Entrepreneurial intentions of engineering students from a South African TVET college

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ABSTRACT: The purpose of this study was to investigate the relationships and interconnections among entrepreneurial intentions, subjective norms, attitude towards behaviour and perceived behavioural control of technical and vocational education and training (TVET) college students. The relationships among these constructs were hypothesised according to the theory of planned behaviour (TPB). This study collected data from engineering students registered at a public TVET college in the Western Cape, South Africa. The data was analysed using covariance-based structural equation modelling. The study found that attitude towards behaviour positively and significantly influenced the students' entrepreneurial intentions. It also found that perceived behavioural control positively and significantly influenced the students' entrepreneurial intentions. However, it found that the influence of subjective norms on the students' entrepreneurial intentions was mediated by attitude towards behaviour and perceived behavioural control, resulting in a significant total indirect effect. This study extends the application of TPB to explain the entrepreneurial intentions of TVET college students from a developing country.

INTRODUCTION

In South Africa, there has been growing recognition that technical and vocational education and training (TVET) is essential for economic development and addressing the country's skill shortage. TVET colleges in South Africa have a long history. More recently, they have been part of further education and training (FET), a level below universities. In the 2010s, TVET colleges moved under the Department of Higher Education and Training (DHET), confirming their position as post-secondary institutions [1]. However, TVET colleges offer National Certificate Vocational (NCV) qualifications, an industry-focused vocational alternative to secondary school grades 10-12.

In addition to NCV qualifications, TVET colleges offer National Technical Education (NATED) qualifications, known as National N Certificates (N1-N6). Traditionally, South Africa's TVET college education has been inclined towards training for employment. Recent studies suggest that this is a missed opportunity, and TVET graduates have significant potential to become entrepreneurs [2].

TVET colleges provide the foundation for entrepreneurship because their programmes integrate theoretical knowledge with practical hands-on skill training. This combination is essential for starting and running businesses. South Africa requires a continuous supply of new entrepreneurs to provide additional employment opportunities and tax revenue for the country [3].

New entrepreneurs would contribute to lowering unemployment, which increased from 25.4% in the third quarter of 2014 to 32.9% in the third quarter of 2022 [4]. Youth unemployment is even higher (44%) in the third quarter of 2022 for those aged 15-34 years [4]. Like other economies, South Africa needs the continuous emergence of new ventures to replace the old ones or even new ones that have fallen or become unprofitable. Entrepreneurship must be encouraged and developed in both society and education.

Entrepreneurship is a behaviour, so entrepreneurship and entrepreneurial behaviour refer to the same thing [5]. In this article, the authors will use the term entrepreneurial behaviour (EB) as it is common in literature. EB is purposive behaviour intended to create new ventures introducing new products, services, processes or business models [5][6]. EB covers a range of behaviours associated with resource mobilisation, legitimacy building, team formation, planning, search and pivoting [6].

Most EB researchers argue that a person's entrepreneurial intentions (EI) are the best predictor and primary determinant of EB [6-8]. EI is …*a self–acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future* [9]. Understanding EI and its influences is one of the central goals of EB research. This study investigates relationships and interconnections among EI and its antecedents among

mechanical and electrical engineering students at a TVET college in the Western Cape, South Africa. Knowing the antecedents of EI may assist in understanding the reasons, motivations and extent to which individuals in a particular context engage in or are likely to engage in EB. This knowledge is important to scholars, governments and policymakers because it enables them to develop interventions that promote EB in a country.

LITERATURE REVIEW AND HYPOTHESES FORMULATION

Given that there is a consensus that EI is the best predictor of EB, recent studies have focused on identifying the determinants of EI [6]. Most studies on the EI of university students have been underpinned by the theory of planned behaviour (TPB) [10], a generic intention model and Shapero's entrepreneurial event model (EEM) [11], a specific entrepreneurship intention model. The TPB was developed from an earlier theory called the theory of reasoned action (TRA) [12], which positioned human behaviour as agentic. The TPB presents EI as a dependent variable with three determinants: attitudes towards behaviour (ATB), subjective norms (SN) and perceived behavioural control (PBC). ATB is an individual's subjective assessment of a behaviour's favourability or unfavorability. SN is a person's perception of the approval of their behaviour by the most important referent group, such as family and friends. PBC refers to a person's perception of the ease or difficulty of performing a behaviour.

In contrast to the TPB, the EEM focuses on entrepreneurship as an event. According to the EEM, EI results from a person's perceived desirability of action (PDA), propensity to act (PTA) and perceived feasibility of an act (PFA). In the EEM, PDA is the degree to which a person is attracted to becoming an entrepreneur and reflects their preference for EB [6]. PDA is influenced by cultural/social elements that affect people's opinions and attitudes toward any particular action.

The second antecedent, PTA, refers to a person's disposition to act on their decisions. PTA is more a personal trait than a subjective perception or attitude. The last antecedent, PFA, refers to the degree to which a person is confident that they can personally perform entrepreneurial actions, such as starting a business, and thus, feel capable of becoming an entrepreneur.

These theories are complementary [6][8]. Although they use different terms, their constructs overlap or have similar meanings. They all relate to an individual's perception of the desirability and feasibility of entrepreneurial endeavours [8]. ATB and PBC of the TPB are analogous to the PDA and PFA of the EEM, respectively. The construct SN is not adequately addressed in EEM as it is incorporated into PDA [13]. Ajzen explains that PBC combines a person's locus of control and self-efficacy, positioning PBC as analogous to entrepreneurial self-efficacy (ESE) [10]. This study opted to use the TPB; thus, the authors considered the following hypotheses:

H1a ATB positively influences TVET students' EI.

H1b SN positively influences TVET students' EI

H1c PBC positively influences TVET students' EI.

In addition, previous studies suggest SN influences ATB and PBC [7][14][15].

H2 SN positively influences TVET students' ATB.

H3 SN positively influences TVET students' PBC.

These empirical studies are supported by Bandura's social cognitive theory [16]. Social cognitive theory posits that cognitive and motivational processes that direct intention can be influenced by social persuasion.

RESEARCH METHODS

This study collected data from mechanical and electrical engineering students registered at a public TVET college in the Western Cape, South Africa. The TVET college is multi-campus with over 20,000 students. It offers NATED and NCV qualifications for various occupational and vocational disciplines. These include certificates and diplomas in fields ranging from engineering to public management. The survey collected responses between 8 and 11 December 2022. It received 204 responses by its close on 11 December 2022, representing a response rate of 68%. The participants were 74% male and 26% female; 61.8% were studying mechanical engineering and 38.2% were studying electrical engineering; 8.8% were below 18 years old, 88.2% between the ages of 18 and 28 and 2.9% were above 29 years old.

The measures for the constructs EI, ATB, SN and PBC were taken from Liñán and Chen [14]. The constructs were measured on a 7-point Likert scale, with one being *strongly disagree* and seven being *strongly agree*. The constructs were placed in section two on an on-line questionnaire, with section one containing demographic information. Section one of the questionnaire included three questions on having relatives who own a business, having prior experience running a business and having undergone entrepreneurship training.

The conceptual model was analysed using covariance-based structural equation modelling (CB-SEM). The CB-SEM methodology requires an assessment of the measurement model, followed by that of the structural model. The study used IBM SPSS Amos (version 29) with maximum likelihood estimation.

RESULTS

This section presents the results of the assessments of the construct reliability, discriminant validity, measurement and structure models.

Table 1 presents the results of assessing the constructs' reliability and convergent and discriminant validity. Construct reliability was investigated using Cronbach's alpha (α), composite reliability (CR) and average variance extracted (AVE). The results of convergent validity analysis show that all constructs achieved convergent validity, as all indicators were above the recommended minimum thresholds (α > 0.7, CR > 0.7 and AVE > 0.5). Discriminant validity was assessed using the Fornell-Larcker criterion. Discriminant validity was achieved because the square root of AVE (the diagonal in Table 1) was higher than its correlations with the other constructs.

Table 1: Results of tests for construct reliability and discriminant validity.

		ATB	SN	PBC	EI
	ATB	0.858			
Discriminant validity using the Fornell-Larcker criterion	SN	0.342	0.740		
	PBC	0.566	0.330	0.806	
	EI	0.794	0.272	0.636	0.874
Measures of construct reliability	Cronbach's alpha	0.890	0.781	0.846	0.904
	CR	0.893	0.784	0.845	0.906
	AVE	0.736	0.548	0.649	0.764

In this study, model fit was evaluated using the comparative fit index (CFI), goodness-of-fit index (GFI) and the Tucker-Lewis index (TLI), which have recommended minimum thresholds of 0.9, root mean square error of approximation (RMSEA), which has a recommended maximum threshold of 0.8, *p*-value < 0.05 and chi-square (CMIN)/ degree of freedom in range 2 to 5 [17]. The model fit indices showed a good fit, with all indices within range (CMIN = 137.982, df = 48, *p*-value = 0.000, CMIN/df = 2.75, GFI = 0.904, CFI = 0.942, TLI = 0.921 and RMSEA = 0.076).

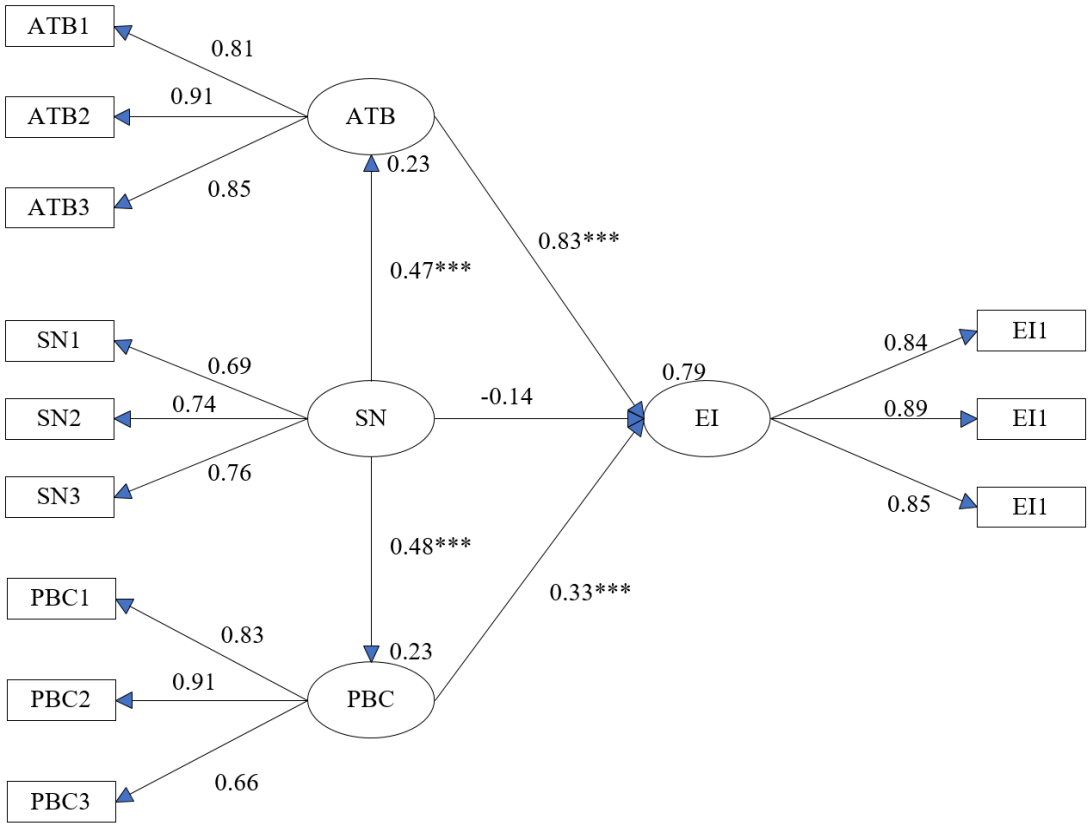

Figure 1: Structure model showing path coefficients and squared multiple correlations.

Figure 1 shows the structural model with standardised estimates of path coefficients. The squared multiple correlations were 0.785 for EI. This shows that ATB and PBC account for a 78.5% variance in EI. Table 2 presents the results of the

hypothesis testing, indicating that all hypotheses except H1b were supported. The impact of PBC on EI was positive and significant (β = 0.335, p = 0.000 < 0.05), supporting H1a. The hypothesis H1b was not supported (β = -0.140, p = 0.053 > 0.05). The impact of ATB on EI was positive and significant (β = 0.826, p = 0.000 < 0.05), supporting H1c. The impact of SN on ATB was positive and significant (β = 0.474, p = 0.000 < 0.05), supporting H2. The impact of SN on PBC was positive and significant (β = 0.483, p = 0.000 < 0.05), supporting H3.

Table 2: Results of direct path analysis and hypothesis testing.

Hypothesis	Estimate	Critical ratio	*p*-value	Findings
PBC → EI	0.335	5.501	***	Supported
ATB → EI	0.826	11.096	***	Supported
SN→ EI	-0.140	-1.936	0.053	Not supported
SN → ATB	0.474	5.339	***	Supported
SN → PBC	0.483	5.337	***	Supported

The study performed mediation analysis using the bootstrap procedure. The number of bootstrap samples was set to 5,000 bootstrap iterations, and the bias-corrected confidence interval (BCCI) of 95% confidence interval was chosen. ATB (H2 and H1a) and PBC (H3 and H1c) were hypothesised to mediate SN and EI. A summary of the mediation analysis is presented in Table 3.

Table 3: Results of mediation analysis using a bootstrap analysis with a 95% confidence interval.

Relationships	Estimates	*p*-value	Confidence interval		Conclusion
			Lower	Upper	
Total indirect effect	0.553	0.000	0.304	0.928	Significant
SN → ATB → EI	0.594	0.000	0.287	0.963	Full mediation
SN → PBC → EI	0.245	0.000	0.106	0.674	Full mediation

As reported in Table 3, the direct effect of SN on EI was insignificant. However, the total indirect effect on EI was significant {β = 0.553, p = 0.000 (95% BCCI = 0.304, 0.9280)}. The standardised indirect path of SN to EI through ATB was significant {β = 0.594, p = 0.000 (95% BCCI = 0.287, 0.963)}. The standardised indirect path of SN to EI through ATB was also significant {β = 0.245, p = 0.000 (95% BCCI = 0.106, 0.674)}.

DISCUSSION

In this study, the TPB constructs accounted for 79% of the variance in the entrepreneurial intentions of the TVET college students. The relatively high variance implies that the application of TPB extends to the entrepreneurship of TVET students in South Africa. This means that academics and policymakers in South Africa could use the TPB to understand what drives the entrepreneurial intentions of TVET college graduates. This understanding is needed to design programmes that promote entrepreneurial behaviour among these graduates. TVET college students often graduate with sufficient practical skills to deal with the technical aspects of a business. Thus, enhancing their entrepreneurial intentions would increase the likelihood that some would realise their entrepreneurial behaviours and start businesses upon graduation.

Of the three antecedents considered in this study, two constructs - attitude towards behaviour and perceived behaviour control - significantly influenced intentions, whereas subjective norm had no direct influence. The significant positive influences of ATB and PBC are consistent with previous studies [6][10][14]. However, this study's finding that SN has no significant direct influence on EI is consistent with Liñán, and Chen [14] but contrary to Sun et al [7], which had a significant positive influence on SN. One reason for this difference is the cultural differences between South Africa and the cultural context of previous studies by Schlaegel and Koenig [18].

The contextual nature of TPB has been demonstrated in a multi-country study that found differences in the relative proportions of the constructs between samples from Spain and Taiwan [14]. The finding that PBC and ATB mediate the influence of SN on EI is collaborated by Schlaegel and Koenig's study [18].

These findings do not support the positioning of TVET college graduates as labour rather than potential entrepreneurs [2]. The commonly held stance is that TVET college graduates are trained for the labour market. This is reflected in the policy statement, …[t]*he main purpose of these colleges is to train young school leavers, providing them with the skills, knowledge and attitudes necessary for employment in the labour market* [19]. The South African labour market cannot absorb all TVET college graduates in the current economic environment. The preference towards employment cannot be sustained. It has led to high unemployment rates of up to 33% among South African TVET college graduates [20]. It is evident from this that other career choices, such as entrepreneurship, need to be pursued. The findings show that TVET college students perceive entrepreneurship as a viable career option. Thus, interventions that promote EI-mediated EB have the potential.

This study's findings have several theoretical and practical implications. From a theoretical perspective, this study extends the application of TPB to explain the entrepreneurial intentions of TVET college students from a developing country. It also collaborates with the findings of previous studies on the contextual nature of the relative influence of the constructs. From a practical perspective, the results of this study can assist policymakers and academics in developing interventions to enhance the entrepreneurial capacity of TVET college graduates. In this study, the authors used convenient sampling to collect data from one department of a TVET college in South Africa. Future research should address this shortcoming by collecting data from several colleges in South Africa.

CONCLUSIONS

The purpose of this study was to investigate the relationships and interconnections among entrepreneurial intentions and subjective norms, attitude towards behaviour and perceived behavioural control of TVET college students. The study had three main findings: first, it found that attitude towards behaviour positively and significantly influenced the students' entrepreneurial intentions. Second, it found that perceived behavioural control positively and significantly influenced the students' entrepreneurial intentions. Lastly, it found that the influence of subjective norms on the students' entrepreneurial intentions was mediated by attitude towards behaviour and perceived behavioural control, resulting in a significant total indirect effect.

This study confirms previous studies and extends the application of TPB to explain the entrepreneurial intentions of TVET college students from a developing country. From a practical perspective, the findings can assist policymakers and academics in developing interventions to enhance the entrepreneurial capacity of TVET college graduates.

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