Associations Between Demographic and Socio-Economic Factors and Entrepreneurship in Brunei

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Abstract: This study explores how demographic and socio-economic factors are associated with entrepreneurship in Brunei, drawing on nationally representative data from the Labour Force Survey. Using self-employment as a proxy for entrepreneurial activity, the analysis identifies the key individual-level characteristics associated with entrepreneurship in Brunei. Binary and multinomial logistic regression models were employed to assess predictors such as gender, age, education level, and household income. The findings reveal patterns indicative of necessity-driven entrepreneurship, especially among those with lower incomes and limited education. These insights contribute to a broader understanding of inclusive entrepreneurial dynamics in a small, resource-dependent economy. The study provides evidence-based recommendations to inform future targeted and socially responsive policy interventions. It also underlines the importance of considering demographic and socio-economic differences in the framework of entrepreneurship policies to support broader and more inclusive participation.

Keywords: Entrepreneurship, Self-employment, Socio-economic Factors, Brunei, Inclusion.

1. Introduction

Entrepreneurship plays a key role in stimulating Brunei's economic growth and reducing its dependence on oil and gas. Over the past few years, various entrepreneurship policies and programs have been implemented to encourage participation in the private sector, create employment opportunities, and improve the economy (Siddiqui, 2012; Hamdan and Hoon, 2019; Shahlehi *et al.*, 2020). However, to ensure that the implemented initiatives reach under-represented groups and achieve a meaningful impact, it is important to understand who is likely to venture into entrepreneurship and the factors that drive their participation (Soomro *et al.*, 2019; Silva *et al.*, 2022). To date, only a limited number of studies have examined the characteristics of entrepreneurial participation in Brunei, particularly in identifying who engages in entrepreneurship and whether someone ventures into entrepreneurship out of necessity, such as unemployment or a lack of job options, or out of opportunity, such as seeing market potential or pursuing work freedom. Therefore, this study focuses on the demographic and socio-economic factors associated with participation in self-employment as an indicator of entrepreneurship.

This study uses data from the Brunei Labour Force Survey (LFS) 2020–2021 to examine the association between characteristics such as gender, age, education level, household income, and the likelihood of self-employment. It also assesses transitions in employment status, from paid employment, inactivity, or unemployment to self-employment, as a preliminary indication of whether entrepreneurship may be driven by necessity or opportunity, consistent with previous studies that use such transitions as a proxy for entrepreneurial motivation (Block and Sandner, 2009; Moulton and Scott, 2016). The LFS was selected for this study because it is a nationally representative large-scale data source and provides comprehensive data on the working-age population in Brunei, including self-employment indicators that are widely used in entrepreneurship research and are comparable to international labour force data (Audretsch, 2003; Grilo and Irigoyen, 2006), although the LFS does not directly measure entrepreneurship.

Although the data used do not indicate cause and effect or the actual motivation of individuals, this study indirectly infers the likelihood and patterns of entrepreneurship through analysis of demographic profiles and employment transitions. The analysis was conducted using binary and multinomial logistic regression. This study is part of PhD research that aims to provide insight into who participates in self-employment in Brunei and how these patterns can help understand entrepreneurship, supporting the formation of more inclusive and evidence-based policies.

2. Literature Review

Self-employment is frequently used as a proxy for entrepreneurship due to its consistent availability across national datasets despite its limitations in fully capturing entrepreneurial activity's complexity (Audretsch, 2003; Thurik *et al.*, 2008). While not all self-employed individuals can be considered entrepreneurs in a true sense, self-employment remains a useful proxy, as it encompasses a broad spectrum of both entrepreneurial and non-entrepreneurial activities. This includes individuals who build businesses offering innovative products or services, create value and novelty in the market, and compete to meet consumer needs. However, self-employment also includes less entrepreneurial forms of work, such as independent professionals or small-scale businesses that lack long-term planning or growth-oriented goals. Self-employed individuals often demonstrate key entrepreneurial traits, including opportunity recognition, risk-taking, and resource management (Schumpeter, 1934; Kirzner, 1973; Gartner, 1988; Shane and Venkataraman, 2000). Self-employment is a practical indicator which continues to be widely used in academic literature and national surveys, using similar definitions and available data (such as the Labour Force Survey) to ensure consistent comparisons between countries (Grilo and Irigoyen, 2006; OECD, 2017). Changes in self-employment status also provide insight into whether participation in entrepreneurship is driven by necessity (for example, due to unemployment) or by opportunity (for example, seeing market potential) (Block and Sandner, 2009; Margolis, 2014).

Various studies have shown that gender and age are key factors influencing participation in entrepreneurship. Men are generally more likely to become entrepreneurs than women, who often face additional constraints such as limited access to capital, family responsibilities, and widely accepted cultural expectations (Minniti and Nardone, 2007; Brush *et al.*, 2009; Powell and Eddleston, 2013; Hägg *et al.*, 2023). However, this gender gap is not universal and can vary depending on the socio-cultural context. When it comes to age, younger individuals often exhibit high entrepreneurial intentions (Aydin *et al.*, 2024), but they typically lack the resources or experience to act on these intentions. In contrast, middle-aged individuals tend to have stronger social networks and greater financial stability, increasing their likelihood of starting a business (Bönte *et al.*, 2009; Păunescu *et al.*, 2018).

Education and household income also play critical roles. Higher education is typically associated with opportunity-driven entrepreneurship, as it equips individuals with relevant skills and access to professional networks (Davidsson and Honig, 2003; Nasiri and Hamelin, 2018). On the other hand, those with lower education or income levels are more likely to engage in entrepreneurship as a necessity, often driven by barriers in the formal labour market, such as limited job availability and high education and skills requirements from employers (Thurik *et al.*, 2008; Fields, 2019). While the referenced studies are based on a range of countries, the underlying conceptual relationships, such as between education, income, and the different routes individuals take to become entrepreneurs, remain relevant for Brunei. These frameworks offer a basis for examining patterns in Brunei, where these relationships have not been investigated yet, to help evaluate the country's ongoing efforts to diversify its economy by promoting entrepreneurship. However, empirical studies examining the relationship between these factors and entrepreneurs in Brunei are limited. Several studies, such as those by Low *et al.* (2013) and Musa and Basir (2019) have examined aspects of entrepreneurship, but these studies are qualitative and focus more on individual motivation and challenges, without examining how individual socio-economic factors and household background, such as income, household size, and the occupation of the household head, may affect both participation in entrepreneurship and the type pursued.

Although this study focuses on individual-level factors, previous research has highlighted the importance of broader ecosystem support, including collaboration between government agencies, financial institutions, educational providers, and communities (Stam and Spigel, 2016). This structural dimension is not addressed in detail in this paper, as its analytical focus is on demographic and socio-economic factors using Labour Force Survey (LFS) data.

3. Data and Methods

3.1 Data Source and Sample

This study uses cross-sectional data from the 2020 and 2021 Brunei Labour Force Surveys (LFS). The LFS is a nationally representative survey collected annually, containing demographic and employment information. For LFS 2021, 7,242 respondents aged 15 years and above were included, with 5.5% identified as self-employed. To analyse changes in employment status, the 2020 and 2021 LFS data were matched at the individual level, as both years used the same household sample set due to COVID-19-related constraints that limited the implementation

of new sampling for the LFS in Brunei. Matching was performed using the pseudo-individual identifiers provided in the LFS dataset. This method allows a longitudinal analysis that resembles a panel, providing insights into employment transitions over time. 5,096 individuals (70.4%) were successfully matched: among them, 2.6% transitioned to self-employment from either paid employment or inactivity, 3.4% remained self-employed, and 0.3% transitioned from unemployed to self-employed.

3.2 Dependent Variables

Two main outcome variables are used. The first is a binary variable of self-employment, denoted as 1 for those self-employed. It refers to respondents who self-reported based on their primary employment status in 2021 as own-account workers, either working for themselves or running a business alone or in partnership without paid employees. Not self-employed, denoted as 0, includes employees, employers, domestic helpers, trainees, the unemployed, and those inactive in the labour force. The second variable is the transition between employment states, derived from the 2020 and 2021 LFS data, with cases matched to give changes in employment status over a one-year period. We group the transitions into four categories: paid employment or inactivity to self-employment, remaining self-employed, transition from unemployed to self-employment, and not self-employed in both years.

3.3 Independent Variables

The analysis started with a full set of demographic and socio-economic variables, including gender, age, residential status, education, religion, household income (from both 2020 and 2021 LFS data), other income, district, household size, participation in long-life learning, disability status, willingness to work more hours, and employment background of the household head. To obtain a parsimonious model, only the variables that remained significant after backwards stepwise selection were used in the binary and multinomial logistic regression models. However, the discussion in this paper focuses on only two main factors: education level and household income.

3.4 Analytical Methods

This study used binary logistic regression and multinomial logistic regression. The binary logistic model assesses factors associated with self-employment status in 2021 as the dependent variable is dichotomous (self-employed vs. not self-employed). Multinomial logistic models were used to analyse changes in employment status between 2020 and 2021 for individuals successfully matched in both years. This method was used because it allows comparisons across four transition categories (see section 3.2). However, given the small sample sizes for some categories, they were re-categorised into larger groups to ensure the stability of the estimates.

4. Results

4.1 Associations With Self-employment

All estimates presented are based on regression models that also control for additional variables (see Section 3.3). The findings show that education and household income are significantly associated with the likelihood of self-employment. Individuals with low education (compared to those with secondary education) were more than twice as likely to be self-employed. Similarly, those in the lowest household income group have a 2.4 times higher likelihood of being self-employed than those in the highest income group. Figure 1 shows a forest plot that displays the estimated odds ratios for the main variables discussed here (education and household income) after controlling for other variables in the regression model.

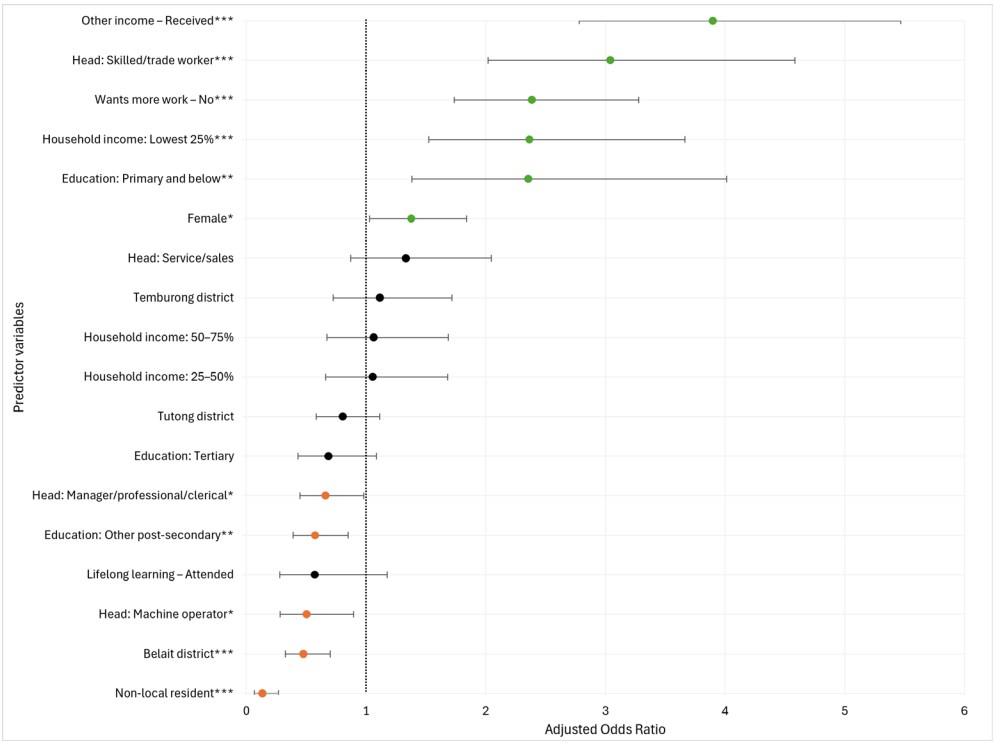

Figure 1: Forest plot of adjusted odds ratios from the full logistic regression model predicting the likelihood of self-employment, based on the 2021 Brunei Labour Force Survey (N = 7,242).

Note: The plot shows adjusted odds ratios (ORs) with 95% confidence intervals. An OR > 1 indicates a higher likelihood of self-employment for a person with that characteristic; an OR < 1 indicates a lower likelihood. Green dots represent statistically significant positive associations, orange dots represent significant negative associations, and black dots are non-significant. Asterisks denote statistical significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The dashed line at OR = 1 marks no association.

4.2 Associations With Transitions to Self-employment

Individuals with lower educational levels were most likely to transition from paid or inactive work to self-employment, with a predicted probability of approximately 6%. In contrast, those with tertiary education were the least likely to transition to self-employment. These differences were statistically significant, particularly between the primary and tertiary groups ($p < 0.001$) and between the secondary and tertiary groups ($p < 0.01$), suggesting that education affects the likelihood of becoming self-employed (Figure 2).

However, the pattern was different when using odds ratios. Individuals with low education had a 99% lower chance of transitioning to self-employment than those with secondary education (OR = 0.010) (Table 1). On the other hand, those with tertiary education were 2.45 times more likely than the reference group, despite having the lowest predicted probability. Thus, the two approaches offer different but complementary perspectives for interpreting the relationship between education and the likelihood of becoming self-employed. While predicted probabilities are estimated by averaging the distribution of other variables in the sample, the odds ratios reflect a relative comparison with the reference group, holding all other variables constant.

In terms of household income, individuals in the lowest 25% income group had the highest predicted probability of remaining self-employed at around 12%, compared to only 5% in the highest income group. This difference was statistically significant ($p < 0.01$), indicating that low-income individuals were more likely to remain self-employed. This odds ratio also supported this finding, where individuals in the lowest 25% group were nearly 10 times more likely to remain self-employed compared to those in the highest income group (OR = 9.585, $p < 0.01$). Meanwhile, for the transition from unemployment to self-employment, individuals in the 50% to 75% income group had twice the chance of becoming self-employed compared to those in the highest income group (OR = 2.00, $p < 0.01$).

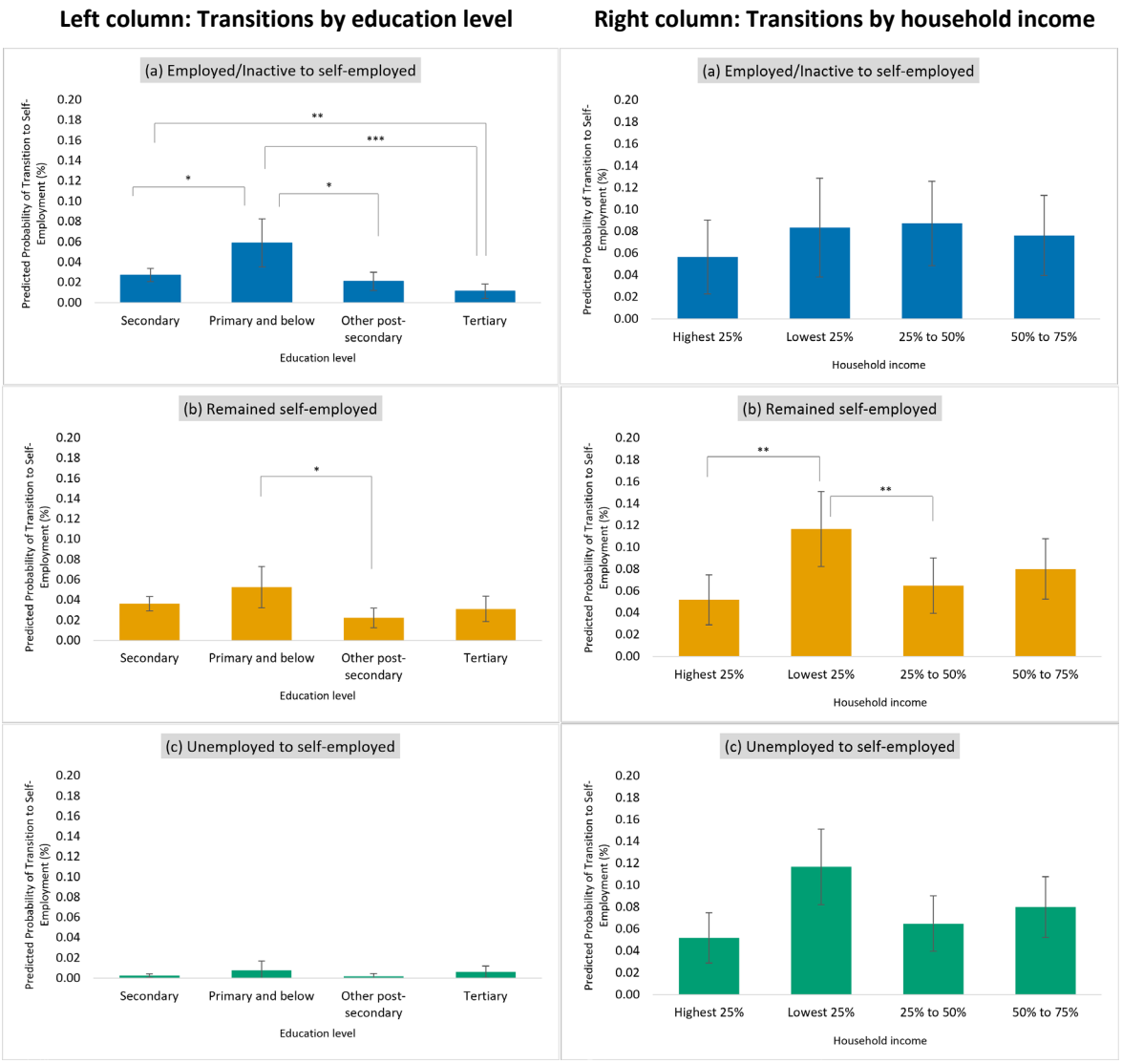

Figure 2: Bar chart showing the predicted probabilities of self-employment transitions by education level and household income group across three transition types: (a) employed/inactive to self-employed, (b) remain self-employed, and (c) unemployed to self-employed.

Note: Estimated marginal mean probabilities were estimated from the fitted multinomial logistic regression model and were computed using the emmeans package in R (Hou *et al.*, 2021; Gabrio *et al.*, 2022). All estimates were calculated by averaging over the observed distribution of the covariates in the dataset, such that the effects of other variables were held constant at their observed proportions in the sample. Error bars represent 95% confidence intervals. Asterisks and horizontal lines above the bars indicate statistically significant pairwise differences between groups, based on comparisons of estimated marginal means. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 1: Multinomial logistic regression results: Odds of transitioning to self-employment by education level and household income group across three transition types.

Explanatory variables	Coefficient (B)	S.E.	p-value	Exp(B) / OR	Coefficient (B)	S.E.	p-value	Exp(B) / OR	Coefficient (B)	S.E.	p-value	Exp(B) / OR
Not self-employed (Base outcome)	Employed/Inactive to self-employed				Remain self-employed				Unemployed to self-employed			

Explanatory variables	Coefficient (B)	S.E.	p-value	Exp(B) / OR	Coefficient (B)	S.E.	p-value	Exp(B) / OR	Coefficient (B)	S.E.	p-value	Exp(B) / OR
Education												
Primary and below	-4.623***	0.286	<0.001	0.010	1.64***	0.180	<0.001	5.154	0.342	0.240	0.155	1.407
Other post-secondary	-6.732***	0.898	<0.001	0.001	1.146	0.595	0.054	3.143	-0.755	0.684	0.270	0.470
Tertiary	0.898***	0.252	<0.001	2.453	0.669*	0.307	0.029	1.952	-1.139*	0.534	0.033	0.320
Secondary (ref)												
Explanatory variables	**Coefficient (B)**	**S.E.**	**p-value**	**Exp(B) / OR**	**Coefficient (B)**	**S.E.**	**p-value**	**Exp(B) / OR**	**Coefficient (B)**	**S.E.**	**p-value**	**Exp(B) / OR**
Not self-employed (Base outcome)	Employed/Inactive to self-employed				Remain self-employed				Unemployed to self-employed			
Household income												
Lowest 25% income group	1.240	0.712	0.081	3.454	2.261**	0.852	0.008	9.585	-0.391	1.063	0.713	0.676
25% to 50% income group	-0.302	0.256	0.238	0.740	0.567	0.303	0.061	1.762	-0.629**	0.214	0.003	0.533
50% to 75% income group	-0.549*	0.253	0.030	0.578	0.339	0.280	0.227	1.402	0.695***	0.202	0.001	2.002
Top 25% income group (ref)												

Note: Asterisks denote significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5. Discussion

5.1 Education and Self-employment in Brunei

The findings demonstrate that individuals with low education are more likely to be self-employed than those with higher education. This pattern aligns with the limited access to formal employment among those with low education in Brunei, as raised by Roberts (2011) and OECD and ERIA (2018). In this context, self-employment is seen more as a response to formal labour market constraints than as an indicator of innovative entrepreneurship. This interpretation is further supported by national statistics, which indicate that 61.1% of the total unemployed in Brunei in 2021 had only secondary education or less (Department of Economic Planning and Statistics, 2021). Such patterns are also consistent with international findings linking self-employment among the less educated to survival-driven motives (Poschke, 2013; Low and Sajnani, 2015; Varghese and George, 2015).

However, the tendency to remain self-employed suggests that it constitutes a major source of income for some groups. Remaining in self-employment may reflect various realities, whether as a survival strategy or a successful venture. This study did not assess the business performance or outcomes. However, staying in self-employment,

particularly among individuals with lower education, often reflects the need to continue earning an income, given the limited options in the formal labour market. Even in small businesses and the informal sector, the ability to remain self-employed has been reported in countries such as Oman, where less-educated individuals continue to be active in the skilled and service sectors (Al Shukaili *et al.*, 2022).

Interestingly, although higher education did not significantly affect the likelihood of being self-employed, the results demonstrated that individuals transitioning from paid employment or inactivity to self-employment were more likely to have a higher level of education. This does not prove causality but suggests that some highly educated individuals may consider self-employment as an alternative career option, especially when the job market changes. This finding is consistent with the argument that high human capital can catalyse entrepreneurial actions when the right opportunity exists (Thurik *et al.*, 2008; Zhang *et al.*, 2022).

5.2 Household Income and Self-employment in Brunei

The findings demonstrate that individuals from low-income households are more likely to be self-employed than those from higher-income groups. This pattern seems to illustrate the role of self-employment as a response to economic stress, which aligns with findings linking necessity-based entrepreneurship among vulnerable groups (Poschke, 2013; Low and Sajnani, 2015). For additional context, household survey data indicate that from 2005 to 2015/16, monthly expenditure and income for the lowest 10% of households increased by an average of 6.7% and 8.4% per year, respectively, while inflation remained relatively low at approximately 5% (Department of Economic Planning and Statistics, 2019; International Monetary Fund, 2025). This suggests real growth in income and spending. Nevertheless, many low-income households still face challenges in meeting basic needs, as indicated by recent studies on poverty and material deprivation in Brunei (Arifin *et al.*, 2024), and thus in this context, self-employment may be a way for some individuals to supplement their income or overcome financial constraints. In this context, self-employment can serve as a means for some individuals to supplement their income or manage financial constraints. Although the expenditure and income data refer to an earlier period, they provide useful background for understanding the longer-term financial conditions faced by low-income households in Brunei.

In addition, this study found that individuals transitioning from unemployment to self-employment were more likely to be from middle-income households (in the third income quartile) based on household income measured before the employment transition. This suggests that a household's financial position, including access to savings, assets, or moral support, may influence a person's ability to realise entrepreneurial aspirations (Hundley, 2006; Molina, 2020).

6. Related Policy Impacts

The findings indicate that low-income and less-educated individuals are more likely to be self-employed, possibly because they are better equipped to overcome financial constraints. While Brunei already provides training and microfinancing initiatives, these may not effectively reach those operating informally or from home-based businesses. Hence, there is a need for more inclusive and accessible programmes that prioritise ease of entry, continuous support, and better outreach to vulnerable groups. For instance, Malaysia's Micro Financing Scheme and eUsahawan initiative (Ridzuan *et al.*, 2020) target underserved groups with digital skills and microloans, while Oman's business development centres offer ongoing mentorship and training for small entrepreneurs (Khan and Almoharby, 2007). These examples demonstrate how entrepreneurship policies can be structured to reach vulnerable groups more effectively, an approach that could be adapted to Brunei's context to better support necessity-driven entrepreneurs. At the same time, the study also found that highly educated individuals, especially those transitioning from employment or inactivity, were also more likely to become self-employed. This suggests that entrepreneurship policies in Brunei should also support opportunity-driven entrepreneurs by promoting innovation, mentorship, and high-growth options.

7. Limitations and Suggestions for Further Research

This study uses two cross-sectional sets of Labour Force Survey (LFS) data for 2020 and 2021, which are linked at the individual level, allowing for a limited longitudinal analysis of employment status transitions. However, the corresponding sample size was limited, and the observational study design allowed for association, not causal, interpretations. A one-year observation period limits our ability to identify long-term patterns or the sustainability of self-employment. Findings based on the 2020–2021 LFS data may also reflect entrepreneurial patterns influenced by the COVID-19 pandemic phase, as well as the initial economic adjustment. Therefore,

future studies should consider using longitudinal data over a longer period to determine the direction of these relationships more accurately.

Another limitation is the use of self-employment as a proxy for entrepreneurship, which may not fully capture the multidimensional nature of entrepreneurial activities.

Additionally, this study did not directly measure the actual motivation of individuals to be self-employed. The interpretation of necessity-based and opportunity-based entrepreneurship is inferred from respondents' socio-economic backgrounds and observed employment transitions. Future studies should incorporate direct measures in the questionnaires or interviews to identify the reasons for choosing self-employment.

8. Conclusions

This study demonstrates that educational level and household income are associated with the tendency to be self-employed in Brunei. Individuals with low educational attainment and those from low-income households are more likely to be self-employed. Simultaneously, individuals with higher education are more likely to transition from paid employment or inactivity to self-employment. Although this study does not establish causality or directly measure motivation, the observed patterns align with findings from previous research that individuals with fewer resources often pursue self-employment out of necessity. In contrast, those with higher skills and qualifications may consider it a strategic or flexible career choice.

This study provides indicative evidence of two distinct self-employment pathways that may warrant different policy responses. Individuals from low-income and less-educated households are more likely to enter and remain self-employed, which may suggest a pattern driven by necessity. In contrast, those with higher education are more likely to transition into self-employment from paid work or inactivity, which may reflect opportunity-driven entrepreneurship. However, the analysis is based on cross-sectional data over a short period and does not capture the underlying motivations behind these patterns. It is also possible that other factors, such as personal preference, flexibility, or informal work norms, may influence these outcomes. Therefore, while the findings suggest potential directions for inclusive and targeted support, further studies using longitudinal and qualitative data are needed better to understand the drivers and nature of self-employment in Brunei.

Ethics Declaration

Ethical approval was obtained from the University of Southampton Research Ethics Committee (ERGO/103771). The study used anonymised secondary data from Brunei's national statistics agency, with no personal identifiers involved.

AI Declaration

No generative AI tools were used to create content or analyse data.

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