

Entrepreneurship Support Programmes and Business Growth in Brunei

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Abstract: Brunei has introduced various entrepreneurship support programmes to support economic diversification efforts and reduce unemployment. However, few empirical studies have explored the relationship between programme participation and business performance. This study investigates whether micro, small, and medium enterprises (MSMEs) that participated in at least one entrepreneurship programme between 2016 and 2024 achieved higher revenue and employment growth than non-participating businesses. We use MSMEs as a proxy for entrepreneurial activity because of their role in new business creation, employment growth, and income generation. We collected data through a survey of registered MSMEs in Brunei, including information on business characteristics, participation in entrepreneurship support programmes during 2016–2024, and changes in revenue and employment over the same period. We applied quasi-experimental Propensity Score Matching (PSM) approach to match programme participants with similar non-participants based on business sector, size, age, and prior performance. We estimated the average treatment effect on the treated (ATT) group for revenue and employment growth. After matching, we found that programme participation was not significantly associated with higher revenue or employment growth. This study adds to the literature on entrepreneurship support programmes by providing evidence from Brunei and providing a basis for policymakers to evaluate and improve future entrepreneurship programme designs.

Keywords: Brunei, Entrepreneurship, Programme Evaluation, MSMEs, Propensity Score Matching, Revenue and Employment Growth

1. Introduction

Entrepreneurship support programmes comprise different activities, such as training, financial assistance, and market access. However, it remains unclear to what extent these programmes are associated with improved business performance, particularly revenue and employment. Research evidence is inconsistent, with some studies reporting that programmes significantly increase sales or revenue, while many others find limited or insignificant effects (McKenzie and Woodruff, 2014). Additionally, some studies face methodological limitations, such as small sample sizes, short evaluation periods, and attrition, which limit conclusions about programme effectiveness (McKenzie and Woodruff, 2014). Studies also suggest that entrepreneurship programmes affect businesses through several mechanisms or intermediaries, however these effects do not always directly increase revenue or employment (El Shoubaki, Laguir and Den Besten, 2020). In Brunei, the government has introduced various entrepreneurship support programmes as part of broader efforts to diversify the economy, encourage private sector development, and reduce unemployment (YEC, 2023). However, there is limited empirical evidence linking participation in entrepreneurship programmes to business performance. Therefore, this study examines whether MSMEs participating in support programmes differ in revenue and employment between 2016 and 2024 compared with those that did not. MSMEs are used as proxies for entrepreneurial activity because of their role in new business creation, employment growth, and income generation (OECD, 2010).

Data were collected from registered MSMEs in Brunei through an online survey that retrospectively captured information on key business characteristics, revenue, and employment for the reference years 2016 and 2024. A total of 727 completed responses were retained for analysis. The analysis employs Propensity Score Matching (PSM) to pair programme participants with non-participants sharing similar characteristics, such as business sector, size, ownership type, and baseline performance (measured by revenue and employment). While this approach mitigates selection bias in observational data, the findings' estimates should be interpreted as associations rather than direct causal effects. This study contributes empirical evidence on the association between participation in entrepreneurship support programmes and business performance outcomes in Brunei. Beyond that, it also demonstrates a feasible evaluation approach applicable in contexts with limited data, drawing on balanced group comparisons. This study is part of a broader PhD project aimed at understanding and measuring entrepreneurship in Brunei, with findings intended to support evidence-based entrepreneurship policy.

2. Literature Review

Various types of support programmes are implemented by governments and development agencies to address constraints such as a lack of capital, skills, facilities, and market access (Ruozzi and Vicente, 2021). These constraints are similarly reflected in the Entrepreneurial Framework Conditions (EFC), a conceptual framework developed by the Global Entrepreneurship Monitor (GEM) that defines the systematic factors shaping entrepreneurial activity. According to EFC, these factors include financing, training and education, infrastructure, government policies, and market access (Acs, Szerb and Autio, 2015). Collectively, such conditions shape entrepreneurship outcomes and performance, including business revenue growth and employment generation. In this study, however, the EFC is not employed to model or test the causal relationships between these conditions and business performance; rather, it serves as an organising framework for categorising different types of entrepreneurial support available within Brunei's business ecosystem.

Among various entrepreneurship programmes implemented, financial assistance is one of the most widely studied. Such support helps to reduce credit constraints, enables business expansion, and promotes sales growth, particularly for enterprises facing early-stage financial barriers (Beck, Demirgüç-Kunt and Maksimovic, 2005). Financial assistance is more closely associated with improved business performance, as it enables investment in inventory, equipment and labour (De Mel, McKenzie and Woodruff, 2008; Banerjee and Duflo, 2014). Another form of support is training and capacity building, typically implemented to improve entrepreneurs' knowledge, skills, and management capabilities. Yet, unlike financial assistance, empirical evidence more commonly links training to improvements in business knowledge and practices, while evidence on revenue or employment growth tends to be more mixed and less consistent (Drexler, Fischer and Schoar, 2014). Dvoulety (2020) argues that knowledge must first change business behaviour before it can increase measurable economic impact. Meanwhile, other forms of support, such as physical infrastructure development and market access facilitation, provide businesses with resources, broader networks, and commercial opportunities. Nonetheless, their effects do not automatically translate into business growth as infrastructure mainly enables productive activities, while market access increases sales only if firms are able to exploit new opportunities effectively (Fox and Porca, 2001; Arráiz, Henríquez and Stucchi, 2013). These differences suggest that entrepreneurship support programmes operate through varying mechanisms and may affect immediate and intermediate outcomes differently, depending on the type of support and context in which it is applied.

This heterogeneity in programme effects is consistent with established theoretical perspectives, including Human Capital Theory and the Resource-Based View (RBV), both of which emphasise that resources, skills, and access create value only when applied effectively within a business context (Barney, 1991; Henry, 2013). For instance, financial interventions are more likely to increase revenue and employment when businesses possess the capacity to expand (De Mel, McKenzie and Woodruff, 2008; Banerjee and Duflo, 2014). By contrast, training programmes tend to produce capacity building outcomes, such as enhanced knowledge, increased confidence, and improved management practices, rather than immediate economic returns (Drexler, Fischer and Schoar, 2014). Against this backdrop, this study focuses on how programme participation relates to revenue growth and employment, two widely used indicators of business development. These indicators are favoured in the literature because they are consistently observable across business contexts and serve as reliable proxies for economic expansion and job creation (Delmar, 2019). However, despite the growing policy emphasis on entrepreneurship in Brunei, limited empirical evidence exists to assess how entrepreneurship support programmes relate to MSME business performance. This study addresses this gap by examining revenue and employment growth among participating and non-participating businesses.

3. Data and Methods

3.1 Data Source and Sample

This study employed an online survey to collect data on MSMEs in Brunei registered with the Registry of Companies and Business Names (ROCBN). The sampling frame was drawn from the Department of Statistics and Economics (DEPS) business databases in Brunei, from which 3,048 MSMEs with active email addresses were identified as eligible for inclusion. DEPS subsequently distributed the questionnaire link to these businesses via email. To ensure comparability across time, MSMEs were required to have a record of operations in 2016 and to remain active in 2025. These eligibility criteria enabled a longitudinal comparison of business performance across two reference points. A total of 727 complete responses were obtained, yielding a response rate of 23.9%, which is considered acceptable for an online survey targeting MSMEs (Fosnacht *et al.*, 2017).

The survey collected data on business characteristics, operational status, business sector, and participation in entrepreneurship programmes between 2016 and 2024. To enable a comparison of changes in business performance over time, respondents were asked to report their business revenue and employment at two reference points. The year 2016 served as the base year, which also marked the start of entrepreneurship initiatives in Brunei, including the establishment of the Darussalam Enterprise (Khalid and Jetin, 2025), while 2024 represents the most recent reference period for business activity. All respondents were business owners or managers with direct knowledge of their business operations. The invitation letter also informed respondents that information on business performance and programme participation would be required to allow advance preparation. This retrospective cross-sectional design was adopted as a practical alternative to panel data, given the time and resource constraints of the study (Caruana *et al.*, 2015) and the absence of secondary data linking programme participation to business performance outcomes in Brunei.

3.2 Dependent Variables

This study measures business performance using two dependent variables: change in revenue and change in employment between 2016 and 2024. Both variables were operationalised as binary, with 1 indicating growth and 0 indicating no change or a decrease. Specifically, a business was classified as growing if the reported revenue or employment level in 2024 exceeded the corresponding figure for 2016.

Data on business performance were derived from respondents' self-reported information for both reference years. Respondents reported their revenue and employment performance levels within pre-defined categories at each time point, and these responses were used to determine the direction of change. Businesses were subsequently classified into two groups, either growing or non-growing, based on the observed direction of change between the two periods. This study did not use continuous growth measurements, as they typically require complete, consistent, and accurately recorded data for more than two points in time, which is often a challenge in MSME studies that rely on retrospective or self-reported data (Awartani and Millis, 2018). Although the binary approach does not capture the magnitude of growth, it minimises reliance on precise growth estimates, which are particularly susceptible to retrospective recall bias reporting errors.

3.3 Independent Variables

In this study, four types of entrepreneurship programmes within the Youth Entrepreneurship Committees (YEC, 2023) ecosystem were analysed: entrepreneurship development and business support (A2), financial assistance (A3), infrastructure and facility support (A4), and market access and business opportunities (A5). Programme participation was measured as a binary indicator of whether respondents had joined any programme between 2016 and 2024. These programme categories were selected based on the Entrepreneurial Framework Conditions (EFC), which were used in this study as an organising framework for categorising different forms of entrepreneurial support within Brunei's business ecosystem. Programme participation was measured as a binary indicator of whether respondents had participated in any programme between 2016 and 2024. Two forms of participation variables were constructed for separate analyses: (i) overall participation in at least one programme, and (ii) participation by specific programme category (A2–A5).

The first analysis adopted an overall approach, comparing businesses that participated in at least one programme with those that did not participate in any. This enabled an overall assessment of the relationship between programme participation and business growth outcomes, without considering specific programme types. The second analysis employed a programme-specific approach, disaggregating participation by programme type to examine whether the relationship between participation and growth outcomes varied across different programme types. For each programme (A2, A3, A4, and A5), participants were compared with non-participants and with participants in other programme combinations, including those who enrolled exclusively in that programme type. It was not possible to isolate exclusive participants entirely, as MSMEs could enrol in more than one programme simultaneously. These two analyses enabled both general and programme-specific evaluations of the associations between programme participation and business growth, as aggregated or overall analyses may obscure programme-specific effects (Meager, 2019). The use of both aggregated and category-specific variables is also consistent with prior research assessing business-level programme effects (Radicic *et al.*, 2019).

Several pre-treatment business covariates were included in the propensity score model. These include 2016 business revenue, employment, business age, sector, ownership structure and ownership gender. These covariates were selected based on theoretical relevance, empirical evidence, and their suitability for collection

through an online MSME survey, as they are expected to influence both the likelihood of programme participation and business growth (Mori, 2015). Where necessary, covariates were grouped into broad categories to address small cell size issue and improve the model stability.

3.4 Analytical Methods

PSM was chosen because programme participation was not randomly assigned; businesses that chose to participate may differ from those that did not (Rosenbaum and Rubin, 1983). By matching treatment (businesses that participated in the programme) and control (businesses that did not participate in the programme) groups on observed pre-treatment characteristics, PSM created more comparable groups for analysis, thereby reducing the influence of observable selection bias.

The propensity score is the probability that a business participates in the programme, given the observed pre-treatment covariates. In this study, the propensity score was estimated using binary logistic regression, with covariates such as baseline revenue and employment in 2016, firm age, sector, ownership, and the owner's gender. The PSM approach relies on two key assumptions: conditional independence that conditional on observed covariates, participation is independent of potential outcomes and overlap (common support), which ensures that matched businesses share a comparable range of propensity scores (Rosenbaum and Rubin, 1983). These assumptions allow for valid comparisons between businesses with similar baseline characteristics. It is acknowledged, however, that PSM cannot account for unobserved confounders (Austin, 2011); accordingly, the findings are interpreted as conditional associations based on observed covariates, rather than direct causal effects.

To implement PSM, nearest-neighbour matching (NNM) with replacement was applied, whereby each treated business was matched to the control group with the closest propensity score, using one nearest neighbour ($k=1$) (Rosenbaum and Rubin, 1985). Following matching, covariate balance between the treatment and control groups was assessed using the standardised mean difference (SMD) for each variable included in the propensity score model (Austin, 2009). SMD below 0.1 are generally considered indicative of adequate covariate balance (Austin, 2009). The Average Treatment Effect on the Treated (ATT) was then estimated by comparing outcomes between matched treatment and control businesses, representing the average difference in growth outcomes between programme participants and their matched counterfactual non-participants. All PSM analyses were conducted using R software (R Core Team, 2024).

4. Results

4.1 Descriptive Statistics and Balance Assessment

Of the 727 businesses, almost half (49.9%) participated in at least one entrepreneurial support programme, with the highest participation in the market access and business opportunities programmes (A5), followed by entrepreneurship and business support programmes (A2), and financial assistance (A3). A higher proportion of participants reported low or no revenue in 2016 compared with non-participants, suggesting a tendency for earlier-stage businesses to engage with support programmes. Although revenue and employment growth were higher among participants than non-participants, the two groups differed in their pre-programmed business characteristics (**Table 1**). To account for these pre-existing differences, PSM was applied to construct a more balanced comparison group, as described in Section 3.4.

Table 1: Selected business profiles prior to PSM analyses

Variable	Non-participants (%)	Participants (%)
Low/no revenue (2016)	23.6	32.5
Joint ownership	21.7	32.0
Revenue growth	50.8	60.3
Employment growth	41.2	54.3

Participants were matched with non-participants based on their observed pre-treatment business characteristics to enable comparisons between more similar groups. **Figure 1** presents the SMD before and after matching for three models: overall programme participation, financial assistance (A3) and market access (A5). Overall, the matching procedure improved covariate balance across all their models, with most SMDs falling

below the conventional threshold of 0.10. The financial assistance model (A3) achieved an adequate balance after matching, while the market access model (A5) showed some imbalance across several covariates, particularly business type, ownership, revenue, and employment. These results indicate that the degree of balance achieved varies by programme type.

4.2 Associations Between Overall Programme Participation and Business Growth

Error! Reference source not found. presents the ATT estimates for the overall programme participation. Overall programme participation was not significantly associated with either revenue or employment growth after matching on observed baseline characteristics.

Table 2: Associations between programme participation and business growth after PSM

Outcome	OR	95% CI	p-value	AME (pp)	6895% CI	p-value
Revenue growth	1.07	(0.74, 1.54)	0.711	1.68	(-7.21, 10.57)	0.711
Employment growth	1.13	(0.79, 1.62)	0.503	3.08	(-5.94, 12.10)	0.503

Note: OR = Odds Ratio; CI = Confidence Interval; AME = Average Marginal Effect expressed in percentage points (pp). Estimates are based on the matched ATT. A total of 357 participating firms were matched to 177 non-participating businesses.

4.3 Programme-Specific Associations with Business Growth

The programme-specific analysis shows that the association between programme participation and business growth varied by programme type, as presented in Error! Reference source not found.. Financial assistance (A3) showed the strongest association with business outcomes. Compared with non-participants, A3 participants had a 30.9 pp higher probability of revenue growth and a 28.8 pp higher probability of employment growth. When compared with participants in other programmes, A3 participants still showed higher probabilities of revenue growth (19.6 pp) and employment growth (13.3 pp). All A3 estimates were statistically significant.

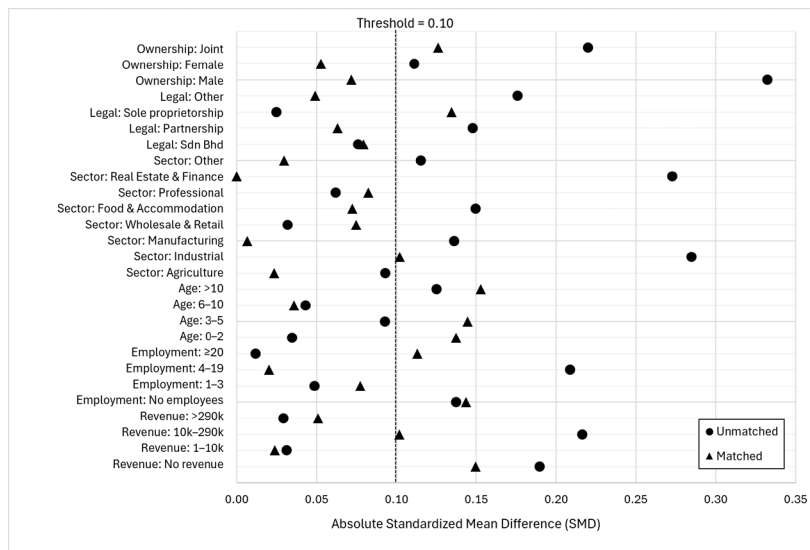
The market access and business opportunities programme (A5) showed a more modest pattern of association. Compared with non-participants, A5 participants had a 10.0 pp higher probability of employment growth, a statistically significant result. However, no significant association was found between revenue growth and non-participants. Neither comparison against other programme participants reached statistical significance for either outcome. Programmes A2 and A4 showed no statistically significant associations with either revenue or employment growth.

Table 3: Programme-specific associations with business growth in the matched sample

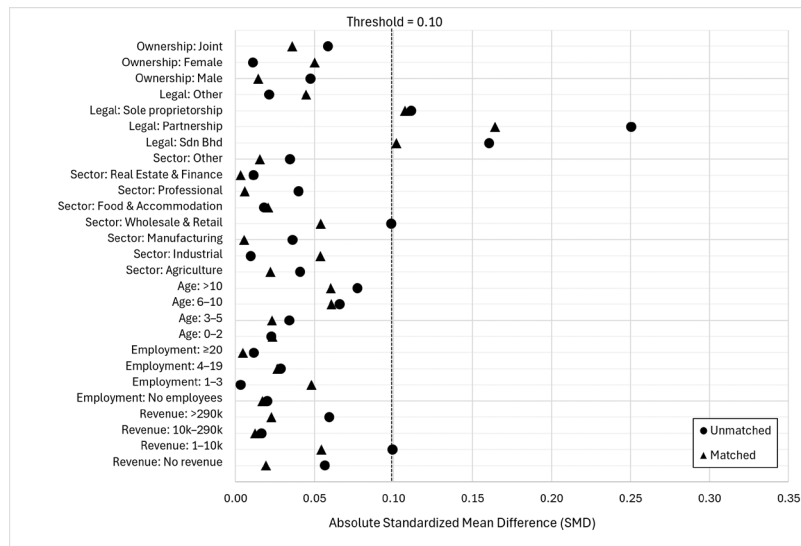
Outcome	Comparison	ATT (pp)	95% CI	p-value
Revenue growth	A3 vs No programme participation	0.309***	(0.231, 0.386)	<0.001
	A3 vs Other programme participation	0.196***	(0.122, 0.271)	<0.001
	A5 vs No programme participation	0.076	(-0.002, 0.154)	0.056
	A5 vs Other programme participation	0.035	(-0.050, 0.119)	0.421
Employment growth	A3 vs No programme participation	0.288***	(0.206, 0.369)	<0.001
	A3 vs Other programme participation	0.133***	(0.055, 0.211)	<0.001
	A5 vs No programme participation	0.100*	(0.020, 0.181)	0.015
	A5 vs Other programme participation	0.028	(-0.057, 0.113)	0.523

Note: ATT = Average Treatment Effect on the Treated. ATT estimates are expressed as percentage-point (pp) differences in outcome probabilities between matched groups. Results for A2 and A4 are not presented as neither programme showed statistically significant associations. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

(a) Overall programme participation



(b) Financial assistance programme (A3)



(c) Market access programme (A5)

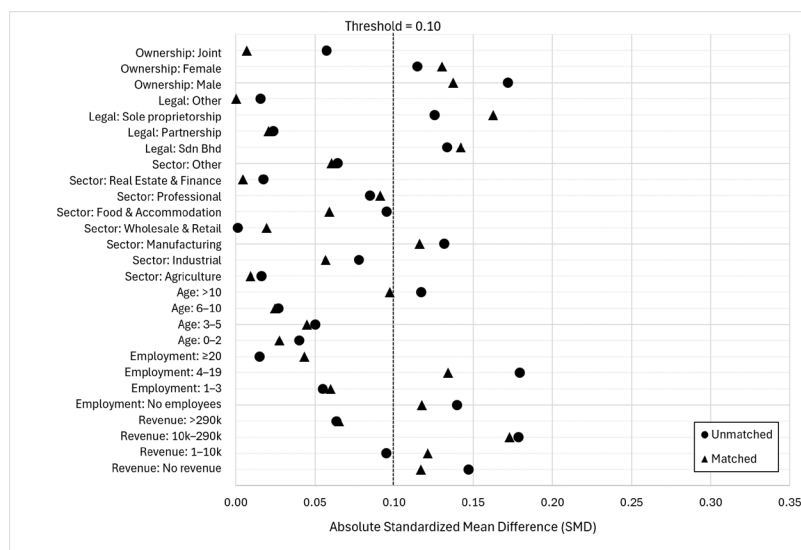


Figure 1: Standardised Mean Differences (SMD) before and after matching for the three matching models.

5. Discussion

5.1 Programme Participation in at Least one Entrepreneurship Programme and Business Growth Outcomes

The study's findings show that participation in at least one entrepreneurship programme is not significantly associated with business revenue or employment growth. Entrepreneurship programmes in Brunei offer various forms of support, such as training, coaching, mentorship, financial assistance, and capacity building, tailored to entrepreneurs with different business needs (YEC, 2023). Some programmes develop basic business skills, especially for early-stage entrepreneurs, while others empower specific groups, such as women and low-income households. These differences in objectives, targets, and approaches suggest that the programme's impact may not be uniform. In this study, participation is measured only by whether a business joined at least one programme, without accounting for programme type or intensity. Therefore, combining all programmes into a single measure may mask differences in each programme's impact. This aligns with the literature, which shows that the effects of entrepreneurship programmes often vary by programme type, objectives, and context (Grimm and Paffhausen, 2014; Meager, 2019). The absence of a significant relationship does not mean that all programmes are ineffective, but it may reflect offsetting effects. This study did not directly test for offsetting effects; this interpretation is based on the non-significant result for programme participation and the possibility of varied programme effects. The programme-specific analyses reported below provide further insight into this aggregate finding.

5.2 The Role of Financial Assistance in Business Growth

The financial assistance programme (A3) was the only programme to show a relationship with the probability of growth in both business revenue and employment, compared with non-participants and participants in other programmes. This pattern suggests that different forms of entrepreneurship support may relate differently to business growth, particularly when support is provided through direct financial assistance. Financial assistance enables businesses to use additional capital directly for operational expansion, investment, and capacity increases. In contrast to training-based or capacity-building programmes, financial support may translate more quickly into business growth because it does not necessarily depend on prior behavioural or skill changes. This finding is consistent with previous research showing that capital support can increase investment and performance in small enterprises under certain circumstances (De Mel, McKenzie and Woodruff, 2008).

5.3 Market Access Support and Business Growth Outcomes

Participating businesses in market access programmes (A5) are more likely to experience employment growth than non-participants, while no statistically significant relationship was observed for revenue growth. This pattern suggests that market access programmes operate differently from financial assistance, as supports such as business matching, market exposure, and business network building are more likely to influence operational activities and business opportunities first, rather than directly increasing revenue. In these circumstances, businesses may increase their operational capacity or add employees to prepare for new market opportunities before the impact on revenue becomes visible. This finding is consistent with previous studies showing that business support programmes and market access often influence operating practices, business relationships, and collaboration opportunities before translating into more significant improvements in financial performance (Bloom *et al.*, 2013; J-PAL, 2024). Therefore, the observed relationship for market access programmes is better understood as a process in which businesses first adjust their operations and increase their business capacity before the impact on revenue becomes more visible. However, as shown in Section 4.1, covariate balance for the A5 group was not fully achieved after matching. This suggests that businesses receiving support may differ from other groups in terms of their underlying characteristics and growth potential. Therefore, the observed relationship is not only related to the type of support received but is also likely to be associated with the business's characteristics. This pattern is consistent with the literature, which shows that the effectiveness of entrepreneurial interventions often varies by business characteristics and the group of support recipients (McKenzie and Woodruff, 2014).

5.4 Related Practical and Policy Impacts

The findings highlight the importance of strengthening evidence-based monitoring and evaluation systems for entrepreneurship and MSME support programmes in Brunei. Improved data collection and programme

monitoring may help generate evidence on which forms of support are more closely associated with business growth and employment, thereby supporting more appropriate programme design and implementation for different business contexts.

5.5 Limitations and Suggestions for Further Research

This study employed a cross-sectional survey design. It included a retrospective component and enabled comparisons of businesses using the respondents' self-reported data. Propensity score matching helped reduce differences in observed covariates between programme participants and non-participants. However, unobserved factors are likely to influence the relationship between programme participation and business growth. Therefore, the study findings were interpreted as a relationship or association and not a direct causal effect.

The use of retrospective information is prone to recall bias and associated reporting inaccuracies, especially regarding business performance in the 2016 base year. Several steps were taken to address these problems. Respondents were informed in advance through the invitation letter that information on business performance and programme participation would be required, allowing them to prepare relevant records where available. In addition, specific pre-defined response categories were used in the questionnaire to reduce reliance on precise numerical recall. Although covariate balance improved after matching, small differences remained in some programme groups.

Further research should use longitudinal and/or experimental designs. These designs are better suited to examine how programme participation relates to changes in business performance. They can also identify causal relationships more clearly. Future studies could examine intermediate outcomes such as knowledge and management improvements, as these outcomes reflect changes in business capabilities before revenue and employment growth are observed.

6. Conclusions

Overall, this study suggests that the association between entrepreneurship support programmes and MSME business performance varies by programme type. Some programmes are associated with positive improvements in revenue and employment growth, while others are not. These findings underscore the importance of identifying which forms of support are most beneficial for different business needs and contexts, so that support for MSME entrepreneurship can be strengthened more effectively.

Ethics Declaration

Ethical approval was obtained from the University of Southampton Research Ethics Committee (ERGO/90503).

AI Declaration

AI tools were utilised exclusively for language enhancement, including assistance with grammar, spelling, sentence structure, and clarity. The authors retain full responsibility for the accuracy, originality, and intellectual content of the final paper.

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