	0,15	0,14	0,07	0,08	0,09	0,10	0,10	0,10	0,06	0,07	0,08	0,07	0,10	0,10	0,10	0,11	0,11	0,11	0,11	0,11	0,11	0,06	0,07	0,08	0,08	0,08	0,09		
Asia	0,10	0,10	0,10	0,12	0,13	0,13	0,05	0,07	0,09	0,00	0,02	0,05	0,03	0,04	0,06	0,10	0,10	0,11	0,12	0,12	0,12	0,09	0,09	0,09	0,08	0,09	0,10	0,10	0,10	0,10	0,11	0,11	0,11	0,12	0,13	0,13	0,12	0,12	0,12
Europe	0,08	0,09	0,10	0,12	0,12	0,12	0,12	0,12	0,12	0,09	0,11	0,12	0,09	0,09	0,09	0,10	0,10	0,10	0,11	0,12	0,12	0,20	0,18	0,16	0,20	0,18	0,15	0,10	0,10	0,10	0,15	0,14	0,13	0,11	0,11	0,11	0,09	0,10	0,11
Balkans	0,12	0,12	0,12	0,09	0,09	0,09	0,12	0,11	0,11	0,16	0,15	0,14	0,17	0,16	0,14	0,17	0,16	0,14	0,16	0,15	0,13	0,15	0,14	0,13	0,12	0,11	0,11	0,18	0,16	0,14	0,13	0,12	0,11	0,18	0,17	0,15	0,14	0,13	0,12
North America	0,09	0,09	0,09	0,12	0,12	0,11	0,07	0,07	0,07	0,28	0,20	0,15	0,14	0,14	0,13	0,06	0,07	0,09	0,09	0,10	0,10	0,09	0,10	0,10	0,13	0,13	0,13	0,08	0,09	0,09	0,11	0,12	0,12	0,10	0,11	0,12	0,07	0,08	0,09
Latin America	0,09	0,10	0,10	0,06	0,08	0,09	0,09	0,10	0,11	0,03	0,07	0,10	0,09	0,10	0,10	0,09	0,09	0,10	0,04	0,05	0,06	0,09	0,10	0,10	0,06	0,07	0,09	0,06	0,07	0,08	0,05	0,05	0,07	0,04	0,04	0,05	0,11	0,11	0,11
Middle East	0,13	0,13	0,12	0,15	0,14	0,13	0,17	0,15	0,13	0,09	0,09	0,10	0,17	0,16	0,15	0,12	0,12	0,12	0,14	0,14	0,13	0,11	0,10	0,10	0,10	0,09	0,10	0,11	0,12	0,12	0,07	0,09	0,10	0,10	0,11	0,12	0,13	0,12	0,12
Turkic Republics	0,14	0,13	0,12	0,15	0,14	0,13	0,17	0,15	0,14	0,03	0,07	0,10	0,21	0,18	0,16	0,17	0,15	0,14	0,17	0,15	0,13	0,13	0,13	0,12	0,13	0,13	0,12	0,18	0,16	0,14	0,16	0,16	0,14	0,20	0,17	0,15	0,16	0,14	0,12
Far East	0,13	0,13	0,12	0,11	0,12	0,12	0,09	0,10	0,11	0,16	0,13	0,12	0,03	0,05	0,07	0,10	0,10	0,11	0,11	0,11	0,11	0,11	0,11	0,10	0,10	0,10	0,10	0,09	0,09	0,11	0,11	0,11	0,11	0,07	0,09	0,10	0,11	0,11	0,11

Table 4. e and d vectors.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13																										
e	0,242	0,243	0,244	0,241	0,242	0,243	0,238	0,241	0,242	0,210	0,231	0,240	0,225	0,233	0,239	0,239	0,241	0,243	0,237	0,239	0,241	0,236	0,239	0,242	0,238	0,240	0,243	0,238	0,240	0,242	0,239	0,240	0,242	0,233	0,237	0,240	0,241	0,242	0,244
d	0,758	0,757	0,756	0,759	0,758	0,757	0,762	0,759	0,758	0,790	0,769	0,760	0,775	0,767	0,761	0,761	0,759	0,757	0,763	0,761	0,759	0,764	0,761	0,758	0,762	0,760	0,757	0,762	0,760	0,758	0,761	0,760	0,758	0,767	0,763	0,760	0,759	0,758	0,756

Table 5. Weights of criteria.

Criteria	Weights
Scholarship Opportunities (C1)	0,0765
Tuition or Programme Fee (C2)	0,0766
Housing and Transportation Cost (C3)	0,0768
Stationery and Other Costs (C4)	0,0780
Language (C5)	0,0776
Discrimination (C6)	0,0767
Turkish Way of Life (C7)	0,0769
Orientation and Adaptation Deficiencies of the University (C8)	0,0769
Social Support and Activity Deficiencies (C9)	0,0768
Government Policies (C10)	0,0768
Relations with Public Institutions (C11)	0,0768
Visa Requirements (C12)	0,0771
Safety and Security (C13)	0,0766

the regions from which international students come are not specified. Additionally, Snoubar and Çelik (2013) pointed out that for international students in Turkey, cultural differences are the most important factor affecting success and harmony. Parallel to the finding of Balkan countries, where we found the second lowest level of exclusion in our study, Kondakçi et al. (2016) concluded in their research that international students from the Balkans came with the motivation of socio-cultural proximity.

Hanassab and Tidwell (2002) claimed in their study's findings that international students from Asian nations experience socio-cultural exclusion and have trouble adapting to the host country due to the cultural barrier between their home country and the host country. Similarly, Yeh and Inose (2003) discovered that Asian students experience sociocultural exclusion due to the difficulties of learning the English language. Zhang and Goodson (2011) highlighted the social exclusion of international students from the Asian region, claiming that international students from Europe and South America had a greater socio-cultural fit than international students from Asia.

Indeed, those who feel social exclusion more intensely are groups of international students from Latin America, Asia, and Africa, respectively. There are hardly any international students coming to Turkey from the Latin American region, but the number of international students coming from the Asian and African regions is considerable. These regions are quite distant from Turkey in terms of socio-cultural aspects. Especially for those coming from the Asian region, there may be problems adapting to the socio-cultural environment and the university and campus climate. Many experiences, including geographical distance and diversity in lifestyles, language and communication barriers, food culture, relatively low economic purchasing power, and a lack of awareness of public rights (health insurance, visa, work permit, etc.), bring social exclusion into all three dimensions for those coming from the region. For Asian international students, the lack of professional help and poor coping strategies can exacerbate a state of vulnerability due to differences in cultural perceptions (Khawaja and Dempsey 2008). In this study, it can be concluded that these mitigating actions are effective in reducing the high level of social exclusion among Asian students. In addition, a significant number of international student groups from the African region come to different provinces of Turkey for educational purposes. It is observed that new nationalism and micro-nationalist attitudes are gradually increasing in some countries and regions of the world. These attitudes and tendencies, in addition to international education policies that restrict international education (e.g. quota application) in some countries, create the basis for social exclusion. At a broader level, racist attitudes constitute an important barrier to social integration. Although there is no general perception towards those coming from Africa in Turkey, in the studies conducted with African international students (Dzıwornu, Yakar, and Temurçin 2016), the perceptions of the Turkish people about Africans and the difficulties in learning languages negatively affect academic success and bring the integration problem to light. (Bulut-Sahin and Kondakci 2022; Geburu and Yuksel-Kaptanoglu 2020; Musizvingoza 2020). It has been revealed in a study conducted in

Table 7. Normalised matrix.

	C1			C2			C3			C4			C5			C6			C7			C8			C9			C10			C11			C12			C13				
	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m
Africa	0,21	0,23	0,23	0,12	0,15	0,19	0,16	0,20	0,24	0,12	0,20	0,32	0,09	0,13	0,18	0,13	0,17	0,20	0,08	0,12	0,15	0,05	0,09	0,15	0,11	0,16	0,22	0,14	0,19	0,22	0,13	0,18	0,23	0,08	0,12	0,16	0,10	0,14	0,18		
Asia	0,14	0,17	0,19	0,16	0,21	0,25	0,06	0,12	0,18	0,00	0,02	0,12	0,03	0,06	0,12	0,13	0,17	0,21	0,16	0,20	0,24	0,09	0,14	0,20	0,09	0,14	0,21	0,13	0,17	0,21	0,13	0,18	0,23	0,15	0,20	0,25	0,16	0,21	0,24		
Europe	0,11	0,15	0,18	0,16	0,21	0,23	0,16	0,20	0,24	0,07	0,15	0,27	0,11	0,14	0,17	0,13	0,16	0,19	0,14	0,20	0,24	0,22	0,30	0,34	0,23	0,30	0,33	0,13	0,17	0,21	0,18	0,23	0,28	0,14	0,17	0,21	0,12	0,17	0,21		
Balkans	0,17	0,21	0,22	0,12	0,15	0,17	0,15	0,18	0,21	0,12	0,20	0,32	0,20	0,25	0,27	0,22	0,27	0,29	0,21	0,25	0,25	0,17	0,22	0,27	0,13	0,19	0,24	0,23	0,27	0,28	0,15	0,19	0,23	0,22	0,27	0,29	0,19	0,23	0,25		
North America	0,14	0,16	0,17	0,16	0,20	0,21	0,09	0,12	0,15	0,22	0,27	0,35	0,16	0,22	0,26	0,08	0,12	0,18	0,12	0,16	0,20	0,09	0,15	0,22	0,14	0,21	0,27	0,11	0,15	0,19	0,13	0,19	0,25	0,13	0,18	0,24	0,09	0,14	0,19		
Latin America	0,13	0,17	0,19	0,09	0,13	0,17	0,12	0,18	0,22	0,02	0,10	0,22	0,11	0,15	0,20	0,11	0,15	0,19	0,06	0,08	0,12	0,09	0,15	0,22	0,07	0,12	0,19	0,07	0,11	0,16	0,06	0,09	0,14	0,05	0,07	0,11	0,14	0,19	0,23		
Middle East	0,19	0,22	0,23	0,20	0,23	0,25	0,21	0,25	0,27	0,07	0,12	0,22	0,20	0,26	0,30	0,16	0,21	0,24	0,20	0,24	0,25	0,12	0,17	0,22	0,11	0,15	0,21	0,14	0,20	0,24	0,08	0,14	0,22	0,13	0,18	0,23	0,17	0,21	0,24		
Turkic Republics	0,21	0,23	0,23	0,20	0,24	0,26	0,21	0,26	0,28	0,02	0,10	0,22	0,25	0,29	0,31	0,22	0,26	0,28	0,23	0,25	0,25	0,14	0,20	0,26	0,15	0,21	0,25	0,23	0,27	0,28	0,19	0,25	0,31	0,24	0,28	0,29	0,21	0,24	0,25		
Far East	0,19	0,22	0,23	0,15	0,20	0,24	0,12	0,18	0,22	0,12	0,17	0,27	0,03	0,08	0,14	0,13	0,17	0,21	0,14	0,19	0,21	0,12	0,18	0,24	0,11	0,16	0,22	0,13	0,16	0,19	0,13	0,18	0,24	0,09	0,15	0,20	0,14	0,19	0,23		

Table 8. TrA matrix.

(TrA).	C1			C2			C3			C4			C5			C6			C7			C8			C9			C10			C11			C12			C13				
	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m
Africa	0,14	0,16	0,16	0,08	0,11	0,13	0,11	0,14	0,17	0,09	0,14	0,23	0,06	0,09	0,13	0,09	0,12	0,14	0,06	0,08	0,11	0,03	0,07	0,11	0,08	0,11	0,15	0,10	0,13	0,15	0,09	0,12	0,16	0,05	0,08	0,11	0,07	0,10	0,12		
Asia	0,10	0,12	0,13	0,11	0,15	0,17	0,04	0,08	0,12	0,00	0,02	0,09	0,02	0,05	0,08	0,09	0,12	0,15	0,11	0,14	0,16	0,07	0,10	0,14	0,06	0,10	0,14	0,09	0,12	0,14	0,09	0,12	0,16	0,10	0,14	0,18	0,11	0,14	0,16		
Europe	0,08	0,10	0,13	0,11	0,14	0,16	0,11	0,14	0,17	0,05	0,10	0,19	0,08	0,10	0,12	0,09	0,11	0,13	0,10	0,14	0,16	0,16	0,20	0,24	0,16	0,20	0,23	0,09	0,12	0,14	0,12	0,16	0,19	0,09	0,12	0,15	0,09	0,12	0,15		
Balkans	0,12	0,14	0,15	0,08	0,10	0,12	0,10	0,13	0,15	0,09	0,14	0,23	0,14	0,17	0,19	0,15	0,18	0,20	0,15	0,17	0,18	0,11	0,16	0,19	0,09	0,13	0,17	0,16	0,19	0,19	0,11	0,13	0,16	0,15	0,19	0,20	0,13	0,16	0,17		
North America	0,09	0,11	0,12	0,11	0,14	0,15	0,06	0,08	0,10	0,16	0,19	0,24	0,11	0,15	0,18	0,05	0,09	0,13	0,08	0,11	0,14	0,07	0,11	0,16	0,10	0,14	0,19	0,08	0,10	0,13	0,09	0,13	0,18	0,09	0,13	0,17	0,06	0,10	0,13		
Latin America	0,09	0,12	0,13	0,06	0,09	0,12	0,08	0,12	0,15	0,02	0,07	0,16	0,08	0,11	0,14	0,08	0,11	0,13	0,04	0,06	0,08	0,07	0,11	0,16	0,05	0,08	0,13	0,05	0,08	0,11	0,04	0,06	0,10	0,03	0,05	0,07	0,10	0,13	0,16		
Middle East	0,13	0,15	0,16	0,14	0,16	0,17	0,15	0,17	0,19	0,05	0,09	0,16	0,14	0,18	0,21	0,11	0,15	0,16	0,14	0,16	0,18	0,08	0,11	0,16	0,08	0,11	0,14	0,10	0,14	0,17	0,05	0,10	0,15	0,09	0,13	0,16	0,12	0,15	0,16		
Turkic Republics	0,14	0,16	0,16	0,14	0,17	0,18	0,15	0,18	0,19	0,02	0,07	0,16	0,17	0,20	0,22	0,15	0,18	0,19	0,16	0,18	0,18	0,10	0,14	0,18	0,11	0,14	0,17	0,16	0,19	0,19	0,13	0,18	0,21	0,17	0,20	0,20	0,14	0,16	0,17		
Far East	0,13	0,15	0,16	0,10	0,14	0,17	0,08	0,12	0,15	0,09	0,12	0,19	0,02	0,05	0,10	0,09	0,12	0,15	0,10	0,13	0,15	0,08	0,12	0,16	0,08	0,11	0,15	0,09	0,11	0,13	0,09	0,12	0,17	0,06	0,10	0,14	0,10	0,13	0,16		

Table 9. Gij matrix.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
Africa	0,54	0,58	0,55	0,55	0,6	0,57	0,61	0,6	0,58	0,56	0,6	0,6	0,59
Asia	0,57	0,55	0,61	0,67	0,6	0,57	0,55	0,6	0,59	0,58	0,6	0,6	0,55
Europe	0,59	0,55	0,55	0,59	0,6	0,58	0,56	0,5	0,5	0,58	0,5	0,6	0,57
Balkans	0,55	0,59	0,57	0,55	0,5	0,51	0,53	0,5	0,56	0,51	0,6	0,5	0,54
North America	0,58	0,56	0,61	0,51	0,6	0,6	0,58	0,6	0,55	0,59	0,6	0,6	0,59
Latin America	0,58	0,6	0,57	0,62	0,6	0,59	0,63	0,6	0,61	0,61	0,6	0,6	0,56
Middle East	0,54	0,53	0,52	0,6	0,5	0,55	0,53	0,6	0,58	0,56	0,6	0,6	0,55
Turkic Republics	0,54	0,53	0,52	0,62	0,5	0,52	0,52	0,6	0,55	0,51	0,5	0,5	0,53
Far East	0,54	0,56	0,57	0,57	0,6	0,57	0,57	0,6	0,58	0,58	0,6	0,6	0,56

Table 10. Ranking of fuzzy MAIRCA and TOPSIS.

Regions	Q Score	Fuzzy MAIRCA RANKING	TOPSIS	TOPSIS RANKING
Turkic Republics	6,918	1	0,743	1
Balkans	7,052	2	0,706	2
Middle East	7,233	3	0,557	4
Europe	7,261	4	0,561	3
North America	7,430	5	0,495	5
Far East	7,472	6	0,400	6
Africa	7,558	7	0,373	7
Asia	7,603	8	0,368	8
Latin America	7,812	9	0,214	9

Turkey that African international students are less inclined to seek psychological support to cope with their problems together with Asian international students (Elemo and Türküm 2019). In this framework, it is clear that the state of social exclusion is more visible for these two international student groups. It can also be said that the socio-cultural dimension of social exclusion is considered more prominent due to the backgrounds of these two student groups. However, considering that these two groups of international students come from countries and families with a certain economic level, it is possible that they will experience exclusion due to their economic dimension, especially when housing, tuition fees, transportation, and other expenses are taken into account.

The scope of this study is limited. For example, the study only focuses on the experiences of social exclusion of international students coming to Turkey. In this context, comparisons to be made on the basis of countries can give important clues about international student mobility. In further studies, a comparative analysis can be made by using another method in this study which we have performed using the Entropy method. For example, AHP and DEMATEL methods can be used. Furthermore, analysis with spherical fuzzy sets can be performed with Pythagorean sets. According to the obtained analysis results, the performances of different countries can be listed with VICOR methods.

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References

Agulnik, P. 2002. *Understanding social exclusion*. Oxford University Press on Demand.

- Akgül, O. 2017. "Sosyal Dışlanmanın Kiskacında Dezavantajlı Grup "Misafir Öğrenciler", Uluslararası Öğrencilik Sosyal, Ekonomik ve Kültürel Perspektifler, Ed. Osman Akgül, *İstanbul, Harf Yayınları*.
- Akkutay, Ü. 1984. Enderun Mektebi, Ankara, *Gazi Üniversitesi Yayın No. 38*.
- Alpar, B. I. 2022. *International Students' Quality of Life: The Case of Istanbul University During COVID-19*. Istanbul: Istanbul University Press.
- Andersson, J., J. Sadgrove, and G. Valentine. 2012. "Consuming Campus: Geographies of Encounter at a British University." *Social & Cultural Geography* 13 (5): 501–515. <https://doi.org/10.1080/14649365.2012.700725>.
- Arber, R. 2010. "English Education for International Students in Local Schools: Practices of Inclusion and Discourses of Exclusion." *English Teaching & Learning* 34 (2): 1–43.
- Baş, H. 2021. Uluslararası Öğrenciler ve Sosyal Dışlanma Durumlar, Yaklaşımlar ve Boyutlar, *Gazi Kitabevi*, Ankara.
- Baş, H., and S. Eti. 2020. "Türkiye'de uluslararası öğrencilerin istihdamı: Hukuki boyut ve koşullara dair bir araştırma." *Sosyal Politika Çalışmaları Dergisi* 20 (46): 105–132. <https://doi.org/10.21560/spcd.v20i54504.538022>.
- Baş, H., and S. Eti. 2022. "Determining Significant Factors Influencing the Choices of International Students with Spherical Fuzzy DEMATEL." *Journal of Social Policy Conferences* 83: 249–273.
- Bazarbayeva, L., and F. Rahimov. 2020. "Türkiye'de Öğrenim Gören Uluslararası Öğrencilerin Mezun Olduktan Sonraki Sorunları ve Çözüm Önerileri", 3. Uluslararası Öğrencilik Sempozyumu Bildiri Kitabı, Ed. Osman Akgül, Konya, Necmettin Erbakan Üniversitesi Yayınları.
- Boral, S., I. Howard, S. K. Chaturvedi, K. McKee, and V. N. A. Naikan. 2020. "An Integrated Approach for Fuzzy Failure Modes and Effects Analysis Using Fuzzy AHP and Fuzzy MAIRCA." *Engineering Failure Analysis* 108: 104195. <https://doi.org/10.1016/j.engfailanal.2019.104195>.
- Brown, L., and I. Jones. 2013. "Encounters with Racism and the International Student Experience." *Studies in Higher Education* 38 (7): 1004–1019. <https://doi.org/10.1080/03075079.2011.614940>.
- Bulut-Sahin, B., and Y. Kondakci. 2022. "Conflicting Perspectives on the Internationalization of Higher Education: Evidence from the Turkish Case." *Journal of Studies in International Education* 10283153221126245.
- Byrne, D. 2005. *EBOOK: Social Exclusion*. McGraw-Hill Education (UK).
- Candila, V., D. Maximov, A. Mikhaylov, N. Moiseev, T. Senjyu, and N. Tryndina. 2021. "On the Relationship Between oil and Exchange Rates of oil-Exporting and oil-Importing Countries: From the Great Recession Period to the Covid-19 era." *Energies* 14 (23): 8046. <https://doi.org/10.3390/en14238046>.
- Chatterjee, K., D. Pamucar, and E. K. Zavadskas. 2018. "Evaluating the Performance of Suppliers Based on Using the R'AMATEL-MAIRCA Method for Green Supply Chain Implementation in Electronics Industry." *Journal of Cleaner Production* 184: 101–129. <https://doi.org/10.1016/j.jclepro.2018.02.186>.
- Chen, J. H., Y. Li, A. M. Wu, and K. K. Tong. 2020. "The Overlooked Minority: Mental Health of International Students Worldwide Under the COVID-19 Pandemic and Beyond." *Asian Journal of Psychiatry* 54: 102333. <https://doi.org/10.1016/j.ajp.2020.102333>.
- Cheng, R. 2020. The COVID-19 Crisis and International Students. <https://www.insidehighered.com/views/2020/03/19/higher-ed-institutions-arent-supporting-international-students-enough-during-covid>. Access April 21, 2022.
- Chiou, B. 2017. "Two-step Migration: A Comparison of Australia's and New Zealand's Policy Development Between 1998 and 2010." *Asian and Pacific Migration Journal* 26 (1): 84–107. <https://doi.org/10.1177/01117196817695272>.
- Cohen, A. K., L. T. Hoyt, and B. Dull. 2020. "A Descriptive Study of COVID-19–Related Experiences and Perspectives of a National Sample of College Students in Spring 2020." *Journal of Adolescent Health* 67 (3): 369–375. <https://doi.org/10.1016/j.jadohealth.2020.06.009>.
- Crossman, J. E., and M. Clarke. 2010. "International Experience and Graduate Employability: Stakeholder Perceptions on the Connection." *Higher Education* 59 (5): 599–613. <https://doi.org/10.1007/s10734-009-9268-z>.
- Daly, M. 2006. Social Exclusion as Concept and Policy Template in the European Union. CES Working Paper, no. 135.
- Doğan, R. 1997. "Osmanlı Eğitim Kurumları ve Eğitimde ilk Yenileşme Hareketlerinin Batılılaşma Açısından Tahlili." *Ankara Üniversitesi İlahiyat Fakültesi Dergisi* 37 (3-4): 407–442.
- Dziwornu, M. G., M. Yakar, and K. Temurçin. 2016. "Migration Intentions of International Students in Turkey: A Case Study of African Students at Süleyman Demirel University." *Süleyman Demirel Üniversitesi Fen-Edebiyat Fakültesi Sosyal Bilimler Dergisi* 38: 227–250.
- Elemo, A. S., and A. S. Türküm. 2019. "The Effects of Psychoeducational Intervention on the Adjustment, Coping Self-Efficacy and Psychological Distress Levels of International Students in Turkey." *International Journal of Intercultural Relations* 70: 7–18. <https://doi.org/10.1016/j.ijintrel.2019.02.003>.
- Ersin, İ, H. Dinçer, and S. Yüksel. 2019. "Yerel Yönetimlerde Yatırım Kriterlerinin Belirlenmesi: Bulanık Dematel Yöntemiyle Bir Analiz." *Yönetim ve Ekonomi Dergisi* 26 (2): 477–493. <https://doi.org/10.18657/yonveek.496291>.
- Eynullayeva, K., M. Gökalp, and B. Y. Hatunoglu. 2021. "Investigation of the Turkish Cultural Adaptation of International Students Living in Turkey." *European Educational Researcher* 4 (2): 155–169.
- Fang, T., and M. Gunderson. 2015. "Vulnerable Groups in Canada and Labour Market Exclusion." *International Journal of Manpower* 36 (6): 824–847. <https://doi.org/10.1108/IJM-02-2014-0052>.
- Gebri, M. S., and I. Yuksel-Kaptanoglu. 2020. "Adaptation Challenges for International Students in Turkey." *Open Journal of Social Sciences* 08 (09): 262–278. <https://doi.org/10.4236/jss.2020.89021>.

- Gul, M., and M. F. Ak. 2020. "Assessment of Occupational Risks from Human Health and Environmental Perspectives: A new Integrated Approach and its Application Using Fuzzy BWM and Fuzzy MAIRCA." *Stochastic Environmental Research and Risk Assessment* 34 (8): 1231–1262. <https://doi.org/10.1007/s00477-020-01816-x>.
- Güçlü, N. 1996. "Yabancı öğrencilerin Uyum Problemleri." *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi* 12: 101–110.
- Hanassab, S., and R. Tidwell. 2002. "International Students in Higher Education: Identification of Needs and Implications for Policy and Practice." *Journal of Studies in International Education* 6 (4): 305–322. <https://doi.org/10.1177/102831502237638>.
- Hashim, I. H. 2003. "Cultural and Gender Differences in Perceptions of Stressors and Coping Skills." *School Psychology International* 24 (2): 182–203. <https://doi.org/10.1177/0143034303024002004>.
- Hasnain, A., and J. Hajek. 2022. "Understanding International Student Connectedness." *International Journal of Intercultural Relations* 86: 26–35. <https://doi.org/10.1016/j.ijintrel.2021.10.008>.
- Hastings, C., G. Ramia, S. Wilson, E. Mitchell, and A. Morris. 2023. "Precarity Before and During the Pandemic: International Student Employment and Personal Finances in Australia." *Journal of Studies in International Education* 27 (1): 39–63. <https://doi.org/10.1177/10283153211065136>.
- Hopkins, P. 2011. "Towards Critical Geographies of the University Campus: Understanding the Contested Experiences of Muslim Students." *Transactions of the Institute of British Geographers* 36 (1): 157–169. <https://doi.org/10.1111/j.1475-5661.2010.00407.x>.
- Islam, M. T. 2019. "(Re) Searching for the Development of a Conceptual Model of Education for Citizenship in the Context of Young People's Globalised Mobility in Higher Education." *Globalisation, Societies and Education* 17 (2): 194–207.
- James, M. A., and G. E. Derrick. 2020. "When 'Culture Trumps Strategy': Higher Education Institutional Strategic Plans and Their Influence on International Student Recruitment Practice." *Higher Education* 79 (4): 569–588. <https://doi.org/10.1007/s10734-019-00424-1>.
- Jones, E. 2017. "Problematising and Reimagining the Notion of 'International Student Experience'." *Studies in Higher Education* 42 (5): 933–943. <https://doi.org/10.1080/03075079.2017.1293880>.
- Khan, A. A., Z. A. Shaikh, L. Baitenova, L. Mutaliyeva, N. Moiseev, A. Mikhaylov, Asif Ali Laghari, Sahar Ahmed Idris, and H. Alshazly. 2021. "QoS-ledger: Smart Contracts and Metaheuristic for Secure Quality-of-Service and Cost-Efficient Scheduling of Medical-Data Processing." *Electronics* 10 (24): 3083. <https://doi.org/10.3390/electronics10243083>.
- Khawaja, N. G., and J. Dempsey. 2008. "A Comparison of International and Domestic Tertiary Students in Australia." *Journal of Psychologists and Counsellors in Schools* 18 (1): 30–46.
- Knight, J. 2008. "The Role of Cross-Border Education in the Debate on Education as a Public Good and Private Commodity." *Journal of Asian Public Policy* 1 (2): 174–187. <https://doi.org/10.1080/17516230802094478>.
- Kondakçı, Y., Ö Çalişkan, B. B. Şahin, M. A. Yılık, and C. E. Demir. 2016. "Regional Internationalization In Higher Education Between Turkey And The Balkans." *Bilig* 78: 287–303.
- Kristiana, I. F., N. A. Karyanta, E. Simanjuntak, U. Prihatsanti, T. M. Ingarianti, and M. Shohib. 2022. "Social Support and Acculturative Stress of International Students." *International Journal of Environmental Research and Public Health* 19 (11): 6568. <https://doi.org/10.3390/ijerph19116568>.
- Kutlu, A. C., and M. Ekmekçioğlu. 2012. "Fuzzy Failure Modes and Effects Analysis by Using Fuzzy TOPSIS-Based Fuzzy AHP." *Expert Systems with Applications* 39 (1): 61–67. <https://doi.org/10.1016/j.eswa.2011.06.044>.
- Lai, A. Y. K., S. M. M. Sit, S. K. K. Lam, A. C. M. Choi, D. Y. S. Yiu, T. T. K. Lai, and T. H. Lam. 2021. "A Phenomenological Study on the Positive and Negative Experiences of Chinese International University Students from Hong Kong Studying in the UK and US in the Early Stage of the COVID-19 Pandemic." *Frontiers in Psychiatry* 12.
- Lee, J. J. 2017. "Neo-nationalism in Higher Education: Case of South Africa." *Studies in Higher Education* 42 (5): 869–886. <https://doi.org/10.1080/03075079.2017.1293875>.
- Lee, J., J. E. Jon, and K. Byun. 2017. "Neo-Racism and Neo-Nationalism Within East Asia." *Journal of Studies in International Education* 21 (2): 136–155. <https://doi.org/10.1177/1028315316669903>.
- Lee, J. J., and C. Rice. 2007. "Welcome to America? International Student Perceptions of Discrimination." *Higher Education* 53 (3): 381–409.
- Li, F., and Y. Han. 2023. "Chinese International Students' Identity (re)Construction Mediated by Teacher Feedback: Through the Lens of Academic Discourse Socialisation." *Journal of English for Academic Purposes* 61: 101211. <https://doi.org/10.1016/j.jeap.2022.101211>.
- Li, H., and P. Pitkänen. 2018. "Understanding the Integration of Mainland Chinese Students." *Nordic Journal of Migration Research* 8 (2): 107. <https://doi.org/10.1515/njmr-2018-0008>.
- Li, J., S. Yüksel, H. Dinçer, A. Mikhaylov, and S. E. Barykin. 2022. "Bipolar q-ROF Hybrid Decision Making Model with Golden cut for Analyzing the Levelized Cost of Renewable Energy Alternatives." *IEEE Access* 10: 42507–42517. <https://doi.org/10.1109/ACCESS.2022.3168315>.
- Lightman, N., and L. Good Gingrich. 2018. "Measuring Economic Exclusion for Racialized Minorities, Immigrants and Women in Canada: Results from 2000 and 2010." *Journal of Poverty* 22 (5): 398–420. <https://doi.org/10.1080/10875549.2018.1460736>.

- Liu-Farrer, G. 2009. "Educationally Channeled International Labor Mobility: Contemporary Student Migration from China to Japan." *International Migration Review* 43 (1): 178–204. <https://doi.org/10.1111/j.1747-7379.2008.01152.x>.
- Madenoglu, F. S. 2021. "Bütünleşik Entropi-Copras Yaklaşımı ile Kurumsal Kaynak Planlama (Kkp) Yazılımının Seçimi." *Journal of Management and Economics Research* 19 (4): 14–29.
- Matsuzuka, Y., and M. Gérard. 2022. "Student Mobility and Social Welfare." *Hitotsubashi Journal of Social Studies* 53 (1): 19–36.
- Musizvingoza, R. 2020. "Exploring the Challenges and Coping Strategies of Sub-Saharan African Students in Turkey." *Uludağ Üniversitesi Eğitim Fakültesi Dergisi* 33 (3): 587–611. <https://doi.org/10.19171/uefad.672263>.
- Nachatar Singh, J. K. 2018. "What are the Factors That Contribute to Postgraduate International Students' Academic Success? A Malaysian Qualitative Study." *Higher Education Research & Development* 37 (5): 1035–1049. <https://doi.org/10.1080/07294360.2018.1467383>.
- Nyland, C., H. Forbes-Mewett, S. Marginson, G. Ramia, E. Sawir, and S. Smith. 2009. "International Student-Workers in Australia: A new Vulnerable Workforce." *Journal of Education and Work* 22 (1): 1–14. <https://doi.org/10.1080/13639080802709653>.
- O'Connor, S. 2015. "Encounter, Interaction, and the University: Producing Practices of Inclusion and Exclusion of International Students." *Laboring and Learning* 10: 1–21.
- Paltridge, T., S. Mayson, and J. Schapper. 2014. "Welcome and Exclusion: An Analysis of The Australian Newspaper's Coverage of International Students." *Higher Education* 68 (1): 103–116. <https://doi.org/10.1007/s10734-013-9689-6>.
- Poloma, A. W. 2017. *Academic capitalism and the public good in public and private US higher education: A grounded theory study of internationalization*. University of Massachusetts Boston.
- Pottie-Sherman, Y. 2018. "Retaining International Students in Northeast Ohio: Opportunities and Challenges in the 'age of Trump'." *Geoforum; Journal of Physical, Human, and Regional Geosciences* 96: 32–40. <https://doi.org/10.1016/j.geoforum.2018.07.015>.
- Quinton, W. J. 2020. "So Close and yet so far? Predictors of International Students' Socialization with Host Nationals." *International Journal of Intercultural Relations* 74: 7–16. <https://doi.org/10.1016/j.ijintrel.2019.10.003>.
- Razgulín, J., G. Argustaitė-Zailskienė, and K. Šmigelskas. 2023. "The Role of Social Support and Sociocultural Adjustment for International Students' Mental Health." *Scientific Reports* 13 (1): 893. <https://doi.org/10.1038/s41598-022-27123-9>.
- Renahy, E., B. Alvarado-Llano, M. Koh, and A. Quesnel-Vallée. 2012. "Income and Economic Exclusion: Do They Measure the Same Concept?" *International Journal for Equity in Health* 11 (1): 4–11. <https://doi.org/10.1186/1475-9276-11-4>.
- Ritter, Z. S. 2016. "International Students' Perceptions of Race and Socio-Economic Status in an American Higher Education Landscape." *Journal of International Students* 6 (2): 367–393. <https://doi.org/10.32674/jis.v6i2.362>.
- Rzyski, P., and M. Nowicki. 2020. "COVID-19-related Prejudice Toward Asian Medical Students: A Consequence of SARS-CoV-2 Fears in Poland." *Journal of Infection and Public Health* 13 (6): 873–876. <https://doi.org/10.1016/j.jiph.2020.04.013>.
- Saqib, A., T. H. Chan, A. Mikhaylov, and H. H. Lean. 2021. "Are the Responses of Sectoral Energy Imports Asymmetric to Exchange Rate Volatilities in Pakistan?" *Evidence from Recent Foreign Exchange Regime*. *Frontiers in Energy Research* 9: 614463.
- Sá, C. M., and E. Sabzalieva. 2018. "The Politics of the Great Brain Race: Public Policy and International Student Recruitment in Australia, Canada, England and the USA." *Higher Education* 75 (2): 231–253. <https://doi.org/10.1007/s10734-017-0133-1>.
- Sherry, M., P. Thomas, and W. H. Chui. 2010. "International Students: A Vulnerable Student Population." *Higher Education* 60 (1): 33–46. <https://doi.org/10.1007/s10734-009-9284-z>.
- Şimşek, B., & Bakır, S. 2016. "Uluslararası Öğrenci Hareketliliği Ve Atatürk Üniversitesinin Uluslararasılaşma Süreci." *Atatürk Üniversitesi Türkiyat Araştırmaları Enstitüsü Dergisi* 55: 509–542.
- Sherwani, Jawwad Jamal. 2015. "Social Exclusion of Foreign Degree Seeking students in Sabanci University", Ozgur Proje-Final Report.
- Snoubar, Y., and G. Celik. 2013. "Cultural Differences of International Students in Turkey and Problems They Experience." *Procedia - Social and Behavioral Sciences* 106: 759–766. <https://doi.org/10.1016/j.sbspro.2013.12.087>.
- Sung, C. C. M. 2022. "English Only or More?" *Language Ideologies of International Students in an EMI University in Multilingual Hong Kong*. *Current Issues in Language Planning* 23 (3): 275–295.
- Taborda, E. K. 2020. *Socio-Economic Well-Being of International F-1 Students Living and Working in the United States* (Doctoral dissertation, University of Massachusetts Boston).
- Tannock, S. 2007. "To Keep America Number 1: Confronting the Deep Nationalism of US Higher Education." *Globalisation, Societies and Education* 5 (2): 257–272.
- Thies, T., and S. Falk. 2023. "International Students in Higher Education: Extracurricular Activities and Social Interactions as Predictors of University Belonging." *Research in Higher Education*, 1–22.
- Valdez, G. 2015. *Classroom exclusion: Perceptions of undergraduate Chinese international students studying in the US* (Doctoral dissertation, The University of Arizona).

- Waters, J. L. 2006. "Emergent Geographies of International Education and Social Exclusion." *Antipode* 38 (5): 1046–1068. <https://doi.org/10.1111/j.1467-8330.2006.00492.x>.
- Waters, J. L. 2012. "Geographies of International Education: Mobilities and the Reproduction of Social (Dis)Advantage." *Geography Compass* 6 (3): 123–136. <https://doi.org/10.1111/j.1749-8198.2011.00473.x>.
- Wilson, S., C. Hastings, A. Morris, G. Ramia, and E. Mitchell. 2022. "International Students on the Edge: The Precarious Impacts of Financial Stress." *Journal of Sociology* 14407833221084756.
- Yao, C. W., C. A. George Mwangi, and V. K. Malaney Brown. 2019. "Exploring the Intersection of Transnationalism and Critical Race Theory: A Critical Race Analysis of International Student Experiences in the United States." *Race Ethnicity and Education* 22 (1): 38–58. <https://doi.org/10.1080/13613324.2018.1497968>.
- Yeh, C. J., and M. Inose. 2003. "International Students' Reported English Fluency, Social Support Satisfaction, and Social Connectedness as Predictors of Acculturative Stress." *Counselling Psychology Quarterly* 16 (1): 15–28. <https://doi.org/10.1080/0951507031000114058>.
- Yumashev, A., and A. Mikhaylov. 2020. "Development of Polymer Film Coatings with High Adhesion to Steel Alloys and High Wear Resistance." *Polymer Composites* 41 (7): 2875–2880. <https://doi.org/10.1002/pc.25583>.
- Zhang, J., and P. Goodson. 2011. "Predictors of International Students' Psychosocial Adjustment to Life in the United States: A Systematic Review." *International Journal of Intercultural Relations* 35 (2): 139–162. <https://doi.org/10.1016/j.ijintrel.2010.11.011>.
- Zhao, X. 2017. "International Students and Social Exclusion in the age of Social Media." *Transitions: Journal of Transient Migration* 1 (2): 163–175. https://doi.org/10.1386/tjtm.1.2.163_1.
- Zhou, S. 2023. "The Adjustment Challenges and Corresponding Solutions for Chinese International Students in the United States." *Journal of Education, Humanities and Social Sciences* 8: 1223–1230.
- Zhou, Y., D. Jindal-Snape, K. Topping, and J. Todman. 2008. "Theoretical Models of Culture Shock and Adaptation in International Students in Higher Education." *Studies in Higher Education* 33 (1): 63–75. <https://doi.org/10.1080/03075070701794833>.