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Expansion without diversification: Growth and rising concentration by source country in Malaysia's registered foreign construction workforce, 2020–2023

Mohd Nasir Saari[1,2]*, Md Shukri Shuib[1], and Mohd Na'eim bin Ajis[1]

[1]Ghazali Shafie Graduate School of Government, College of Law, Government and International Studies, Universiti Utara Malaysia, Sintok, Kedah, Malaysia

[2]Centre of Excellence for Engineering and Technology (CREaTE), Public Works Department Malaysia, Alor Gajah, Melaka, Malaysia

Abstract

Malaysia's total fertility rate has been below the replacement level since 2013; its population is aging, and non-citizens made up 8.9% of residents in 2023. Construction is one of the sectors that is most dependent on migrant workers. This study examines whether the growth in the foreign construction workforce registered with the Construction Industry Development Board (CIDB) broadened or narrowed its distribution across source countries. Using unpublished country-by-year counts for 11 origin categories supplied by the CIDB, we calculated the annual and compound growth rates, country shares, concentration ratios (CR1 to CR4), Herfindahl–Hirschman index (HHI), entropy-based diversity measures, and a proportional-growth counterfactual. The number of registered workers fell by 17.6% in 2021 and then rose to 385,503 in 2023, which is 2.25 times the 2020 level of 171,412. Bangladesh accounted for 80.7% of the total net increase. The HHI rose from 3,950.7 to 5,151.8, and the effective number of source countries fell from 2.53 to 1.94. Bangladesh's share rose by 13.4 percentage points, and Indonesia's fell by 12.1 points; thus, the combined share of the two largest origins (CR2) moved only from 82.8% to 84.2%. The near-constant CR2 concealed a large shift in shares within the leading pair, which arose from differential growth rather than a decline in Indonesian registrations. This pattern holds when the 2021 trough is used as the base year and when the residual category is excluded, and growth is not reliably associated with initial size. In conclusion, the registered workforce expanded without any diversification. Registry counts cannot identify the recruitment, policy, or sending-country processes behind this pattern, and concentration measures do not indicate anticompetitive conduct.

Keywords: Construction labor supply; Foreign worker dependency; Source-country concentration; Herfindahl–Hirschman index; Migration corridor; Population and labor force; Malaysia

***Corresponding author:**
Mohd Nasir Saari
(dnasir@jkr.gov.my)

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1. Introduction

Malaysia is an upper-middle-income destination country in which population change reflects both natural increase and international migration (Department of Statistics Malaysia [DOSM], 2025b, 2025c; World Bank, n.d.). The total fertility rate has been below the replacement level of 2.1 since 2013 and fell to 1.6 children per woman in 2024, the year in which live births reached their lowest number since 1980 (DOSM, 2025b). The share of residents aged 65 and over rose from 7.4% in 2023 to 8.0% in 2025 (DOSM, 2023, 2025a). The non-citizen population, by contrast, has varied with border policy. Under pandemic travel restrictions, it fell from 2.6 million in 2021 to between 2.4 and 2.5 million in 2022, depending on the release. After borders reopened, it rose to 3.0 million, or 8.9% of the population, in 2023, and it stood at 3.38 million in 2025 (DOSM, 2022, 2023, 2025a). Its sex ratio of 226 to 228 men per 100 women points to the predominance of male labor migrants in this population (DOSM, 2023, 2025a).

Reliance on non-citizen labor is particularly pronounced in the construction industry. Local participation in construction trades declined before the pandemic, whereas foreign registrations increased (Mohd Fateh *et al.*, 2022). The number of foreign construction workers registered with the Construction Industry Development Board (CIDB) fell from 171,412 in 2020 to 141,278 in 2021 and then rose to 385,503 by 2023. This magnitude of growth is readily taken as evidence that the labor supply has been restored; however, a headcount alone says nothing about where the additional workers came from.

The research problem is that workforce size and composition can move in different directions. A sector may regain or exceed its earlier headcount while becoming more dependent on a single migration corridor, and a stable combined share for the leading origins may conceal a substantial shift in the balance between them. This distinction matters for two reasons. First, dependence on a small number of corridors exposes construction delivery to policy changes, recruitment suspensions, or diplomatic disputes affecting one sending country. Second, recruitment channels shape the legal and insurance protections that bear on workers' safety and security on site (Alshboul & Shehadeh, 2025), and the manpower agencies that place foreign workers can play a part in preventing occupational accidents (Chang *et al.*, 2016); thus, a change in corridor composition may also change the conditions under which workers are employed. Malaysian research documents the sector's reliance on foreign labor and the governance of individual corridors (J. Anderson, 2021; Sha & Khor, 2024; Spaan & van Naerssen, 2018). Whether the complete registered construction workforce became more or less concentrated by source country during the pandemic contraction and the expansion that followed is therefore an open question.

This question is relevant beyond Malaysia. An estimated 167.7 million international migrants were in the labor forces of destination countries in 2022, and 17.4% of them, or 29.2 million people, were in upper-middle-income countries (International Labour Organization, 2024). Much of the migration literature on construction, including the Malaysian studies cited above, examines single corridors or samples of firms and projects, partly because destination-wide administrative data by origin are rarely published; in Malaysia, the origin-level figures used here are not public (Section 2.2). Where such data are lacking, comparative research may overlook destinations such as Malaysia, which combine a large temporary labor regime with supply from several Asian corridors at once, and in which the relative weight of each corridor can change quickly under bilateral and administrative decisions. Examining the full origin distribution of Malaysia's registered construction workforce makes this compositional dimension visible and shows what aggregate registry statistics can reveal when microdata are unavailable. It also offers a structural descriptor that quantitative research on construction workforces and safety seldom includes: predictive models are increasingly common in that field, yet workforce origin composition is rarely among their inputs (Cavalcanti *et al.*, 2023; Shehadeh & Alshboul, 2025).

1.1. Literature review

Four distinct bodies of literature inform this study, each contributing essential elements to the analysis. First, research on the Malaysian construction sector highlights its heavy reliance on foreign workers, the embedding of this reliance within a segmented labor market, and the persistent weakness of local participation (Abdul-Aziz, 2001; Mohd Fateh *et al.*, 2022); this establishes why the origins of these workers matter. Second, migration theory explains the mechanisms driving worker arrival through specific corridors, attributing their persistence to networks, cumulative causation, and institutional factors, while noting that corridor weights can shift in response to policy changes, recruitment costs, or conditions in sending countries (Czaika & de Haas, 2014; Massey *et al.*, 1993). Third, literature on market concentration—primarily developed for employer and product market analysis—provides the necessary metrics to describe workforce distribution across origins, including concentration ratios, the Herfindahl–Hirschman index (HHI), and its number-equivalent form (Adelman, 1969; Azar *et al.*, 2022; Rhoades, 1993). Finally, resource dependence theory elucidates why a narrow distribution of suppliers increases vulnerability

to disruption when a few external providers control a critical input (Pfeffer & Salancik, 1978). Together, these frameworks define the setting, mechanisms, measures, and stakes of the subsequent analysis.

1.1.1. Foreign labor dependence in Malaysian construction

Malaysia's construction labor market was segmented long before the pandemic, with foreign workers concentrated in demanding and insecure jobs (Abdul-Aziz, 2001). Firms reported project delays, communication problems, safety concerns, and supervision costs associated with managing foreign labor, although the effects varied across firms and projects (Abdul-Rahman *et al.*, 2012). At the economy-wide level, the wage effects of foreign labor differ among worker groups and cannot be reduced to a uniform displacement effect (Athukorala & Devadason, 2012), and sectoral estimates for 1991 to 2019 indicate that the productivity effects of foreign worker employment are asymmetric and vary across agriculture, industry, and services (Hii & Lau, 2025). Mohd Fateh *et al.* (2022) reported that CIDB registrations of local construction personnel fell by 45% between 2017 and 2018, while foreign registrations rose by 48%, and they linked weak local participation to pay, occupational image, working conditions, and the project-based character of construction. Coronavirus disease 2019 (COVID-19) disrupted construction activity and productivity in Malaysia (Tan & Abdul-Samad, 2023). On Malaysian construction projects during the pandemic, language barriers among foreign workers and between foreign workers and supervisors contributed to breakdowns in project communication (Subramaniam *et al.*, 2021). Elsewhere in Asia, studies have documented worker displacement and uneven return migration (Rajan & Arcand, 2023; Rani *et al.*, 2022; Shivakoti, 2026). This literature establishes the extent of the sector's reliance on migrant labor but says little about how that labor is distributed across countries of origin.

1.1.2. Migration corridors, systems, and institutions

Migration corridors persist through social networks, cumulative causation, and institutions connecting origin and destination countries, which reduce the cost and uncertainty of later movements (Massey *et al.*, 1993). Bakewell (2014) cautions against treating such systems as self-sustaining, since agency and institutional change also shape their evolution. Whether people can act on an intention to migrate depends on political rules, financial resources, recruitment access, and networks (de Haas, 2021), and established routes may reinforce themselves even when many countries can supply workers (de Haas, 2010). Demographic changes in the origin countries also affect the supply: in low- and middle-income countries, growth in young adult populations has been associated with higher emigration (Bollyky *et al.*, 2022). Persistence does not imply stasis. The direction and intensity of international migration change unevenly (Czaika & de Haas, 2014), and migration policies can produce outcomes that depart from their stated aims when they meet labor demand, networks, and implementation constraints (Castles, 2004). Temporary worker programs also involve trade-offs among admission numbers, employment conditions, and migrant rights (Ruhs & Chang, 2004; Ruhs & Martin, 2008).

Malaysian research places institutions at the center of corridor formation. The temporary labor regime combines employer demand with bilateral arrangements, work permit controls, and periodic regularization or enforcement measures (Chin, 2002; Devadason & Chan, 2014; Kaur, 2010). Governance research on this regime argues that its effectiveness depends on more extensive collaboration among the agencies and stakeholders involved (Zaidun *et al.*, 2023). Administrative practices after arrival form part of this system of control (J. Anderson, 2021), as do health policies oriented mainly toward preventing communicable diseases (Loganathan *et al.*, 2020). Employer demand is itself shaped by institutional systems that extend across national borders (B. Anderson *et al.*, 2024). In the Indonesia–Malaysia corridor, brokers, information networks, and the migration industry mediate recruitment decisions (Hugo, 1993; Spaan & van Naerssen, 2018), while in the Nepal–Malaysia corridor, intermediaries both enable and restrict movement (Sha & Khor, 2024), and pandemic conditions altered precarity and information exchange (Wahab & Hamidi, 2022). Employer-provided dormitories create further dependence (Jones *et al.*, 2024), and across Southeast Asia, the pandemic increased the risks of trafficking, debt bondage, and wage withholding (Buckley *et al.*, 2022). A registration record is therefore the outcome of several processes: employer selection, source-country approval, recruitment costs, intermediary capacity, documentation, and the worker's decision and ability to migrate. Aggregate counts can show how the resulting distribution changed, but they cannot separate these processes.

1.1.3. Concentration measures: From employers to origins

Research on labor market concentration has mainly examined employer demand. When a few employers dominate hiring within an occupation and locality, workers have fewer alternatives and may receive lower wages, even without explicit collusion (Azar *et al.*, 2022; Qiu & Sojourner, 2023). This literature summarizes market

shares with concentration ratios and the HHI, the sum of squared shares (Hirschman, 1964; Rhoades, 1993). Because squaring weights large shares heavily, the HHI rises as activity concentrates among dominant units, and its reciprocal can be read as the number of equal-sized units that would produce the same value (Adelman, 1969). Entropy-based measures and their number-equivalent forms offer a complementary view that gives more weight to smaller categories (Jost, 2006). Migrant-dependent industries raise a different question: how narrowly is the labor supply distributed across countries of origin? Applied to origins, these measures describe dependence on particular migration corridors. They do not establish monopsony, market power, or anticompetitive conduct. Nor do thresholds developed to classify product markets in merger reviews have any substantive meaning when the units are countries and the quantities are registered workers.

1.1.4. Resource dependence and exposure

Resource dependence theory holds that reliance on a small number of external providers of critical inputs increases exposure to disruption and creates incentives to diversify the supply (Pfeffer & Salancik, 1978). International business research applies this reasoning to cross-border interdependence and supplier relationships (H. Jiang *et al.*, 2023; Kumari & Tiwari, 2026). Supply chain research similarly treats dependence on a dominant supplier as a source of exposure and conceives resilience as a balance between vulnerability and capacity to respond (Ambulkar *et al.*, 2015; Pettit *et al.*, 2010). Studies conducted during the COVID-19 period distinguish concentration from viability and adaptation (Ivanov & Dolgui, 2020; S. Jiang *et al.*, 2023). However, this analogy has its limitations, as migrant workers are not interchangeable inputs. The exposure of interest here is therefore organizational: it arises when one institutional corridor supplies a large share of registered laborers.

1.2. Research gap and aims of the study

Taken together, these four bodies of work leave one question unanswered. Construction research establishes how heavily Malaysia relies on foreign workers but not how they are distributed across countries of origin (Section 1.1.1). Migration research explains why corridors persist and why their relative weight can shift under institutional and policy change (Section 1.1.2), yet it usually examines one corridor at a time rather than the full set of corridors serving a destination sector. Concentration measures can summarize such a distribution (Section 1.1.3), and resource dependence theory explains why a narrow distribution matters for exposure (Section 1.1.4); however, to our knowledge, neither has been applied to the origins of Malaysia's construction workforce. Consequently, it is not known whether the rapid expansion of the registered workforce after the pandemic broadened or narrowed its source-country base, or which corridors drove any change. This study addresses this gap by separating the change in workforce size from the change in its composition across source countries.

To this end, the study addresses three research questions (RQs):

(i) RQ1: How did the size of Malaysia's registered foreign construction workforce change between 2020 and 2023?
(ii) RQ2: Did the expansion broaden or narrow the distribution of registered workers across the source countries?
(iii) RQ3: Which origin categories account for the change in concentration, and is growth associated with initial size?

Because the design was descriptive, the analysis was organized around three benchmark expectations rather than causal hypotheses. Under proportional expansion, every category would grow at the same rate, country shares would remain constant, and the HHI would remain unchanged. Under diversification, the HHI would fall, and the effective number of source countries (the number of equal-sized origins implied by the HHI) would increase. Under concentration, the HHI would rise, and the effective number would fall. The objective was to determine which benchmark the registry data fit most closely and which categories accounted for any departure from proportional growth.

This study makes three contributions. Empirically, it provides what is, to our knowledge, the first complete source-country decomposition of CIDB's registered foreign construction workforce for 2020–2023. Methodologically, it shows that concentration ratios (CR_k, the combined share of the k largest source countries), the HHI, entropy-based measures, and component shares answer different questions, and that a stable CR2 can conceal a large shift within the leading pair. Substantively, it links corridor concentration within one sector to Malaysia's wider demographic reliance on non-citizen labor. The remainder of the paper is organized as follows: Section 2 describes the data and methods, Section 3 presents the results, Section 4 discusses them, and Section 5 concludes the study.

2. Data and methods

This section presents the research design (Section 2.1), CIDB registry data and their coverage (Section 2.2), growth,

concentration, and diversity measures (Section 2.3), and the statistical methods used to assess the association between initial share and growth (Section 2.4). Supporting details on registry definitions, data verification, analytical integrity, and the measures are provided in Section A1.

2.1. Research design

This study uses a quantitative, non-experimental design based on an annual aggregate series to describe Malaysia's registered foreign construction workforce from 2020 to 2023. The unit of analysis is the country of origin category reported by CIDB in a given year. Annual counts are analyzed both as a time series and as a distribution of country shares so that the scale and composition of the same administrative population can be compared across four consecutive years. The design can identify changes in the distribution provided that CIDB applies consistent registry definitions and categories throughout the period. It cannot estimate the effect of a policy intervention, model individual migration decisions, or identify the institutional process that produced a change. Therefore, the findings apply directly to foreign construction personnel registered with CIDB during 2020–2023 and should not be extended without qualification to undocumented workers, other industries, or other destination countries.

2.2. Data source, coverage, and comparability

The study population comprised foreign workers listed as active in CIDB's construction personnel registration statistics, classified by nationality for 2020 to 2023 (CIDB, 2025). The data were supplied by CIDB's Contractor and Construction Personnel Registration Division in response to the authors' request. Nationality is used as the indicator of source country throughout. We used "category" for each of the 11 reported groups, including the residual group, and "corridor" for the migration route from a given source country to Malaysia. The CIDB reports 11 categories: Bangladesh, Indonesia, Pakistan, India, Myanmar, China, Nepal, the Philippines, Vietnam, South Korea, and Others. All reported counts were used; no sampling was involved.

Each figure represents the count of foreign construction personnel holding an active CIDB registration in the reference year, not the count of registration transactions in that year. Therefore, the series measures the registered stock each year; it does not follow individuals and cannot distinguish new entrants from continuing workers. Comparability across years rests on three features: all four years come from the same CIDB dataset, the same 11 categories are reported every year, and the categories sum exactly to the reported sector total each year. The definition of active registration and the procedures for data handling and verification are described in Sections A1.1 and A1.2.

Registry coverage is narrower than the population of all foreign construction workers in Malaysia. It excludes undocumented workers, workers outside CIDB's coverage, and any records omitted through registration errors. Coverage can also change for administrative reasons. The Employment Recalibration Program 2.0, which regularizes undocumented foreign workers already in the country, reopened for applications on January 27, 2023, after an earlier phase ended in December 2022 and closed on June 30, 2024 (Radio Televisyen Malaysia, 2023, 2025). Between May and December 2024, a CIDB regularization exercise required employers to register foreign workers who held construction work permits but were not yet registered as construction personnel (CIDB, 2024). Therefore, part of the 2023 increase may reflect administrative capture rather than new arrivals, and the 2024 exercise affects the comparability of later figures. These are constraints on coverage, not sampling errors.

The analysis is confined to 2020–2023 because this is the period covered by the country-by-year series that CIDB supplied on request; these origin-level figures have not been published yet. Figures for adjacent years exist but are not comparable. A 2019 figure of approximately 420,000 foreign construction workers referred to workers registered with the Immigration Department rather than CIDB registrations (Mohd Fateh *et al.*, 2022). The figure of 465,591 CIDB-registered foreign construction workers in September 2024 is a point-in-time count without an origin breakdown, recorded during the 2024 regularization exercise (Sofiah, 2024). New recruitment from Bangladesh and several other countries was also suspended in June 2024 (The Daily Star, 2024), which introduced a policy break after the study period. Splicing these figures onto the 2020–2023 series would confound definitional and policy changes with workforce change. Because the series began in a pandemic year, this study describes expansion from a pandemic base and does not assess recovery relative to pre-pandemic levels. In summary, no consistently defined origin-level series were available on either side of the study period. Before 2020, the only national figure we found came from a different administrative source and had no breakdown by origin. For 2024, the published CIDB figure is a point-in-time total without an origin breakdown, recorded while the regularization exercise was changing registry coverage. The four-year window is therefore set by data availability rather than by analytical choice, and it cannot be extended until comparable origin-level tables are released in the future.

2.3. Growth, concentration, and diversity measures

Annual changes in counts and percentages record the path of the series, including the 2021 contraction. The

compound annual growth rate (CAGR) for category i summarizes the change between two endpoints:

$$CAGR_i = (N_{i,end} / N_{i,start})^{1/k} - 1 \quad (1)$$

where k is the number of years between the endpoints. The CAGR is the constant annual rate that links the two endpoints and is used because it places categories of widely different sizes on a common scale. However, because it depends only on the endpoints, it conceals intermediate fluctuations such as the 2021 decline. Therefore, the CAGR is never reported alone; annual changes are shown for every category (Table 1), and the CAGR is calculated for two windows, 2020–2023 (k = 3) and 2021–2023 (k = 2). The second window uses the pandemic trough as the base and tests whether the conclusions depend on the choice of starting year.

Country shares $s_{i,t}$ were calculated for each year on a 0–100 scale, and changes from 2020 to 2023 were expressed in percentage points. Shares and percentage-point changes always refer to the registered total in each year (the absolute headcount), whereas contributions to growth refer to the net increase of 214,091 registered workers between 2020 and 2023; the two denominators are kept distinct throughout this paper. The concentration ratio $CR_{k,t}$ is the sum of the k largest shares in year t, and CR1, CR2, CR3, and CR4 identify the proportions supplied by the largest one to four categories. Thus, CR1 is the share of the largest category, and CR2, CR3, and CR4 are the combined shares of the two, three, and four largest categories, respectively. Every year, the four largest categories were Bangladesh, Indonesia, Pakistan, and Myanmar; therefore, CR1 to CR4 referred to the same origins throughout the period. The HHI is calculated as follows:

$$HHI_t = \Sigma_i s_{i,t}^2 \quad (2)$$

The index ranges from 10,000/n when all n categories are equal (909.1 for 11 categories) to 10,000 when one category supplies every worker. Because the attainable minimum depends on n, the normalized HHI (HHI_N) was also calculated on a 0–1 scale as follows:

$$HHI_N = (HHI/10{,}000 - 1/n)/(1 - 1/n) \quad (3)$$

The reciprocal, 10,000/HHI, gives the effective number of source countries, or the number of equal-sized origins that would produce the observed HHI (Adelman, 1969). Changes in the HHI are decomposed into category contributions, $s_{i,2023}^2 - s_{i,2020}^2$, which sum to the total change in HHI.

Two further measures test whether the conclusions depend on the heavy weighting of large shares in the HHI. Shannon entropy, which gives relatively more weight to smaller categories, is calculated as follows:

$$H_t = -\Sigma_i p_{i,t} \ln p_{i,t} \quad (4)$$

where p is the proportion of registered workers from the source country i in year t. Its exponential, $\exp(H_t)$, represents an entropy-based effective number of source countries, whereas $Ht/\ln n$ represents an evenness index between 0 and 1 (Jost, 2006). The dissimilarity index is calculated as follows:

$$D = \tfrac{1}{2} \Sigma_i |s_{i,t} - s_{i,t-1}| \quad (5)$$

where $s_{i,t}$ and $s_{i,t-1}$ represent the percentage shares of source country \(i\) in consecutive years. The index indicates the percentage of registered workers that would hypothetically need to be redistributed among source-country categories for the distribution in year t to match that in year t–1 (Duncan & Duncan, 1955). Finally, a proportional growth counterfactual applies the aggregate 2020–2023 growth factor to each 2020 count and compares the results with the observed 2023 count. This directly tests the proportional expansion benchmark: under proportional growth, all the differences are zero.

The measures were selected because each answers a different question; none is used as a substitute for another (see Table A1). Growth rates and contributions to the net increase show the origin of the additional workers. Concentration ratios show how much of the registry the leading one to four origins supply, but they are insensitive to how shares are divided within that group. The HHI summarizes the entire distribution in one value and can be decomposed into category contributions, and its reciprocal, the effective number of source countries, restates it in an intuitive unit. Entropy-based measures act as a robustness check because they assign more weight to small origins than the HHI. The dissimilarity index and proportional growth counterfactual express a departure from the earlier distribution in terms of registered workers, rather than index points. For readers without a technical background, the effective number of source countries and the counterfactual are the most direct summaries, and the other measures establish that the conclusion does not depend on any single index.

Antitrust thresholds for classifying market concentration were not used. They were developed for firms' shares of product markets, whereas the units here are countries of origin and the quantities are the registered workers. The analysis relies on the level and direction of each measure over time. None of these measures estimates operational effects such as corridor-level disruption, project delay, or

resilience; they identify structural dependence from which such exposure could arise.

2.4. Statistical methods for the share–growth association

The association between each category's 2020 share and its 2020–2023 CAGR addresses a question distinct from compositional change: whether larger corridors tended to grow faster than smaller ones. Compositional change itself is established by the share changes, counterfactual, and dissimilarity index described above. Pearson's r measures linear association, and Spearman's ρ measures rank association. Because the 2020 count enters both the share numerator and CAGR denominator, the two variables are mechanically coupled. This coupling tends to push the association toward negative values. Therefore, it is unlikely to produce a spurious positive coefficient; however, caution is warranted in the interpretation.

The 11 categories are interdependent and compositional and form the entire registry rather than a probability sample; therefore, conventional p-values have no sampling interpretation. We treat the coefficients as descriptive and assess their stability in four ways: two-sided Monte Carlo permutation tests (100,000 random reassignments of CAGRs to shares), which ask how unusual the observed coefficient is relative to arbitrary pairings; leave-one-out recalculation; bootstrap percentile intervals (20,000 resamples); and recalculation with 2021 as the base year.

These methods were chosen because of the data structure rather than convention. Pearson's r and Spearman's ρ were both reported because the shares are highly skewed. Bangladesh alone held more than half of the registry in 2020; therefore, a linear coefficient can be dominated by one category, whereas a rank coefficient is less sensitive to the extreme values. Parametric significance tests and regression models were not used because they assume random sampling from a larger population and approximately normal errors, neither of which holds for the 11 interdependent categories that make up the entire registry. A Monte Carlo permutation test requires no distributional assumption; it compares the observed coefficient with those produced by randomly reassigning growth rates to shares, which is the relevant reference when the question is whether the observed pairing is unusual (Good, 2005). Bootstrap percentile intervals likewise make no distributional assumption and indicate how much the coefficients vary when the set of categories is perturbed (Efron & Tibshirani, 1993). With 11 categories, these intervals are approximate and are used to judge stability rather than to estimate population parameters. Leave-one-out recalculation shows whether a single category dominates a coefficient, and the 2021 base tests sensitivity to the starting year. Time-series models were not considered because four annual observations could not support trend estimation or change-point analysis.

In summary, each method was preferred to a specific alternative for a stated reason. Spearman's ρ was reported alongside Pearson's r, rather than Pearson's r alone, because a rank coefficient is less sensitive to Bangladesh's very large share. The Monte Carlo permutation test was used instead of the conventional t-test for a correlation coefficient because it does not require random sampling or bivariate normality; with 100,000 random reassignments, it approximates the exact permutation distribution of 11! = 39,916,800 possible pairings with a Monte Carlo standard error of the estimated p-value below 0.002. Bootstrap percentile intervals were used instead of Fisher z intervals because they do not assume normality. Leave-one-out recalculation was used instead of formal outlier tests because, with 11 categories, it shows directly how much each category changes the coefficient. Descriptive indices and their decomposition were preferred to regression and time-series models, which would require more observations and a sampling framework that the registry does not provide.

3. Results

This section reports the results for the three RQs. Section 3.1 describes the change in the size of the registered workforce (RQ1). Sections 3.2 and 3.4 examine whether the distribution across source countries broadened or narrowed (RQ2). Sections 3.2, 3.3, and 3.5 identify which categories account for the change in concentration and whether growth was associated with initial size (RQ3), and Section 3.6 reports the sensitivity analyses.

3.1. Workforce trajectory

The CIDB recorded 171,412 registered foreign construction workers in 2020 and 141,278 in 2021, a decline of 17.6% during the pandemic mobility restrictions (Table 1; Figure 1). The registered workforce then grew by 41.0% to 199,164 in 2022 and by 93.6% to 385,503 in 2023. The 2023 total was 2.25 times the 2020 total, equivalent to a CAGR of 31.0%; measured from the 2021 trough, the CAGR was 65.2%. During this period, the registered workforce increased by 214,091 workers. The contraction in 2021 was broad-based: ten of the eleven categories declined, with the only exception being the Philippines (+0.5%). By 2023, every category exceeded its 2020 count.

3.2. Composition and departure from proportional growth

Growth was highly uneven across the origins (Table 2; Figure 2). From 2020 to 2023, the CAGR ranged from

Table 1. Registered foreign workers in Malaysia's construction sector by country of origin, with annual and cumulative percentage changes, 2020–2023

Country	2020	2021	2022	2023	2020–2021 (%)	2021–2022 (%)	2022–2023 (%)	2020–2023 (%)
Bangladesh	96,925	80,235	124,513	269,656	−17.2	+55.2	+116.6	+178.2
Indonesia	45,081	39,429	44,070	54,806	−12.5	+11.8	+24.4	+21.6
Pakistan	9,825	6,291	10,209	22,902	−36.0	+62.3	+124.3	+133.1
India	5,082	3,074	3,718	8,663	−39.5	+20.9	+133.0	+70.5
Myanmar	6,069	5,519	6,436	11,185	−9.1	+16.6	+73.8	+84.3
China	2,904	2,399	3,829	5,849	−17.4	+59.6	+52.8	+101.4
Nepal	3,536	2,796	3,898	9,087	−20.9	+39.4	+133.1	+157.0
Philippines	626	629	1,026	1,170	+0.5	+63.1	+14.0	+86.9
Vietnam	472	393	624	935	−16.7	+58.8	+49.8	+98.1
South Korea	191	157	250	300	−17.8	+59.2	+20.0	+57.1
Others	701	356	591	950	−49.2	+66.0	+60.7	+35.5
Total	171,412	141,278	199,164	385,503	−17.6	+41.0	+93.6	+124.9

Source: CIDB (2025), unpublished data provided on request. The counts represent the active registrations of foreign construction workers. The categories sum exactly to the reported annual total for each year.

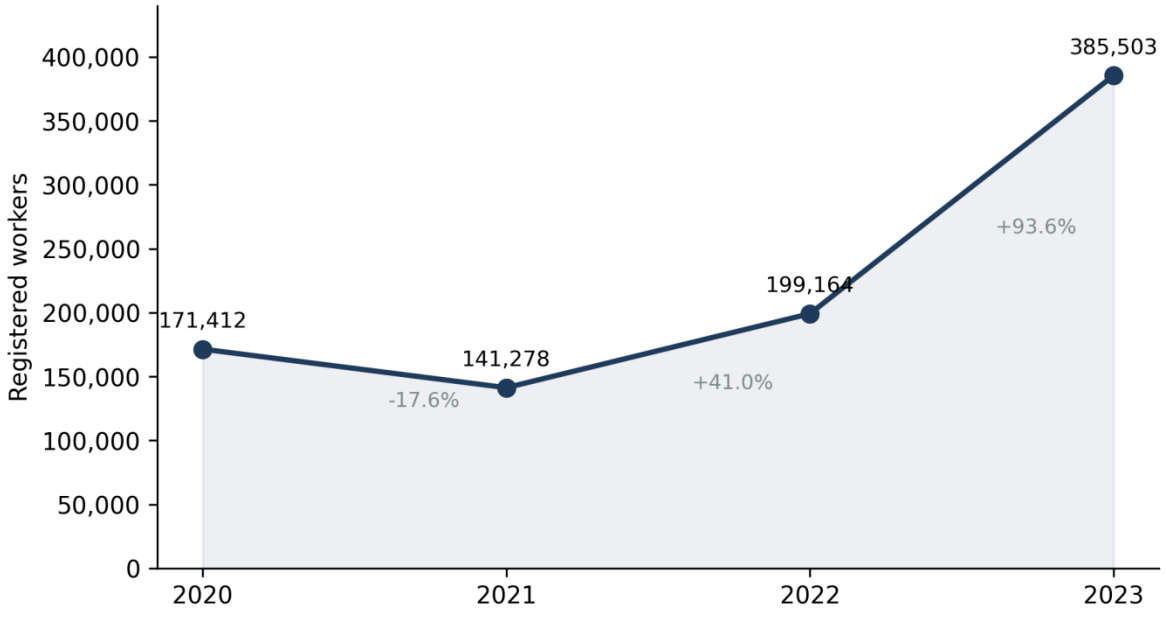


Figure 1. Total registered foreign construction workforce, 2020–2023, with annual percentage change

Table 2. Growth, shares, and contribution to net increase by source country, ranked by 2020–2023 CAGR

Country	CAGR 2020–2023 (%)	CAGR 2021–2023 (%)	Share 2020 (%)	Share 2023 (%)	Share change (pp)	Net increase, 2020–2023	Share of net increase (%)
Bangladesh	40.6	83.3	56.55	69.95	+13.40	172,731	80.7
Nepal	37.0	80.3	2.06	2.36	+0.29	5,551	2.6
Pakistan	32.6	90.8	5.73	5.94	+0.21	13,077	6.1
China	26.3	56.1	1.69	1.52	−0.18	2,945	1.4
Vietnam	25.6	54.2	0.28	0.24	−0.03	463	0.2
Philippines	23.2	36.4	0.37	0.30	−0.06	544	0.3
Myanmar	22.6	42.4	3.54	2.90	−0.64	5,116	2.4
India	19.5	67.9	2.96	2.25	−0.72	3,581	1.7
South Korea	16.2	38.2	0.11	0.08	−0.03	109	0.1
Others	10.7	63.4	0.41	0.25	−0.16	249	0.1
Indonesia	6.7	17.9	26.30	14.22	−12.08	9,725	4.5
Total	31.0	65.2	100.00	100.00	0.00	214,091	100.0

Note: Shares and changes were calculated from the unrounded values. Share 2020, Share 2023, and Share change refer to the total registered in each year. The Share of net increase refers to the net increase of 214,091 registered workers between 2020 and 2023.
Abbreviations: CAGR: Compound annual growth rate; pp: Percentage points.

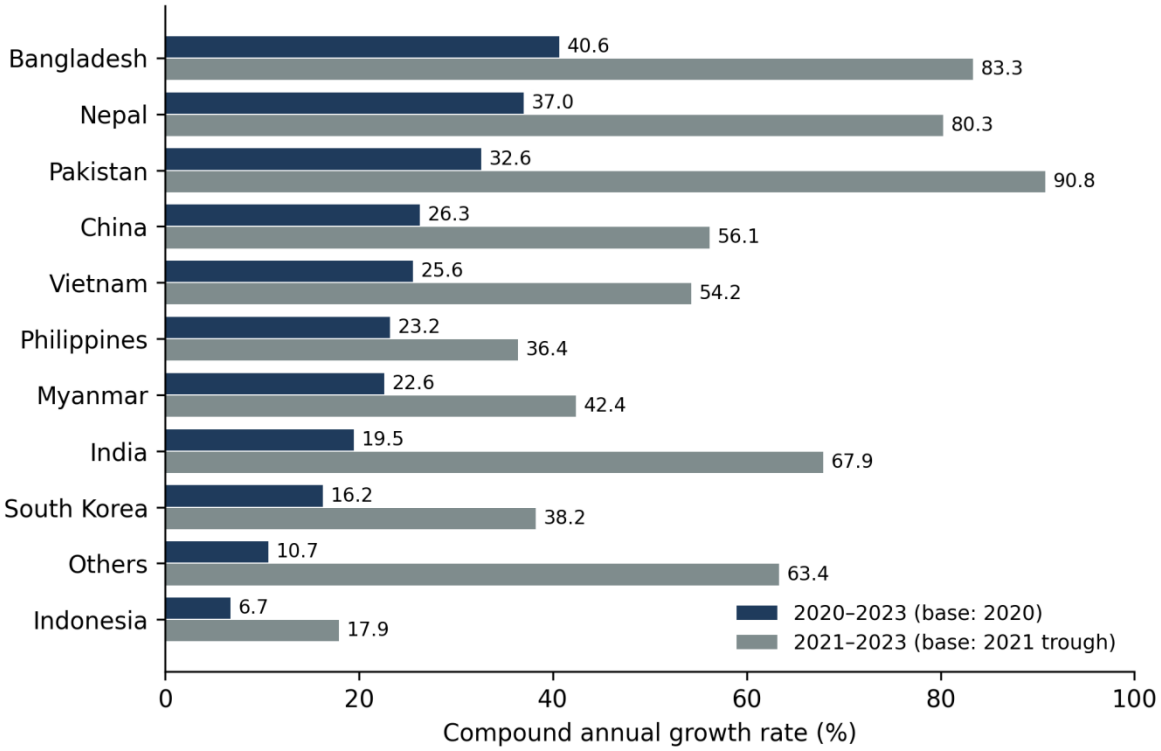


Figure 2. Compound annual growth rate by source country for 2020–2023 and 2021–2023

6.7% in Indonesia to 40.6% in Bangladesh. Nepal (37.0%) and Pakistan (32.6%), both small origins in 2020, grew at rates close to those of Bangladesh, whereas Indonesia, the second largest origin in 2020, grew the most slowly. Bangladesh added 172,731 registered workers, 80.7% of the net increase, whereas Indonesia added 9,725 workers, or 4.5%. Indonesia's headcount rose, while its share fell because the total expanded much faster. Measured from the 2021 trough, Pakistan (90.8%), Bangladesh (83.3%), and Nepal (80.3%) grew the fastest, and Indonesia (17.9%) grew the slowest; the rank correlation between the two windows' CAGRs was ρ = 0.673, indicating broadly similar orderings.

The proportional growth counterfactual shows how far the 2023 distribution departs from the 2020 structure (Table 3). If every category had grown at the aggregate rate, Indonesia would have recorded 101,386 registered workers in 2023, rather than the observed 54,806, a shortfall of 46,580 workers. Bangladesh exceeded its proportional value by 51,673 workers. The remaining nine categories were, in aggregate, 5,093 below their proportional values. The dissimilarity index between the 2020 and 2023 distributions was 13.9, meaning that nearly one in seven registered workers in 2023 would need to be in a different origin category to reproduce the 2020 distribution. Therefore, the share data alone are inconsistent with the proportional expansion benchmark, independent of the correlation analysis presented in Section 3.3.

3.3. Initial share and subsequent growth

The 2020 share was weakly and unstably associated with the 2020–2023 CAGR (Pearson $r = 0.314$; Spearman $\rho = 0.245$). Permutation tests showed that coefficients at least this large arose frequently under arbitrary pairings ($p = 0.348$ for r and $p = 0.468$ for ρ), and the bootstrap percentile intervals spanned zero ($r = -0.79$ to 0.85; $\rho = -0.54$ to 0.85). The Pearson coefficient depended heavily on single categories: it became −0.475 when Bangladesh was omitted and 0.617 when Indonesia was omitted. With 2021 as the base year, the association was weaker ($r = 0.130$; $\rho = 0.318$). The data provide no reliable indication that larger corridors grew faster or slower than smaller ones. This finding concerns only the size–growth relationship; the compositional change reported in Section 3.2 does not depend on it.

3.4. Concentration and diversity

Between 2020 and 2023, every concentration and diversity measure except CR2 moved toward greater concentration (Table 4; Figure 3). The HHI rose by 30.4%, from 3,950.7 to 5,151.8, and increased each year (by 100.5, 395.1, and 705.5 points). The normalized index rose from 0.335 to 0.467, and the effective number of source countries fell from 2.53 to 1.94. By 2023, therefore, the registered workforce was as concentrated as one supplied by fewer than two equal-sized countries. The entropy-based effective number, which gives more weight to smaller categories, fell from 3.58 to 2.97, and evenness fell from 0.532 to 0.454. CR1 rose

Table 3. Observed 2023 registrations, proportional growth counterfactual, and category contributions to the change in Herfindahl–Hirschman index (HHI), 2020–2023

Country	Observed 2023	Proportional counterfactual 2023	Observed minus counterfactual	Contribution to ΔHHI
Bangladesh	269,656	217,983	+51,673	+1,695.5
Indonesia	54,806	101,386	−46,580	−489.6
Pakistan	22,902	22,096	+806	+2.4
India	8,663	11,429	−2,766	−3.7
Myanmar	11,185	13,649	−2,464	−4.1
China	5,849	6,531	−682	−0.57
Nepal	9,087	7,952	+1,135	+1.3
Philippines	1,170	1,408	−238	−0.04
Vietnam	935	1,062	−127	−0.02
South Korea	300	430	−130	−0.01
Others	950	1,577	−627	−0.11
Total	385,503	385,503	0	+1,201.1

Note: The counterfactual multiplies each 2020 count by the aggregate growth factor (385,503/171,412 = 2.249). The contributions to ΔHHI are $s_{2023}^2 - s_{2020}^2$ and sum to a total change of 1,201.1 points.

Table 4. Concentration and diversity by source country, 2020–2023

Year	Total	CR1 (%)	CR2 (%)	CR3 (%)	CR4 (%)	HHI	HHI_N	10,000/ HHI	Shannon entropy, *H*	exp(*H*)	Evenness	*D*
2020	171,412	56.5	82.8	88.6	92.1	3,950.7	0.335	2.53	1.276	3.58	0.532	–
2021	141,278	56.8	84.7	89.2	93.1	4,051.2	0.346	2.47	1.236	3.44	0.515	2.3
2022	199,164	62.5	84.6	89.8	93.0	4,446.3	0.389	2.25	1.189	3.28	0.496	6.8
2023	385,503	69.9	84.2	90.1	93.0	5,151.8	0.467	1.94	1.088	2.97	0.454	9.0

Notes: HHI_N is the normalized Herfindahl–Hirschman index (HHI) for 11 categories; 10,000/HHI is the effective number of source countries; exp(*H*) is the entropy-based effective number; evenness is *H*/ln 11; and *D* is the dissimilarity index relative to the previous year. CR1 to CR4 are the combined shares of the largest one to four categories, which, in every year, were Bangladesh, Indonesia, Pakistan, and Myanmar.

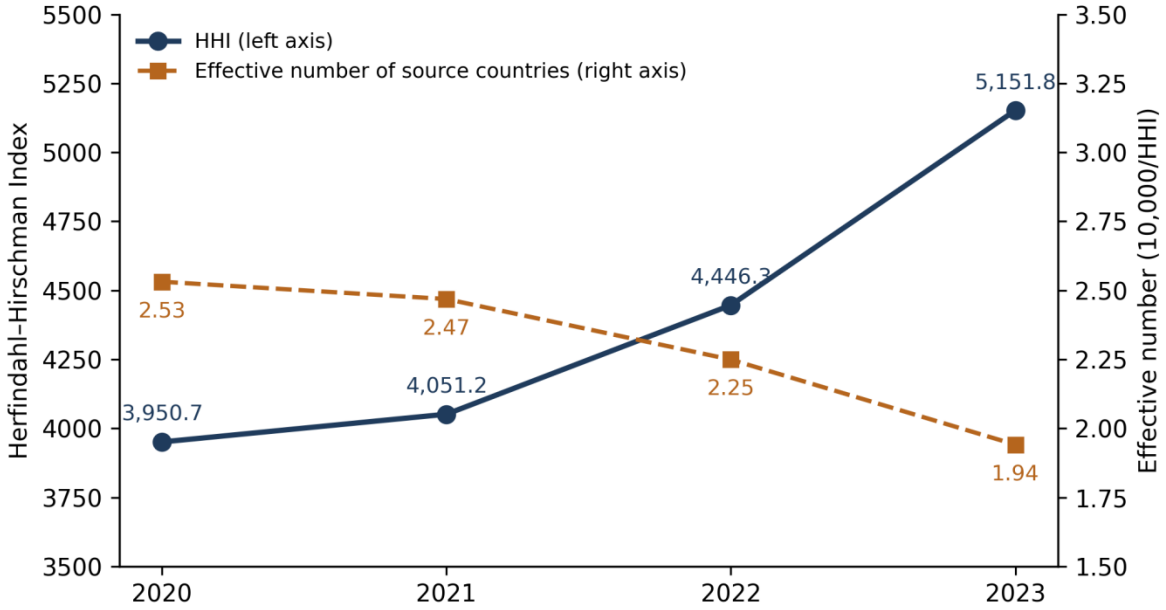


Figure 3. Herfindahl–Hirschman index (HHI) and effective number of source countries, 2020–2023

from 56.5% to 69.9%, CR3 from 88.6% to 90.1%, and CR4 from 92.1% to 93.0%. CR2, by contrast, remained between 82.8% and 84.7% throughout. Year-on-year dissimilarity increased from 2.3 in 2021 to 6.8 in 2022 and 9.0 in 2023, indicating that compositional change accelerated as the workforce grew. Because concentration also rose during the 2021 contraction, the direction of change in the total did not determine the direction of change in concentration.

3.5. Shift in shares within the two largest source countries

Bangladesh and Indonesia together supplied 82.8% and 84.2% of registered workers in 2020 and 2023, respectively, a change of only 1.3 percentage points when calculated from the unrounded shares. The balance between them changed substantially (Figure 4). Bangladesh gained 13.4 percentage points, rising from 56.5% to 69.9%, while Indonesia lost 12.1 percentage points, falling from 26.3% to 14.2%. The remaining nine categories declined collectively from 17.2% to 15.8%, although their combined count more than doubled, from 29,406 to 61,041. Both leading countries recorded higher counts in 2023 than in 2020; thus, the change was a relative shift in shares that arose arithmetically from differential growth: Bangladeshi registrations grew at a compound rate of 40.6% a year and Indonesian registrations at 6.7%. Two further

distinctions follow. First, the registry cannot show whether these growth differentials reflect policy or institutional reallocation between corridors, such as differences in bilateral approvals or recruitment channels, or differences in employer demand and sending-country supply. Second, because the data are aggregate stocks, they cannot show that any individual Indonesian worker was replaced by a Bangladeshi worker; the results therefore describe a change in composition, not worker-level substitution.

The decomposition in Table 3 shows where the rise in concentration originated. Bangladesh's growing share added 1,695.5 points to the HHI, Indonesia's shrinking share subtracted 489.6 points, and the other nine categories together contributed −4.9 points. Among categories other than Bangladesh, the distribution became more even: the HHI calculated within that group fell from 3,989.6 to 2,867.5 as Indonesia's dominance of the remainder declined. The overall concentration increased because one corridor gained weight, and the distribution became more even across the remaining origins.

3.6. Sensitivity analyses

Three checks test whether the conclusion of expansion without diversification depends on analytical choices. First, using the 2021 trough rather than 2020 as the base leaves the direction unchanged: the HHI rose by 27.2% between 2021 and 2023, and Bangladesh supplied 77.6% of the net increase in that window. Second, excluding the heterogeneous Others category changes the HHI only marginally (3,983.1 in 2020 and 5,177.3 in 2023, compared to 3,950.7 and 5,151.8). Third, the HHI, normalized HHI, both effective numbers, evenness, CR1, CR3, and CR4 all point in the same direction; only CR2 fails to register the change, for the reason identified in Section 3.5. None of the measures examined reversed this finding.

4. Discussion

This study examined whether the growth of Malaysia's registered foreign construction workforce between 2020 and 2023 broadened or narrowed its source-country base. The results show that the distribution became more concentrated.

Regarding RQ1, the registered workforce contracted by 17.6% in 2021 and then grew to 2.25 times its 2020 size by 2023. Regarding RQ2, the expansion fits the concentration benchmark rather than the proportional or diversification benchmarks: the HHI rose from 3,950.7 to 5,151.8, the effective number of source countries fell from 2.53 to 1.94, and nearly one in seven registered workers in 2023 would have had to be in a different category to reproduce the 2020 distribution. Regarding RQ3, the change in concentration was accounted for, in arithmetic terms, mainly by one corridor. Bangladesh supplied 80.7% of the net increase, and its share increased from 56.5% to 69.9%.

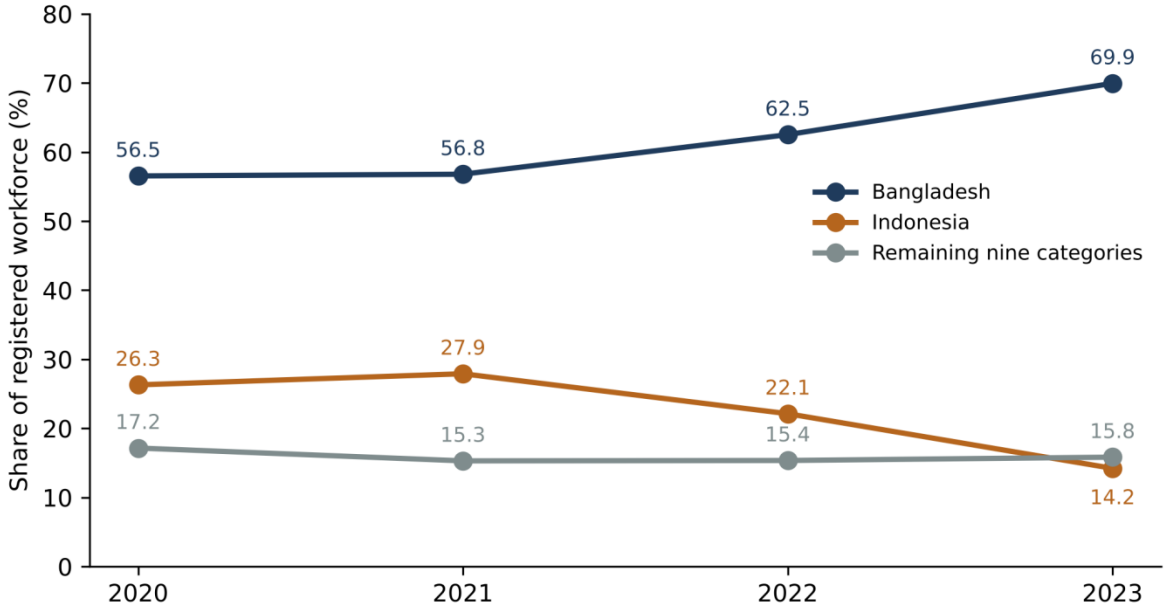


Figure 4. Shares of Bangladesh, Indonesia, and the remaining nine origin categories, 2020–2023

The two largest countries supplied 82.8% of registered workers in 2020 and 84.2% in 2023 (CR2), and the three largest supplied 88.6% and 90.1% (CR3). However, within the leading pair, Indonesia's share decreased from 26.3% to 14.2%. Growth was not consistently associated with the initial size.

Several explanations are consistent with the timing of these changes, although none were tested and the registry data cannot establish causal effects. Indonesia, the second largest category in 2020, recorded the lowest growth in both windows, while Nepal and Pakistan began with small shares and grew rapidly. These differences may stem from bilateral arrangements, recruitment costs, intermediary networks, and sending-country capacity (Bollyky *et al.*, 2022), or worker preferences; however, administrative data cannot distinguish among these explanations. Nonetheless, the timing of the expansion is consistent with known policy events. Malaysia's borders reopened on April 1, 2022 (Kaos, 2022), the Employment Recalibration Program 2.0 reopened in January 2023 (Radio Televisyen Malaysia, 2023), and recruitment from Bangladesh resumed in 2022 after a suspension, with more than 400,000 workers reported to have migrated to Malaysia under the reopened arrangements before the new intake was frozen in 2024 (The Daily Star, 2024). The 2023 rise in registrations may therefore combine new arrivals with the regularization of workers already in the country. Separating these components requires dated approvals, entry records, and regularization counts by corridor. The present series documents the outcomes that such research would need to explain.

Beyond the construction sector, the findings connect a sectoral registry to Malaysia's demographic transition, a link that reviews of destination-country evidence also draw between migration, labor markets, and population structure (Koczan *et al.*, 2021). With fertility below replacement since 2013 and an older population growing (DOSM, 2023, 2025a, 2025b), the domestic supply of young workers for physically demanding trades is unlikely to expand. Local participation in construction was already weak before the pandemic (Mohd Fateh *et al.*, 2022). Thus, the non-citizen population appears to be an adjustable component of the labor supply. Its movements between 2021 and 2025 coincided with changes in border and recruitment policy rather than with a natural increase, and its sex ratio of more than 220 men per 100 women indicates how strongly labor migration shapes its structure (DOSM, 2022, 2023, 2025a).

The present results add a compositional dimension to this perspective. The rise in registered foreign construction workers in 2023 coincided with the increase in the non-citizen population from approximately 2.5 million to 3.0 million reported by DOSM (2023), although the two series differ in definition and coverage and cannot be combined. Within registered construction employment, adjustment through migration was increasingly channeled through one corridor. The results have three implications for population and labor force research. First, the size of the non-citizen population and the composition of its origins can change on different schedules. Therefore, demographic accounting that tracks only totals will miss shifts in dependence. Second, when one corridor dominates, bilateral or administrative decisions affecting that corridor can change national population estimates. The slight decline in the non-citizen population from 3.39 million in 2024 to 3.38 million in 2025 (DOSM, 2025a), which followed the 2024 suspension of new intakes, is consistent with this possibility, although the present data cannot establish a causal link. Third, sectoral registries, where they publish origin details, can complement census-based estimates by showing where migrant labor enters the economy and how concentrated its sources are.

These results can also be related to the theories reviewed in Section 1.1. Resource dependence theory links concentration to exposure when external actors control critical inputs (Pfeffer & Salancik, 1978; H. Jiang *et al.*, 2023). Malaysia's registered construction workforce expanded without diversifying by source country, although the data cannot explain this. Recruitment decisions are dispersed among employers and intermediaries, whereas some costs of corridor concentration are collectively borne by the industry and the state. This asymmetry may weaken the incentives to diversify, but testing this proposition requires evidence on approvals, recruitment governance, costs, and institutional incentives. The findings also qualify the idea of corridor persistence (Bakewell, 2014; Massey *et al.*, 1993). Bangladesh and Indonesia remained the leading pair, yet the balance between them changed substantially, and the historical ties of the Indonesia–Malaysia corridor (Hugo, 1993; Spaan & van Naerssen, 2018) did not prevent Bangladesh from becoming more prominent. Malaysia's system of temporary admission, employer sponsorship, enforcement, regularization, and bilateral agreements provides a plausible institutional context for this shift (J. Anderson, 2021; Chin, 2002; Devadason & Chan, 2014; Kaur, 2010), consistent with the view that policy and institutions can redirect established flows (Castles, 2004; Czaika & de Haas, 2014). The data cannot be used to test this mechanism, but they indicate why corridor institutions warrant study alongside aggregate labor demand.

The results also have conceptual and methodological implications. Workforce size, overall concentration, and the

composition of the dominant pair did not change together, and no single statistic captured all three movements. CR1 captured Bangladesh's growing weight, CR2 recorded the continuing dominance of the leading pair, the HHI and its effective number summarized inequality across all categories, entropy-based measures confirmed the result with more weight on small origins, and the within-group HHI showed that the remaining corridors became more even. CR2 alone would have suggested continuity, and an HHI alone would not have shown that one corridor accounted for more than the entire increase in the index. Conceptually, the study distinguishes dependence on migrant labor, a matter of scale, from concentration within that labor supply, a matter of distribution. Methodologically, it recommends that analyses of migrant-dependent sectors report component shares, a decomposition of index change, and a number-equivalent measure alongside summary indices, rather than attaching a competition-policy label to an HHI value.

4.1. Policy implications

The findings suggest six actions, proportionate to the evidence, which are offered as prompts for monitoring and further inquiry rather than as prescriptions derived from causal evidence. First, CIDB, with the Ministry of Works and the Ministry of Human Resources, could publish the registered total annually together with country shares, CR1, the HHI, and the effective number of source countries, so that growing dependence on one corridor becomes visible as it occurs rather than retrospectively. Second, the CIDB and the Ministry of Home Affairs, through the Immigration Department, could link registry counts with dated approval, entry, and regularization records by corridor, so that new arrivals can be distinguished from workers newly captured by regularization. Third, sharp changes in concentration could prompt a review of corridor-specific processing times, approval volumes, recruitment costs, and bilateral conditions, and that review, rather than an index value, should inform any intervention threshold. An index value alone does not justify quotas or restrictions. Fourth, any attempt at diversification should be preceded by an assessment of recruitment infrastructure, bilateral agreements, consular capacity, skills matching, and enforceable labor standards, because even rapid growth from small corridors changes overall shares only slowly: Nepalese and Pakistani registrations grew at 37.0% and 32.6% per year, respectively, yet their combined share rose only from 7.8% to 8.3%. Fifth, contractors and project planners can map the agencies, approvals, transport routes, and accommodation arrangements on which mobilization depends, identify trades that rely heavily on one corridor, and plan realistic lead times for lawful alternatives. Sixth, efforts to reduce operational exposure must not compromise worker protection. Recruitment reform should be accompanied by the enforcement of safety, insurance, and labor standards (Alshboul & Shehadeh, 2025) and attention to the rights and welfare of workers holding temporary employment passes (Ibrahim & Razali, 2023), and should not transfer recruitment costs or risks to migrants (Ruhs & Martin, 2008).

The six actions differ in what they require and how quickly they can be implemented (Table A2). In order of difficulty, the first and fifth can proceed within existing arrangements, because they rely on aggregate counts that CIDB already holds or on planning information that contractors already collect, and they involve no personal data. The third requires only an agreed set of indicators and a review procedure. The second is the most demanding among the domestic actions: linking registry, approval, entry, and regularization records held by different agencies requires a legal basis and safeguards for inter-agency data sharing, such as the framework established by the Data Sharing Act 2025 (Act 864), together with compatible identifiers and the protection of personal records. A de-identified linkage reported only as aggregate counts by corridor and quarter would be a realistic first step. The fourth depends on bilateral negotiation and recruitment and consular capacity in sending countries, which Malaysian agencies do not control, and the sixth requires sustained enforcement capacity rather than a single reform. The timeframes in Table A2 are indicative; they show a plausible sequence rather than a commitment by any agency.

4.2. Limitations and directions for future research

Several limitations constrain the claims supported by these data. The four-year series began in a pandemic year and could not establish a pre-pandemic baseline or identify longer cycles; therefore, this study describes expansion rather than recovery. The short window reflects a data constraint rather than a design choice: CIDB's origin-level tables are not published, the only earlier national figure comes from a different administrative source without an origin breakdown, and the 2024 figures were affected by regularization and the suspension of new recruitment. Consequently, the series cannot support trend estimation, change-point analysis, or conclusions about persistence beyond 2023, and the findings describe only a single expansion episode. The annual figures record registered stocks, not gross inflows, exits, renewals, or individual trajectories, and the same person may appear in subsequent years. The registry excludes undocumented workers, and regularization in 2023 and 2024 means that part of any change may reflect administrative capture. The residual

category conceals changes among less common origins, and the tables supplied contain no variables on occupation, employer, project, wage, location, recruitment cost, or working conditions. Policy and recruitment changes in both Malaysia and sending countries occurred during this period and cannot be separated from demand in aggregate data. The share–growth association rests on 11 categories and is sensitive to individual observations. Finally, because the HHI and entropy measures depend on the number and granularity of categories, their values are comparable across years within this series but not directly with series that use a different classification system.

Future work can be conducted on five fronts. A direct comparison of the Bangladesh and Indonesia corridors using evidence of bilateral arrangements, approval procedures, recruitment fees, intermediaries, skill profiles, and worker preferences could test explanations for their divergent trajectories. A longer, consistently defined series extending before 2020 and after 2023 would permit change-point analysis around the 2022 reopening, 2023 recalibration program, and 2024 suspension. Project-level data could be used to test whether corridor concentration is associated with mobilization delay, cost variation, turnover, or safety outcomes after accounting for project and contractor characteristics. Nationality and language proficiency are already known to be associated with foreign construction workers' safety perception (Korkmaz & Park, 2018), and predictive safety models of the kind now applied to construction injury data (Shehadeh & Alshboul, 2025) could incorporate recruitment channels as an explanatory variable. Comparable analyses of plantation agriculture, manufacturing, and services could establish whether a stable top-group concentration conceals shifts in shares. Interviews with workers, employers, recruiters, unions, and officials could examine mechanisms that counts cannot reveal. Throughout, operational exposure should be kept separate from worker welfare: a reliable recruitment system for employers is not necessarily equitable or protective of migrant workers.

5. Conclusions

The growth in Malaysia's registered foreign construction workforce between 2020 and 2023 was an expansion without any diversification. The workforce more than doubled, but one corridor supplied four-fifths of the increase, and by 2023, the registry was as concentrated as a workforce drawn from fewer than two equally sized source countries.

The results also support three broader conclusions. First, the growth in headcount and supply resilience are distinct properties: a larger registry may be more exposed to disruption in a single corridor than a smaller one. Second, the combined share of the leading pair is an unreliable guide to dependence because shifts in shares within the pair can leave it virtually unchanged. Therefore, monitoring should be based on component shares and number-equivalent measures. Third, in an aging, low-fertility society that relies on non-citizen labor, the origins of that labor are a demographic variable in their own right, and changes in corridor composition deserve the same attention as changes in migrant totals.

These conclusions are bounded. They describe CIDB-registered foreign construction personnel, not all foreign workers in Malaysian construction; they rest on annual stock counts that cannot identify turnover or causal processes; and they do not imply monopsony, anticompetitive conduct, or the need for country-specific restrictions. Whether alternative corridors can expand without weaker recruitment standards or worker safeguards, and whether the same pattern holds after 2023 and in other labor-dependent sectors, remain empirical questions for research that links registry data to dated policy, recruitment, and project records.

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Conflict of interest

The authors declare that they have no competing interests.

Author contributions

Conceptualization: All authors
Data curation: Mohd Nasir Saari
Formal analysis: Mohd Nasir Saari
Methodology: All authors
Supervision: Md Shukri Shuib, Mohd Na'eim bin Ajis
Writing original draft: Mohd Nasir Saari
Writing review & editing: All authors

Ethics approval and consent to participate

The study used aggregate statistics supplied by the Construction Industry Development Board Malaysia on the authors' request and involved no human participants, no contact with workers, and no access to individual records.

Consent for publication

Not applicable.

Availability of data

The country-by-year counts analyzed in this study are not publicly released. They were supplied as aggregate tables by the Contractor and Construction Personnel Registration Division of the Construction Industry Development Board Malaysia (CIDB) in response to the authors' request. The complete country-by-year matrix used in the analysis is reproduced in Table 1.

References

Abdul-Aziz, A.-R. (2001). Foreign workers and labour segmentation in Malaysia's construction industry. *Construction Management and Economics, 19*(8), 789–798.

https://doi.org/10.1080/01446190110072022

Abdul-Rahman, H., Wang, C., Wood, L. C., & Low, S. F. (2012). Negative impact induced by foreign workers: Evidence in Malaysian construction sector. *Habitat International, 36*(4), 433–443.

https://doi.org/10.1016/j.habitatint.2012.03.002

Adelman, M. A. (1969). Comment on the "H" concentration measure as a numbers-equivalent. *The Review of Economics and Statistics, 51*(1), 99–101.

https://doi.org/10.2307/1926955

Alshboul, O., & Shehadeh, A. (2025). Integrating labor and insurance regulations for enhanced safety and security of construction workers. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 17*(3), Article 04525021.

https://doi.org/10.1061/JLADAH.LADR-1259

Ambulkar, S., Blackhurst, J., & Grawe, S. (2015). Firm's resilience to supply chain disruptions: Scale development and empirical examination. *Journal of Operations Management, 33-34*, 111–122.

https://doi.org/10.1016/j.jom.2014.11.002

Anderson, B., Khadka, U., & Ruhs, M. (2024). Demand for migrant workers: Institutional system effects beyond national borders. *Journal of Ethnic and Migration Studies, 50*(5), 1202–1225.

https://doi.org/10.1080/1369183X.2023.2279741

Anderson, J. T. (2021). Managing labour migration in Malaysia: Foreign workers and the challenges of 'control' beyond liberal democracies. *Third World Quarterly, 42*(1), 86–104.

https://doi.org/10.1080/01436597.2020.1784003

Athukorala, P.-C., & Devadason, E. S. (2012). The impact of foreign labor on host country wages: The experience of a Southern host, Malaysia. *World Development, 40*(8), 1497–1510.

https://doi.org/10.1016/j.worlddev.2012.04.025

Azar, J., Marinescu, I., & Steinbaum, M. (2022). Labor market concentration. *Journal of Human Resources, 57*(S), S167–S199.

https://doi.org/10.3368/jhr.monopsony.1218-9914R1

Bakewell, O. (2014). Relaunching migration systems. *Migration Studies, 2*(3), 300–318.

https://doi.org/10.1093/migration/mnt023

Bollyky, T. J., Graetz, N., Dieleman, J., Miller-Petrie, M. K., Schoder, D., Joyce, S., Guillot, M., & Hay, S. I. (2022). Growing up and moving out: Migration and the demographic transition in low- and middle-income nations. *Population Studies, 76*(1), 63–80.

https://doi.org/10.1080/00324728.2022.2034919

Buckley, P., Pietropaoli, L., Rosada, A., Harguth, B., & Broom, J. (2022). How has COVID-19 affected migrant workers' vulnerability to human trafficking for forced labour in Southeast Asia? A narrative review. *Journal of Public Health and Emergency, 6*, Article 19.

https://doi.org/10.21037/jphe-21-108

Castles, S. (2004). Why migration policies fail. *Ethnic and Racial Studies, 27*(2), 205–227.

https://doi.org/10.1080/0141987042000177306

Cavalcanti, M., Lessa, L., & Vasconcelos, B. M. (2023). Construction accident prevention: A systematic review of machine learning approaches. *Work, 76*(2), 507–519.

https://doi.org/10.3233/WOR-220533

Chang, H. C., Wang, M. C., Liao, H. C., Cheng, S. F., & Wang, Y. H. (2016). Hazard prevention regarding occupational accidents involving blue-collar foreign workers: A perspective of Taiwanese manpower agencies. *International Journal of Environmental Research and Public Health, 13*(7), Article 706.

https://doi.org/10.3390/ijerph13070706

Chin, C. B. N. (2002). The 'host' state and the 'guest' worker in Malaysia: Public management and migrant labour in times of economic prosperity and crisis. *Asia Pacific Business Review, 8*(4), 19–40.

https://doi.org/10.1080/713999163

Construction Industry Development Board Malaysia. (n.d.).

Construction personnel registration. Retrieved September 25, 2026, from https://www.cidb.gov.my/eng/construction-personnel-registration/

Construction Industry Development Board Malaysia. (2024, August 30). *Implementation of the whitening programme for foreign workers in the construction sector*. Accessed November 4, 2026. https://www.cidb.gov.my/eng/implementation-of-the-whitening-programme-for-foreign-workers-in-the-construction-sector/

Construction Industry Development Board Malaysia. (2025). *Active registered foreign construction personnel by nationality, 2020–2023* [Unpublished raw data, supplied on request on January 21, 2025]. Contractor and Construction Personnel Registration Division.

Czaika, M., & de Haas, H. (2014). The globalization of migration: Has the world become more migratory? *International Migration Review, 48*(2), 283–323.

https://doi.org/10.1111/imre.12095

Data Sharing Act 2025, Act 864 (Malaysia). Accessed November 4, 2026. https://www.jdn.gov.my/wp-content/uploads/2025/06/Act-864.pdf

de Haas, H. (2010). The internal dynamics of migration processes: A theoretical inquiry. *Journal of Ethnic and Migration Studies, 36*(10), 1587–1617.

https://doi.org/10.1080/1369183X.2010.489361

de Haas, H. (2021). A theory of migration: The aspirations-capabilities framework. *Comparative Migration Studies, 9*, Article 8.

https://doi.org/10.1186/s40878-020-00210-4

Department of Statistics Malaysia. (2022, July 29). *Current population estimates, Malaysia, 2022*. Accessed November 4, 2026. https://www.dosm.gov.my/portal-main/release-content/current-population-estimates-malaysia-2022

Department of Statistics Malaysia. (2023, July 31). *Current population estimates, Malaysia, 2023*. Accessed November 4, 2026. https://www.dosm.gov.my/portal-main/release-content/current-population-estimates-malaysia----2023

Department of Statistics Malaysia. (2025a, July 31). *Current population estimates, 2025*. Accessed November 4, 2026. https://www.dosm.gov.my/portal-main/release-content/current-population-estimates-2025

Department of Statistics Malaysia. (2025b, October 16). *Vital statistics, Malaysia, 2025*. Accessed November 4, 2026. https://dosm.gov.my/portal-main/release-content/vital-statistics-malaysia-2025

Department of Statistics Malaysia. (2025c, December 24). *International migration statistics, Malaysia, 2025*. Accessed November 4, 2026. https://www.dosm.gov.my/portal-main/release-content/international-migration-statistics-malaysia-2025

Devadason, E. S., & Chan, W. M. (2014). Policies and laws regulating migrant workers in Malaysia: A critical appraisal. *Journal of Contemporary Asia, 44*(1), 19–35.

https://doi.org/10.1080/00472336.2013.826420

Duncan, O. D., & Duncan, B. (1955). A methodological analysis of segregation indexes. *American Sociological Review, 20*(2), 210–217.

https://doi.org/10.2307/2088328

Efron, B., & Tibshirani, R. J. (1993). *An introduction to the bootstrap*. Chapman & Hall.

https://doi.org/10.1201/9780429246593

Good, P. I. (2005). *Permutation, parametric, and bootstrap tests of hypotheses* (3rd ed.). Springer.

https://doi.org/10.1007/b138696

Hii, N. L., & Lau, E. (2025). Asymmetric effects of foreign worker employment on sectoral labor productivity: A Malaysian perspective. *Economies, 13*(5), Article 127.

https://doi.org/10.3390/economies13050127

Hirschman, A. O. (1964). The paternity of an index. *American Economic Review, 54*(5), 761. Accessed November 4, 2026. https://www.jstor.org/stable/1818582

Hugo, G. (1993). Indonesian labour migration to Malaysia: Trends and policy implications. *Southeast Asian Journal of Social Science, 21*(1), 36–70.

https://doi.org/10.1163/030382493X00035

Ibrahim, M. S., & Razali, R. M. (2023). Perceptions of the rights and welfare of foreign workers in Peninsular Malaysia. *Pertanika Journal of Social Sciences and Humanities, 31*(2), 765–786.

https://doi.org/10.47836/pjssh.31.2.15

International Labour Organization. (2024). *ILO global estimates on international migrant workers: International migrants in the labour force* (4th ed.).

https://doi.org/10.54394/ESKI5420

Ivanov, D., & Dolgui, A. (2020). Viability of intertwined supply networks: Extending the supply chain resilience angles towards survivability. A position paper motivated by COVID-19 outbreak. *International Journal of Production Research, 58*(10), 2904–2915.

https://doi.org/10.1080/00207543.2020.1750727

Jiang, H., Luo, Y., Xia, J., Hitt, M., & Shen, J. (2023). Resource dependence theory in international business: Progress and prospects. *Global Strategy Journal, 13*(1), 3–57.

https://doi.org/10.1002/gsj.1467

Jiang, S., Yeung, A. C. L., Han, Z., & Huo, B. (2023). The effect of customer and supplier concentrations on firm resilience during the COVID-19 pandemic: Resource dependence and power balancing. *Journal of Operations Management, 69*(3),

497–518.

https://doi.org/10.1002/joom.1236

Jones, K., Ghimire, A., & Khor, Y. (2024). Living at work: Migrant worker dormitories in Malaysia. *Work in the Global Economy, 4*(1), 89–108.

https://doi.org/10.1332/27324176Y2024D000000018

Jost, L. (2006). Entropy and diversity. *Oikos, 113*(2), 363–375.

https://doi.org/10.1111/j.2006.0030-1299.14714.x

Kaos, J. (2022, March 8). Malaysia will reopen its borders to international travellers on April 1, says PM. *The Star*. Accessed November 4, 2026. https://www.thestar.com.my/news/nation/2022/03/08/malaysia-will-reopen-its-borders-to-international-travellers-on-april-1-says-pm

Kaur, A. (2010). Labour migration in Southeast Asia: Migration policies, labour exploitation and regulation. *Journal of the Asia Pacific Economy, 15*(1), 6–19.

https://doi.org/10.1080/13547860903488195

Koczan, Z., Pinat, M., & Rozhkov, D. (2021). *The impact of international migration on inclusive growth: A review* (IMF Working Paper No. 2021/088). International Monetary Fund.

https://doi.org/10.5089/9781513571966.001

Korkmaz, S., & Park, D. J. (2018). Comparison of safety perception between foreign and local workers in the construction industry in Republic of Korea. *Safety and Health at Work, 9*(1), 53–58.

https://doi.org/10.1016/j.shaw.2017.07.002

Kumari, A., & Tiwari, M. (2026). Evolution of research on resource dependency theory: A bibliometric exploration of its correlation with the firm's performance. *Kybernetes, 55*(9), 4094–4122.

https://doi.org/10.1108/K-12-2024-3239

Loganathan, T., Rui, D., & Pocock, N. S. (2020). Healthcare for migrant workers in destination countries: A comparative qualitative study of China and Malaysia. *BMJ Open, 10*(12), Article e039800.

https://doi.org/10.1136/bmjopen-2020-039800

Massey, D. S., Arango, J., Hugo, G., Kouaouci, A., Pellegrino, A., & Taylor, J. E. (1993). Theories of international migration: A review and appraisal. *Population and Development Review, 19*(3), 431–466.

https://doi.org/10.2307/2938462

Mohd Fateh, M. A., Mohamed, M. R., & Omar, S. A. (2022). The involvement of local skilled labour in Malaysia's construction industry. *Frontiers in Built Environment, 8*, Article 861018.

https://doi.org/10.3389/fbuil.2022.861018

Pettit, T. J., Fiksel, J., & Croxton, K. L. (2010). Ensuring supply chain resilience: Development of a conceptual framework. *Journal of Business Logistics, 31*(1), 1–21.

https://doi.org/10.1002/j.2158-1592.2010.tb00125.x

Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: A resource dependence perspective*. Harper & Row.

Qiu, Y., & Sojourner, A. (2023). Labor-market concentration and labor compensation. *ILR Review, 76*(3), 475–503.

https://doi.org/10.1177/00197939221138759

Radio Televisyen Malaysia. (2023, January 18). *Permohonan RTK 2.0 dibuka semula 27 Januari ini*. Berita RTM. Accessed November 4, 2026. https://berita.rtm.gov.my/nasional/senarai-berita-nasional/senarai-artikel/permohonan-rtk-2-0-dibuka-semula-27-januari-ini/

Radio Televisyen Malaysia. (2025, January 11). *Imigresen nafi pelaksanaan program RTK 3.0*. Berita RTM. Accessed November 4, 2026. https://berita.rtm.gov.my/nasional/senarai-berita-nasional/senarai-artikel/imigresen-nafi-pelaksanaan-program-rtk-3-0/

Rajan, S. I., & Arcand, J.-L. (2023). COVID-19 return migration phenomena: Experiences from South and Southeast Asia. *Journal of Ethnic and Migration Studies, 49*(20), 5133–5152.

https://doi.org/10.1080/1369183X.2024.2268963

Rani, H. A., Farouk, A. M., Anandh, K. S., Almutairi, S., & Rahman, R. A. (2022). Impact of COVID-19 on construction projects: The case of India. *Buildings, 12*(6), Article 762.

https://doi.org/10.3390/buildings12060762

Rhoades, S. A. (1993). The Herfindahl-Hirschman index. *Federal Reserve Bulletin, 79*(3), 188-189. Accessed November 4, 2026. https://fraser.stlouisfed.org/files/docs/publications/FRB/pages/1990-1994/33101_1990-1994.pdf

Ruhs, M., & Chang, H.-J. (2004). The ethics of labor immigration policy. *International Organization, 58*(1), 69–102.

https://doi.org/10.1017/S0020818304581031

Ruhs, M., & Martin, P. (2008). Numbers vs. rights: Trade-offs and guest worker programs. *International Migration Review, 42*(1), 249–265.

https://doi.org/10.1111/j.1747-7379.2007.00120.x

Sha, H., & Khor, Y. (2024). Cross-border mobility, inequality and migration intermediaries: Labour migration from Nepal to Malaysia. *International Migration, 62*(2), 93–109.

https://doi.org/10.1111/imig.13232

Shehadeh, A., & Alshboul, O. (2025). Enhancing occupational safety in construction: Predictive analytics using advanced ensemble machine learning algorithms. *Engineering Applications of Artificial Intelligence, 159*, Article 111761.

https://doi.org/10.1016/j.engappai.2025.111761

Shivakoti, R. (2026). Preparedness and post-pandemic return to Nepal and the Philippines. *International Migration, 64*(4),

Article e70196.

https://doi.org/10.1111/imig.70196

Sofiah, A. (2024, October 15). Malaysia's CIDB launches system to improve management of foreign workers in the construction industry. *Human Resources Online*. Accessed November 4, 2026. https://www.humanresourcesonline.net/malaysia-s-cidb-launches-system-to-improve-management-of-foreign-workers-in-the-construction-industry

Spaan, E., & van Naerssen, T. (2018). Migration decision-making and migration industry in the Indonesia–Malaysia corridor. *Journal of Ethnic and Migration Studies, 44*(4), 680–695.

https://doi.org/10.1080/1369183X.2017.1315523

Subramaniam, C., Ismail, S., Durdyev, S., Wan Mohd Rani, W. N. M., Abu Bakar, N. F. S., & Banaitis, A. (2021). Overcoming the project communications management breakdown amongst foreign workers during the COVID-19 pandemic in biophilia inveigled construction projects in Malaysia. *Energies, 14*(16), Article 4790.

https://doi.org/10.3390/en14164790

Tan, C. K. L., & Abdul-Samad, Z. (2023). A study of the impact of COVID-19 on construction workforce productivity in Malaysia. *International Journal of Productivity and Performance Management, 72*(8), 2376–2396.

https://doi.org/10.1108/IJPPM-07-2021-0421

The Daily Star. (2024, April 1). *Malaysia's freeze on hiring foreign workers: Big blow for Bangladesh's aspiring migrant workers*. Accessed November 4, 2026. https://www.thedailystar.net/nrb/migration/news/malaysias-freeze-hiring-foreign-workers-big-blow-bangladeshs-aspiring-migrant-workers-3580026

Wahab, A., & Hamidi, M. (2022). COVID-19 pandemic and the changing views of mobility: The case of the Nepal–Malaysia migration corridor. *Comparative Migration Studies, 10*(1), Article 44.

https://doi.org/10.1186/s40878-022-00320-1

World Bank. (n.d.). *World Bank country and lending groups*. Retrieved September 25, 2026, from https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

Zaidun, N. H., Ayob, N. H., Aziz, M. A., & Samsuil Fuad, M. I. (2023). The practice of collaborative governance in Malaysia's foreign worker policy. *International Journal of Interdisciplinary Civic and Political Studies, 18*(2), 79–102.

https://doi.org/10.18848/2327-0071/CGP/v18i02/79-102

Appendix

A1. Supplementary methodological details

A1.1. Registry definitions and unit of count

Each figure is a count of foreign construction personnel holding an active Construction Industry Development Board (CIDB) registration in the reference year, not a count of registration transactions. The registration of foreign personnel is tied to a valid work permit, and the registration period for Temporary Employment Pass and Employment Pass holders is set by the expiry date of the permit (CIDB, n.d.). A worker whose registration is renewed can therefore appear in more than one annual table. The series measures the registered stock in each year; it does not follow individuals and cannot distinguish new entrants from continuing workers. Comparability across years rests on three features: all four years come from the same CIDB dataset, the same 11 categories are reported in every year, and in every year the categories sum exactly to the reported sector total. The residual category ensures that shares sum to the registry total but precludes the analysis of changes within it.

A1.2. Data collection and verification

Country counts and annual totals were supplied by CIDB as aggregate tables on the authors' request and entered into a country-by-year matrix. For each year, the 11 categories summed exactly to the reported sector total. Shares, growth rates, concentration ratios, and diversity measures were then calculated from the reconciled counts, and all formulas were recalculated independently in LibreOffice and Python (NumPy and SciPy). Values were rounded only after calculation; therefore, displayed percentages may differ slightly from values based on unrounded shares. Table 1 contains all the counts needed to reproduce the analysis. The study used aggregate statistics released by CIDB and involved no recruitment, intervention, contact with workers, or access to individual records; therefore, the procedures for participant consent and individual data protection did not apply.

A1.3. Analytical integrity

Each annual total was reconciled with the sum of its country components before any derived statistic was calculated, and an independent recalculation provided a second arithmetic check of the data. Using the complete denominator and comparing several concentration and diversity measures reduces the risk that a conclusion is an artifact of a single indicator. Arithmetic agreement cannot correct for incomplete coverage or changes in the CIDB administrative definitions. Therefore, the principal threats to validity arise from registry coverage, possible administrative changes, annual aggregation, and descriptive design.

A1.4. Summary of measures

Table A1 summarizes the question that each measure answers, what it adds to the others, and how it is read.

Table A1. Growth, concentration, and diversity measures used in the study

Measure	Question it answers	What it adds to the other measures	How it is read
Annual change and CAGR (two base years)	How fast did each origin grow?	Places origins of very different sizes on a common scale; the second base year tests sensitivity to the 2021 trough	Higher value means faster growth
Share of net increase	Where did these additional workers come from?	Links growth to its sources in numbers of workers	Percentage of the 2020–2023 net increase of 214,091
Country share and share change	How large is each origin relative to the annual total?	Shows the direction of change for each origin	Percentage of the annual total; change in percentage points
CR1 to CR4	How much do the largest one to four origins supply?	Simple and intuitive summary of the leading group	Higher means more concentrated; insensitive to shifts within the group
HHI and normalized HHI	How concentrated is the entire distribution?	Uses every category and can be decomposed into category contributions	909.1 (equal shares) to 10,000 (one origin); normalized form from 0 to 1
Effective number (10,000/HHI)	How many equal-sized origins would yield the same concentration?	Restates the HHI in an intuitive unit	Lower means fewer effective origins

(*Cont'd...*)

Table A1. (*Continued*)

Measure	Question it answers	What it adds to the other measures	How it is read
Shannon entropy, exp(H), and evenness	Do the results hold when smaller origins receive more weight?	Robustness check against the HHI's emphasis on large shares	Lower means a less diverse or less even distribution
Dissimilarity index (D)	How much did the distribution change between two comparison years?	Expresses change as the percentage of workers who would need to be in a different category	0 means an identical distribution
Proportional-growth counterfactual	How far did 2023 deviate from proportional growth?	Direct test of the proportional expansion benchmark, in numbers of workers	Every difference would be zero under proportional growth
Within-group HHI excluding Bangladesh	Did the remaining origins become more or less even?	Separates change among smaller corridors from the dominance of the largest	Lower means a more even distribution among the remaining origins

Note: The formulas are provided in Section 2.3. Abbreviations: CAGR: Compound annual growth rate; CR: Concentration ratio; HHI: Herfindahl–Hirschman index.

A2. Feasibility of the recommended actions

Table A2 presents, for each of the six actions recommended in Section 4.1, the parties that would implement it, its main requirements and constraints, and an indicative time frame.

Table A2. Feasibility of the recommended actions

Recommended action	Implementing parties	Requirements and constraints	Indicative timeframe
1. Annual publication of country shares and concentration indicators	CIDB; Ministry of Works; Ministry of Human Resources	Agreed release schedule and stable categories; uses aggregate counts already held, with no personal data	Short term (next annual release)
2. Linkage of registry counts to dated approval, entry, and regularization records	CIDB; Ministry of Home Affairs (Immigration Department); Ministry of Human Resources	Separate systems and identifiers; legal basis and safeguards for inter-agency data sharing; protection of personal records	Medium term, beginning with de-identified aggregate linkage
3. Review of corridor processes when concentration changes sharply	CIDB; Ministry of Human Resources; Immigration Department	Agreed indicators and review procedure; safeguard that a review does not operate as an automatic quota	Short to medium term
4. Feasibility assessment before any diversification	Ministry of Human Resources; Ministry of Home Affairs; sending-country governments	Bilateral negotiation; recruitment, consular, and skills-matching capacity in origin countries	Medium to long term
5. Contractor mapping of recruitment routes and lead times	Contractors; project owners; CIDB (industry guidance)	Planning effort, particularly for small contractors	Short term
6. Protection of safety, insurance, and labor standards	Department of Occupational Safety and Health; Labour Department; employers	Enforcement capacity; costs must not be shifted to workers	Continuous

Notes: The assessment is the authors' own and is indicative only. Short term means within one annual reporting cycle, medium term two to three years, and long term more than three years; continuous means an ongoing responsibility rather than a one-off reform. Abbreviation: CIDB: Construction Industry Development Board.