



Munich Personal RePEc Archive

**The crisis effect in TPB as a moderator
for post-pandemic entrepreneurial
intentions among higher education
students: PLS-SEM and ANN Approach**

Chahal, Jyoti and Dagar, Vishal and Dagher, Leila and Rao,
Amar and Ntom Udemba, Edmund

2024

Online at <https://mpra.ub.uni-muenchen.de/120706/>
MPRA Paper No. 120706, posted 26 Apr 2024 13:39 UTC

The crisis effect in TPB as a moderator for post-pandemic entrepreneurial intentions among higher education students: PLS-SEM and ANN Approach

Jyoti Chahal, Vishal Dagar, Leila Dagher, Amar Rao, Edmund Ntom Udemba

Abstract

This research examines college students' entrepreneurial inclinations using TPB, self-efficacy, and the crisis effect. It also examines the crisis effect's moderating influence post-pandemic. A unique analytical technique using Structural Equation Modeling (SEM) and Artificial Neural Network (ANN) was used to evaluate the model's resilience. 310 Indian university students were surveyed online. Self-efficacy is a crucial predictor of entrepreneurial tendencies among higher education students. ANN analysis confirms SEM findings that self-efficacy and perceived behavior control shape entrepreneurial desires. Despite its negative impact, the crisis effect doesn't appear to affect entrepreneurs' objectives. The crisis impact moderates all exogenous and endogenous factors except subjective norms and entrepreneurial goals, the research finds. The research also shows that students' education and geography affect their entrepreneurial inclinations. Gender, however, has little control. Policymakers and higher education administrators could boost entrepreneurial ambitions by fostering students' self-efficacy and perceived behavior control. Understanding these elements allows higher education stakeholders to create targeted interventions and support systems to foster college student entrepreneurship.

Keywords Entrepreneurial Intentions, Crisis-Effect, Self-efficacy, Artificial Neural Network (ANN), PLS-SEM, Post-Pandemic

1. Introduction

Entrepreneurship and entrepreneurial intentions have always been popular among youth (Akhtar *et al.*, 2022), attracting a great deal of interest among authorities, policymakers and academia (Al-Jabari, 2019). Entrepreneurship literature portrays entrepreneurial intentions as the initial step in launching a business's lengthy and challenging process (Elnadi and Gheith, 2021). Despite the popularity of entrepreneurship, many governments in developing and growing economies face a critical challenge of higher education student unemployment (Miriti, 2020). It is well-known that practically all countries' economies face varying economic slowdowns (Akhtar *et al.*, 2022). In addition, the worldwide catastrophe brought on by the COVID-19 epidemic has greatly exasperated the employment situation (Gupta, 2022) and profoundly affected society (Ratten and Jones, 2021b). As reported in the Centre for Monitoring Indian Economy (CMIE) survey, India has a dire unemployment scenario in which 10 million people will be classified as unemployed over the next four years, increasing the number of unemployed people to 220 million by 2022. Thus, the current Indian unemployment rate of 7.8 in June 2022 represents a problematic scenario for the Indian economy. However, the Indian government intends to create one million extra work possibilities for youngsters, but the number of jobs created would not be enough to counteract the overall population expansion. Entrepreneurship may be the solution in this situation, as Maritz *et al.* (2020) see entrepreneurs as crucial players during and after the crisis and help nations to reduce unemployment (Al-Ghani *et al.*, 2022). In a recent meta-data analysis, Nithya (2022) recommended paying close attention to social characteristics and entrepreneurial goals, especially in emerging nations like India, where are more start-up prospects available to replace established jobs. Thus, more research on this concept is needed to potentially contribute to developing norms to implant entrepreneurial intention in students.

The COVID-19 problem emerged suddenly, causing health, economic and societal repercussions, some of which have trickled down into the educational system (Ratten, 2020). The global pandemic has not only had a terrible influence on businesses and economies worldwide, but it has also provided prospects for new enterprise formation (Maritz *et al.*, 2020). Higher education crises bring fresh opportunities to reimagine entrepreneurial learning and new challenges (Liguori and Winkler, 2020). Several studies have discovered a direct link between the process of developing entrepreneurial behavior and their intentions (Ajzen, 1991; Krueger *et al.*, 2000); ergo, scholars must better understand the impact of various predictors of entrepreneurial intentions (Roy and Das, 2022). From this discussion, this research deals with the following two research questions:

RQ1: Do TPB's antecedents impact college students' post-pandemic entrepreneurial intentions?

RQ2: Does crisis effect influence higher education students' entrepreneurial inclinations, particularly after pandemic?

RQ3: Do control variables (Gender, Area, Education) influence higher education students' entrepreneurial inclinations, particularly after pandemic?

The research is motivated by the critical challenge of higher education student unemployment faced by many governments in developing and growing economies, such as India. The study recognizes that traditional avenues for employment may not be sufficient to absorb the growing population, and entrepreneurship may present a viable solution to address this issue. The study identifies a research need for understanding the coupling between crises and entrepreneurship in academic literature, as crises become more prevalent in reality. It aims to explore how the crisis effect, specifically after the pandemic, influences higher education students' entrepreneurial intentions. The study extends the TPB by incorporating self-efficacy and crisis effect as external variables to better understand entrepreneurial intentions in the post-pandemic period. This extension is motivated by the need for a more comprehensive model to explore the determinants of entrepreneurial intentions in the presence of a crisis. The study's motivation also lies in its innovative methodology, employing the SEM-ANN approach to analyze both linear and non-linear relationships among constructs. This approach is expected to provide deeper insights into the complex relationships between variables in the context of entrepreneurial intentions and the crisis effect. Overall, the study's motivation is driven by the urgency to address youth unemployment, the potential role of entrepreneurship in economic recovery, the impact of the pandemic on education and entrepreneurial opportunities, and the need for an extended model and innovative methodology to gain better insights into students' post-pandemic entrepreneurial aspirations.

To do this, current research first proposed the research model with the integration of self-efficacy and crisis effect as external variables in the main constructs of TPB. Additionally, it also investigates the crisis effect's moderating impact across all TPB components in order to gain more insights from the perspective of the crisis effect. Through a structural model, study empirically exploring various factors that influence college students' aspirations to start their own businesses in aftermath of recent pandemic. Study confirmed the SEM results using the ANN approach to pinpoint the single most influential component.

Existing literature sought to understand students' natural propensity for entrepreneurship in higher education. during pre-COVID -19 (Ahmad *et al.*, 2019; Fayolle and Gailly, 2015; Mwiya *et al.*, 2017; Nabi *et al.*, 2018; Solesvik, 2013;) and during a COVID-19 period (Maritz *et al.*, 2020; Rehan *et al.*, 2021; Ruiz-Rosa *et al.*, 2020). Although it is hazy how the global pandemic affected students' entrepreneurial inclinations, some of those

intentions persisted after the outbreak. (Zhang and Huang, 2021). In the context of entrepreneurship, studies on the crisis have lately been conducted, revealing research needs for the coupling between crisis and entrepreneurship in academic literature as crises become more prevalent in reality (Ratten and Jones, 2021a).

The current research makes significant contributions in three ways. *First*, it fills gaps in the research on higher education students' entrepreneurial intents in the post-pandemic period by giving empirical evidence and theoretical support on the determinants of the extended TPB. *Secondly*, this research extended the TBP by adding two external variables: self-efficacy and crisis effect. With this extended model and moderation effect of the crisis, entrepreneurial intentions can be better understood in the post-pandemic period, as the model can provide more thorough insights on what most affects college students' entrepreneurial intentions in the presence of crisis effect as well as control variables of demographics. Furthermore, this research differs from prior work in the entrepreneurial intention literature in terms of methodology; this study employs the SEM-ANN approach for analyzing linear & non-linear relationship among constructs. In this light, it may be easier to grasp both the crisis repercussions of the post-pandemic age and the entrepreneurial aspirations of today's college students.

2. Theoretical underpinning and hypotheses development

2.1 Theory of planned behaviour (TPB) and entrepreneurial intentions (EI)

TPB model (Ajzen, 1991) is frequently applied to understand what motivates people to take risks and start businesses (Agu *et al.*, 2021; Liñán and Chen, 2009). It has emerged as crucial model for explaining entrepreneurial intention (Liñán and Chen, 2009). Ajzen's (1991) theory of planned behavior was a model of cognition he originally put forth in psychology. This theory often characterizes entrepreneurial motivation as an open and predictable inducement to establish self-employment (Ajzen, 1991). It has shown how attitudes, perceptions of behaviour control, and social norms all influence behavioural intentions. Examining intentions shows how firmly people will follow particular objectives and how hard they adjust their behaviour to attain a specific goal (Arrighetti *et al.*, 2016).

According to Thompson *et al.* (2008), the self-avowed belief of a person who wishes for starting new endeavour and expects to be able to accomplish in near future is known as entrepreneurial intention. Individual entrepreneurial intentions are key predictors of entrepreneurial behaviour (Jena, 2020). Various researchers experimentally investigated university students' entrepreneurial intents with TBP, and their findings validated the validity of TBP by utilizing its primary behavioral predictors (Anjum *et al.*, 2022; Godswill Agu *et al.*, 2022; Mawardi and Baihaqi, 2020; Ruiz-Rosa *et al.*, 2020; Zhang and Huang, 2021).

However, previous research has found considerable variances in the relevance of all major TBP effects on student entrepreneurial inclinations, and their impact varies depending on context and location (Krueger *et al.*, 2000; Nabi *et al.*, 2018). According to Bosnjak *et al.* (2020), TPB has received much attention in environmental science, health science, education research, and business and management. As this model has a stronger ability to foresee entrepreneurial intentions, the TPB provides a robust foundation for including the different external variables that affect intentions (Krueger *et al.*, 2000).

Several researchers have recently extended the TBP by modifying variables in their investigations. The TPB was used by Almohammad *et al.* (2021) to explore the characteristics of immigrant entrepreneurs from Syria in Turkey. They expanded TPB by including the refugee context as an external variable. Che Nawi *et al.* (2022) combined the TBP with another knowledge variable to investigate graduate students' entrepreneurial intentions to start an agribusiness. Our study used all the variables of Ajzen's (1991) TPB and extended with two external variables: self-efficacy and crisis effect.

2.2 Attitude towards behaviour (ATT)

Attitude toward behaviour is a key aspect in influencing entrepreneurial intentions. Attitude is a person's positive or negative evaluation regarding whether or not to engage in a certain conduct, as described by Ajzen and Fishbein (1980) This means if someone has a positive attitude, it will have a stronger impact than if they have a negative attitude.

Individuals who hold a positive attitude toward entrepreneurship are more likely to want to start their own businesses. Douglas and Shepherd (2002) claimed that more positive attitudes, particularly toward the risk, freedom, autonomy, and money supplied, increase the desire to be an entrepreneur. In entrepreneurship intentions, a plethora of research finds a significant path between attitude and entrepreneurial intents even during the time of crisis (Che Nawi *et al.*, 2022; Godswill Agu *et al.*, 2022; Mawardi and Baihaqi, 2020; Mohammed *et al.*, 2017; Ruiz-Rosa *et al.*, 2020). Hence, the following hypothesis is proposed:

Hypothesis 1: Attitude toward entrepreneurship significantly influences the entrepreneurial intentions of higher education students in the post-pandemic period.

2.3 Perceived behaviour control (PBC)

PBC is another antecedent of behavioural intentions in the context of TPB. Behavioral intentions are influenced by PBC (Ajzen, 1987). Students who believe that starting a business is simple and easy may become entrepreneurs (Che Nawi *et al.*, 2022). PBC is one of the strong antecedents of intention in entrepreneurial studies; however, there is continuous disagreement in the entrepreneurial setting about how to distinguish PBC from self-efficacy.

In the study (Ajzen, 2002), both are the same and regard self-efficacy as a subcategory of PBC. However, Parkinson et al. (2017) and Tavousi et al. (2009) confirmed that self-efficacy is distinct from perceived behavior. Thus, our research considers self-efficacy distinct from PBC and employs self-efficacy as an external variable. Even during a crisis, most recent research discovered PBC's strong effect on entrepreneurial goals (Almohammad et al., 2021; Che Nawi et al., 2022; Godswill Agu et al., 2022; Mawardi and Baihaqi, 2020). However, few studies confirm the insignificant impact between these two constructs (Davies et al., 2002; Mohammed et al., 2017). So we frame the following hypothesis:

Hypothesis2: Perceived behaviour control significantly influences the entrepreneurial intentions of higher education students in the post-pandemic period.

2.4 Subjective norms (SN)

Ajzen (1991) described as the societal pressure to perform or refrain from performing a particular activity. When choosing a course of action for a specific task, conduct of individual may be affected by the views of major reference groups, including friends, spouses, family, and relatives. Subjective norms reflect how the individual's family, peers, and society regard this behavior as good or bad when starting a business (Roy and Das, 2022). Subjective norms have long been regarded as the most contradictory component in entrepreneurship. The results are mixed in justifying the connection between entrepreneurial intention and subjective norms. Few studies (Ahmad et al., 2019; Amofah & Saladrignes, 2022; Mwiya et al., 2017; Paray and Kumar, 2020) confirmed the role of SN in predicting entrepreneurial intentions. Lotfi et al. (2023) engaged in an inquiry into the antecedents of entrepreneurial intentions within the specific domain of civil engineering students. The analysis of gathered data unveiled a noteworthy and statistically significant positive influence exerted by entrepreneurial attitude, entrepreneurial capacity, and subjective norms on the entrepreneurial intention of students studying civil engineering. The research undertaken by Bouarir et al. (2023) is dedicated to the comprehensive investigation of the fundamental determinants shaping both entrepreneurial intent and behavior. This comprehensive exploration encompasses an intricate understanding of the importance of entrepreneurial education, the identification of viable business opportunities, and the intrinsic drive for achievement. Notably, the outcomes of the study robustly confirm the direct influence emanating from subjective norms and entrepreneurial self-efficacy on the formation of entrepreneurial attitudes

On the contrary, few studies exhibit an insignificant impact of this variable on intents to start business (Liñán and Chen, 2009; Santos et al., 2016). Furthermore, Armitage and Conner (2001) explained the subjective norms

as a weak predictor for entrepreneurial intentions in their meta-analysis and the same in the case of the results (Omidi Najafabadi *et al.*, 2016). In this case, we formulate the following hypothesis:

Hypothesis3: Subjective norms significantly influence the entrepreneurial intentions of higher education students in the post-pandemic period.

2.5 Self-efficacy (SE)

Albert Bandura (1977) initially established the notion of self-efficacy in psychology, explaining it as individual conviction in one's own abilities to bring about a desired outcome. Self-efficacy, often known as self-confidence in a specific topic centred on how people see their skills and abilities (Wilson *et al.*, 2007). In the entrepreneurial literature, this has also been investigated as a mediator (Elnadi & Gheith, 2021; Kumar & Shukla, 2022; Maheshwari & Kha, 2022; Mortan *et al.*, 2014; Yeh *et al.*, 2021; Zhang & Huang, 2021a; Zhao *et al.*, 2005). The work conducted by Al-Qadasi *et al.* (2023) has demonstrated a positive linkage between entrepreneurial education and both entrepreneurial self-efficacy and perceived behavioural control. Batista-Canino *et al.* (2023) underscored the utility of scientometric tools in the identification of primary thematic focal points in the field. These foci encompass diverse aspects including the modeling of entrepreneurial intention (EI) and the comprehensive consideration of its antecedents and interconnected associations. Furthermore, the exploration encompasses an examination of self-efficacy as a precursor to EI, an investigation into social entrepreneurial intention, and a meticulous analysis of the impact of educational context vis-à-vis individual factors on EI.

Self-efficacy is a key factor in setting the stage for future entrepreneurial endeavours (AL-Qadasi and Gongyi, 2020; Arrighetti *et al.*, 2016; Godswill Agu *et al.*, 2022; Rahmawati *et al.*, 2022). Consequently, following hypothesis is put out:

Hypothesis4: Self-efficacy significantly influences the entrepreneurial intentions of higher education students in the post-pandemic period.

2.6 Crisis effect (CE)

The crisis effect can be explained in various ways, such as its ability to push people to sustain their financial and social positions by pursuing their business ambitions. However, it may limit available financial resources and negatively influence psychological and mental health. (Mouselli and Khalifa, 2017). The crisis is complicated, and its impacts are seen instantly and over time. (Ansell and Boin, 2019). Numerous studies have examined the crisis effect in many ways. The study of the economic crisis's impact on Italian university students' entrepreneurial intentions found that the crisis appears to have a greater influence on participants' expectations of their ability to effectively begin a venture than on their real desire for entrepreneurship as a future job. In another study (Nabil,

2021), where the entrepreneurial intents of students of a Yemeni university were evaluated in light of situational considerations, it was discovered that the crisis harms their entrepreneurial aspirations and does not stimulate them to pursue entrepreneurial endeavors. From another perspective of the crisis as a health catastrophe, students' social entrepreneurial inclinations have deteriorated due to this global health crisis (Ruiz-Rosa *et al.*, 2020). And during this global crisis, entrepreneurship intentions remain unexplored, and research is lacking (Ratten and Jones, 2021a).

Since the COVID-19 problem is contextual and has various effects in different countries, it might be seen as a predictor at the national level (Rehan *et al.*, 2021). The education industry is not unfamiliar with crises, but the consequence of COVID-19 has had the greatest repercussions on educational activities in contrast to previous crises. Consequently, this crisis has prompted new scope for the role of the academic industry's contribution to society. (Ratten and Jones, 2021a).

Several scholars have recently examined the impact of this global crisis in the context of entrepreneurship (Godswill Agu *et al.*, 2022; Maritz *et al.*, 2020; Rehan *et al.*, 2021; Ruiz-Rosa *et al.*, 2020); however, little research has been conducted to determine whether the post-pandemic entrepreneurial environment influences intentions for starting business journey among college students (Zhang and Huang, 2021). Thus, this research aims to advance the entrepreneurial literature by considering the crisis effect in terms of financial, psychological, social, and available resources in the post-pandemic period. The following hypothesis have been developed as a result of this discussion:

Hypothesis5: Crisis-effect significantly influences the entrepreneurial intentions of higher education students in the post-pandemic period.

Hypothesis6: There is a significant moderating effect of Crisis-effect on the relationship between attitude towards entrepreneurship and entrepreneurial intentions of higher education students in the post-pandemic period.

Hypothesis7: There is a significant moderating effect of Crisis-effect on the relationship between perceived behaviour control and entrepreneurial intentions of higher education students in the post-pandemic period.

Hypothesis8: There is a significant moderating effect of Crisis-effect on the relationship between subjective norms and entrepreneurial intentions of higher education students in the post-pandemic period.

Hypothesis9: There is a significant moderating effect of Crisis-effect on the relationship between self-efficacy and entrepreneurial intentions of higher education students in the post-pandemic period.

Figure 1 depicts the study's proposed model, which is based on the theory of planned behavior.

[insert Figure 1 here]

2.7. Control variables

In addition to addressing the core research questions centered around the Theory of Planned Behavior (TPB) antecedents and the crisis effect on post-pandemic entrepreneurial intentions, this study acknowledges the significance of certain control variables that might interplay with the examined relationships. These control variables have been thoughtfully selected to ensure a more nuanced understanding of the factors influencing higher education students' entrepreneurial intentions within the unique context of the post-pandemic era.

Gender is a crucial control variable that warrants exploration, given its potential influence on entrepreneurial intentions. Gender-based disparities in entrepreneurial motivations and aspirations have been well-documented in previous literature. Through the inclusion of gender as a control variable, this study aims to discern whether any gender-specific patterns emerge in the way higher education students envision their entrepreneurial future following the pandemic. Education Level, another vital control variable, holds the potential to impact students' perceptions and inclinations toward entrepreneurship. Different levels of education might expose students to varying degrees of entrepreneurial education, experiences, and mindsets. This variable's consideration is thus essential in comprehending how diverse educational backgrounds shape post-pandemic entrepreneurial intentions among higher education students. Geographic Area adds an additional layer of complexity to the investigation, acknowledging that the environment in which students are situated can significantly influence their entrepreneurial aspirations. Urban and rural landscapes offer distinct economic conditions, resources, and opportunities, which could potentially shape students' attitudes towards entrepreneurship. By accounting for geographic area as a control variable, this study seeks to unveil any geographical nuances in entrepreneurial intentions that might arise in the wake of the pandemic. These control variables, carefully integrated into the research framework, serve the purpose of ensuring a more robust and accurate analysis of the core relationships being examined. By delving into the potential impact of gender, education level, and geographic area, this study endeavors to uncover a comprehensive understanding of the intricate factors that underlie higher education students' entrepreneurial intentions during the post-pandemic landscape.

Hypothesis 10:

Geographic area significantly influences the entrepreneurial intentions of higher education students in the post-pandemic period.

Hypothesis 11:

Gender significantly influences the entrepreneurial intentions of higher education students in the post-pandemic period.

Hypothesis 12:

Education significantly influences the entrepreneurial intentions of higher education students in the post-pandemic period.

3. Methodology

3.1 Data collection

This study used non-random and convenience sampling, considered less time-consuming and cost-effective, and the research accessed the largest responses (Easterby-Smith *et al.*, 2012). *The target population for this research consisted of higher education students enrolled in undergraduate and postgraduate courses in India, with a specific focus on those who expressed aspirations for entrepreneurship during the post-pandemic period. This population was chosen because they represented a significant group that might be seeking alternative pathways to employment and career opportunities, especially given the challenging economic circumstances during and*

after the COVID-19 pandemic. “G” power calculator for SEM models was applied to enumerate the minimum sample size for a sample of 100 participants for an effect size of .01 for a model with one latent variable and five observable variables with a 0.05 level of significance (Christopher Westland, 2010; Cohen, 2013; Soper, 2022). In total, data were collected from 310 higher education students, and the data collection period began in September 2021, during the post-pandemic phase of the country. To collect data, the researchers utilized an online approach, employing a Google Form as the survey instrument. The survey link was disseminated through various channels, including colleges' websites, Facebook pages, and WhatsApp groups of teachers, enabling the researchers to reach a larger and more diverse pool of potential participants across different educational institutions. This online data collection approach was chosen to maximize participation and capture a broad range of perspectives from higher education students in India.

3.2 Respondents profile

We used IBM SPSS 21 to analyze the demographic characteristics of students (Table 1). Most respondents were female (58.40%) compared to male students (41.60%). In the education qualifications, 51.30% were in the post-graduation course, while the rest were in their under-graduation course. The majority of the students were from urban areas (56.50%). In their field of study, 37.10% belong to commerce, followed by science and arts, with 33.90% and 29%, respectively.

[insert Table 1 here]

3.3 Measurements

The measures included in this study were derived from previous research. A seven-point Likert scale, ranging from completely disagree (1) to completely agree (7), was used to record all quantitative data. There are five assertions that make up the Liñán and Chen (2009) measure of entrepreneurial intent. Attitude toward behaviour contains five items followed by (Solesvik 2013). Four items were in the construct of perceived behaviour control (Solesvik, 2013). Social norms were adopted in previous research (Solesvik, 2013), consisting of six items. In external variables, the study used self-efficacy (Wilson *et al.*, 2007) and crisis effect (Mouselli and Khalifa, 2017) with five and four items, respectively.

4. Results

4.1 Data analysis

This study utilized dual-stage of analysis techniques: artificial neural network (ANN) and partial least structural equation modeling (PLS-SEM) (Akour *et al.*, 2022; Leong *et al.*, 2020) for deep learning. Initially, a model was proposed for the entrepreneurial intentions of higher education students with an extended model of TBP (Ajzen,

1991) with two external variables, self-efficacy and crisis effect, from available literature, and all hypotheses were tested through PLS-SEM version 3.3.9. The study also considers the moderation effect of crisis effect on all exogenous constructs (ATT, PBC, SN, and SE) and endogenous constructs. All these moderated effects are tested from PLS-SEM bootstrapping and analyzed through slope analysis. The study also implied the PLS prediction to show the predictive power of the proposed PLS-SEM model. In the next stage, it is integrated with artificial intelligence algorithms.

4.1 Common method bias (CMB)

In this work, we looked at the possibility of common method bias (CBM) by using a single instrument to collect data from both exogenous and endogenous inputs. To ensure that our data was devoid of CBM, we ran a Harman single-factor analysis with six variables (Podsakoff *et al.*, 2003). At 45.48 percent, our single-factor explanation for variance is below the 50% threshold often considered as free from this issue (Podsakoff *et al.*, 2003).

4.2 Construct reliability and validity

Based on the results of the PLS consistent algorithm, we evaluated the constructs' validity and reliability. According to Table 2, every single Cronbach's alpha ranged from 0.841 to .0921, and composite reliability (CR) ranging from .851 to .922 is greater than 0.70 (Hew *et al.*, 2019; Nunnally, 1967); hence, confirming higher construct reliability for measurement model. For convergent validity, we analyzed factor loadings and average variance extracted (AVE) (Hair *et al.*, 2019). The factor loading ranges from 0.648 to 0.903, levels above the suggested value of 0.6 (Chin *et al.*, 1997; Hair *et al.*, 2006) (Table 2). So, no items are deleted from their original state. Additionally, the AVE values were between 0.534 and 0.739, above the threshold value of 0.5.

[insert Table 2 here]

4.3 Discriminant validity

Chin, 2010 defined discriminant validity as a measure of the degree of variance between one construct of the research model and the rest of the constructs. For measuring this validity, Fornell-Larker criterion and Heterotrait-Monotrait ratio (HTMT) are used (Hair *et al.*, 2019). In Table 3, the bold diagonal line provides information on the AVE values' square roots and offloads diagonal elements to show how the many constructs are correlated. The square roots analyzed for the AVE values ranged from 0.731 to 0.860, exceeding the suggested value of 0.5 that supports the Fornell-Larker condition (Fornell and Larcker, 1981).

[insert Table 3 here]

Furthermore, results as shown in Table 3 (in bracket) show that every construct had a value less than the threshold value, 0.85 (Henseler *et al.*, 2015) and 0.90 (Teo *et al.*, 2008), indicating conformance with the HTMT ratio.

4.4 Structural model assessment

After yielding the relevant results from measurement model, a structural model assessment was carried out (see Figure 2). The PLS-SEM bootstrapping approach was applied at the 5% level of significance. Bootstrapping is a non-parametric method for assessing structural model predictiveness with R², and path coefficients (Hair *et al.*, 2022). Figure 2 represents the value of R² showing that R² for entrepreneurial intentions is 67.3%. The result of R² represents a strong coefficient of determination (Hair *et al.*, 2022) and high predictive power (Chin, 2010). Three alternative models are used in the study to examine the path linkages. Table 4 explains the findings of the hypotheses for the direct path, CE's moderating effect, and control variable using Models 1, 2, and 3, respectively. Except for CE ($\beta=0.008$, $p > 0.05$), all of the path relations in Model 1 are positive and statistically significant. However, when CE was included as a moderator in Model 2, all direct pathways remained favorable and significant with the exception of CE's effect on EI ($\beta=-0.038$, $p>0.05$) and same findings are found in case of Model 3, where we introduced the control variables of gender, education and area. Hence the results supported the H1, H2, H3 and H4.

As per findings, self-efficacy was one of predictors that had the maximum level of importance and had a major effect on students in higher education with entrepreneurial goals. This was followed by perceived behaviour control and attitude toward behaviour, which had higher significance in bootstrapping analysis. While the least important factor for the entrepreneurial inclinations of higher education students is subjective norms.

[insert Figure 2 here]

[insert Table 4 here]

The study employed the product indicator approach (Fassott *et al.*, 2016) in bootstrapping for testing H6 to H9, as the structural model was reflective, which tried to determine the moderating effect of the crisis effect between independent variables (ATT, PBC, SN, and SE) and the dependent variable (EI). The findings of Model 2 show that crisis effect negatively and significantly moderated the positive relationship between ATT and EI ($\beta = -0.164$, $p < 0.05$); PBC and EI ($\beta = -0.131$, $p < 0.05$); positively in case of SE and EI ($\beta = 0.148$, $p < 0.05$) except the SN and EI ($\beta = -0.041$, $p > 0.05$). Accordingly, results backed up H6, H7, and H9, but not H8. The slope analysis can depict the significant moderating effect of CE (see Figure 3)

[insert Figure 3 here]

4.4.1 Control variables

Further, Model 3 showed how the control variables impacted the students' entrepreneurial intentions. As can be observed, among the several control variables, the student's area ($\beta = -0.085$, $p < 0.05$) and educational background ($\beta = 0.059$, $p < 0.05$) had a significant impact on their EIs, although their gender had no significant influence ($\beta = -0.27$, $p > 0.05$).

4.5 PLS predict.

In the structural model assessment, after bootstrapping, we performed PLS predict (Sharma *et al.*, 2021; Shmueli *et al.*, 2016) to evaluate how well the suggested model can predict outcomes. The PLS predict technique is based on the k-fold cross-validation method, which may also be used for holdout sample validation. The software computes root mean squared error (RMSE), mean absolute error (MAE), and mean absolute percentage error (MAPE) for the indicators and constructions using k-fold cross validation. Predictions from the linear model (LM) and the mean value Q2 are two simple metrics used by PLS prediction to evaluate the precision of the PLS path model estimations and while comparing PLS-SEM results to those of a linear model (LM), lower PLS-SEM values indicate more explanatory power. Outcomes of PLS Predict are summarized in Table 5 for the endogenous construct of entrepreneurial intentions (EI) and its manifest variables (Five Items). Results indicate that the figures for both RMSE as well as MAE of PLS are smaller than the values of the simple linear model (LV). Other Q² values (more than zero) are also higher in the PLS model compared to LV and show high predictive power (Evermann & Tate, 2016).

[insert Table 5 here]

4.6 ANN results

Multiple analytic approaches, including PLS-SEM as well as ANN, were applied in this research (see Figure 4 and Figure 5). PLS-SEM is regarded as a traditional way to investigate the linear relationship between constructs, while ANN is recommended for determining whether or not the variables in a model have a non-linear connection with one another, consequently it helps users make better decisions (Lee *et al.*, 2020; Teo *et al.*, 2015). Additionally, the ANN is resistant to outliers from small samples. Moreover, it is compatible with non-compensatory models, in which a decline in one construct does not always require a gain in another (Leong *et al.*, 2020). The SPSS version 21 from IBM was utilised in order to carry out ANN analysis. We employed a feed-forward back-propagation multilayer training technique to generate ANN model, and the function of hyperbolic tangent was used in the development (Alam *et al.*, 2021). The ATT, PBC, SN, SE, and CE shown in Figure 5 were all part of the ANN model's input layer, while EI was part of the model's output layer. The neurons in hidden layer

of the ANN are created automatically by a software program. We used ten networks' root mean square error values to assess model accuracy (RMSE) (Nguyen *et al.*, 2021). Consequently, study put only 30% of the data points for testing and 70% for training (Qasem *et al.*, 2020), as well as method of ten-fold cross-validation for preventing over-fitting in ANN models (see Table 6). Results reported mean RMSE (0.413) for training and testing (0.413). The RMSE standard deviation for training is 0.0237 and 0.0347 for testing. There is little variation around the mean RMSE values, which are minimal in both the training and testing phases.. As a result, ANN models predict relationships with higher accuracy (Foo *et al.*, 2018).

[insert Figure 4 here]

[insert Table 6 here]

4.7 Sensitivity analysis

Further, under ANN framework, the study performs the sensitivity analysis that analyzes the variances in the endogenous construct caused by the variation in the associated exogenous constructs. First, the ratio of an independent variable's average value to its maximum mean value of importance was calculated for each independent variable. It was then converted to percentage form (Table 7). We measured the importance of each independent input variable (ATT, SN, PBC, SE, and CE). Furthermore, the ANN model used this analysis to rank (see Table 7 and Figure 5) the input neuron nodes based on their normalized importance (NI). Findings highlight the major significance of "perceived behavioural control", followed by self-efficacy (94%) and attitude (82%) for predicting entrepreneurial intentions. Moreover, the least predictors were the crisis effect (38%) and social norms (27%).

[insert Figure 5 here]

[insert Table 7 here]

5. Discussion

The current study extended self-efficacy and crisis effect as external variables, focusing on the entrepreneurial inclinations of higher education student during post-COVID-19 using the TPB. The PLS-SEM was employed in the study's initial investigation of path relations, and then ANN was utilized to assess the suggested model's robustness. With the exception of the crisis effect, all of the study's independent factors had a positive and statistically significant influence on entrepreneurial inclinations. It shows that students continue to aspire to start businesses despite the pandemic.

As per final Model 3 (see Table 4) output, ATT positively and significantly impacts EI. These outputs support the H1. These results align with earlier investigations (Liñán and Chen, 2009; Ahmad *et al.*, 2019; Paray and Kumar,

2020; Almohammad *et al.*, 2021; Al-Ghani *et al.*, 2022). The outcomes indicated that students had a positive attitude and that an improvement in college students' attitudes resulted in more inclination to start their own businesses. HEIs must organize various entrepreneurial activities, such as engaging workshops, creative competitions, and seminars on different business concepts, to provide a venue for students to demonstrate their entrepreneurial abilities (Anjum *et al.*, 2022).

Results revealed the PBC as the second most important predictor, and ANN also confirmed these findings through sensitivity analysis. It has been discovered as one of the main predictors of students' entrepreneurial intentions in ANN analysis. It reveals that college students believe they can complete a task and that launching a business in the post-pandemic environment is simple. Consistent with prior research (Ali and Jabeen, 2022; Liñán, 2008; Mohammed *et al.*, 2017). Yet, contrary to the results of (Mohammed *et al.*, 2017), perceived behaviour control seemed to be a negative and insignificant determinant for entrepreneurial intentions. This was because of the type and nature of economies. Only students with the appropriate education, exposure, and experience may believe themselves to be better capable of seizing such opportunities in the post-pandemic period as the government gives alternative opportunities (Mwiya *et al.*, 2017). Accordingly, the study recommended establishing entrepreneurship curricula, particularly skill-based and problem-solving approaches. In addition, acquiring skills necessary for the information realm is encouraged so people can participate in online start-ups (Ratten, 2020).

In the case of subjective norms, PLS-SEM and ANN analysis results confirmed it as a least and minor predictor as it depicts the low magnitude effect. Also found a significant effect on social norms with the least beta value. These results supported the H3. These results align with (Armitage and Conner 2001), who found subjective norms as a meager predictor for entrepreneurial goals in their meta-analysis study. The findings also resonate with the results of (Ruiz-Rosa *et al.*, 2020), where intentions were little affected by subjective norms, especially for social entrepreneurship.

Another intriguing finding of this study is the strongest and most promising predictive impact of self-efficacy in nurturing college students' entrepreneurial inclinations as an external variable in TPB. The outcomes of the PLS-SEM and ANN studies corroborated these conclusions, discovering that one's sense of competence is a strong indicator of a tendency toward entrepreneurship. Study unequivocally demonstrates the importance of self-efficacy in helping college students develop their entrepreneurial goals. Findings are consistent with past and recent research studies (Bandura, 1978; Na-Allah & Ahmad, 2022; Rahmawati *et al.*, 2022; Wilson *et al.*, 2007). An entrepreneur's mindsets and emotional responses are significantly influenced by their sense of self-efficacy

(Rahmawati *et al.*, 2022). According to the study, the government and HEIs should continually work on students' self-efficacy with the help of effective entrepreneurial learning methods, legislation, and training connected to market-based abilities. More attention should be paid to the student's resilience and self-confidence development in the post-pandemic period so they can make better decisions.

Another discovery reveals that the crisis effect has no discernible effect on inclinations of college students for entrepreneurship. It suggests that although the epidemic has passed, college students still have entrepreneurial aspirations (Rehan *et al.*, 2021). The output of Model 3 rejected the H5. These findings align with the findings of Mouselli and Khalifa (2017). In ANN also, results show the crisis effect as the least predictor for entrepreneurial intentions. In such a position, we also investigated the moderation effect of the crisis effect between the positive association of all exogenous variables and entrepreneurial intentions. According to the results, the crisis effect as moderator has negatively and significantly affected the relationship of entrepreneurial intents with attitude towards behaviour (H6), perceived behaviour control (H7), positively for self-efficacy (H9), except for subjective norms (H8). The findings of the insignificant moderation effect of the crisis effect on the SN- EI corroborated with the results of the least predicted variable of SN among other variables in path hypotheses testing. This indicates that compared to the pandemic period, the post-pandemic climate had little impact on college students' inclinations to pursue entrepreneurship (Zhang and Huang, 2021).

Regarding control variables, we used three for entrepreneurial intentions: geographical area, gender, and educational level. As per our research, one's geographical location has a substantial bearing on their propensity to engage in entrepreneurial activity. Students from rural areas are more likely to have business-creating aspirations and to be open to trying out new ventures than their urban counterparts. Prior research indicates that geographical location significantly impacts entrepreneurial intentions (Fayolle, 2010). However, research into the differences between rural and urban college students is lacking. Our findings indicate that educational level significantly influences entrepreneurial intentions, particularly among postgraduate students with the more entrepreneurial intention. Findings are in accordance with the prior work of (Behroozi 2012; Tang et al. 2014). For entrepreneurial intentions, gender as a control variable is insignificant. The findings show that gender does not matter when starting a new business. Male and female entrepreneurs have similar entrepreneurial intentions. These findings contradict previous findings (Bandura et al.,1998; Wilson et al.,2007).

5.1 Theoretical contributions

Firstly, the integration of self-efficacy as an external variable in the TPB model provides a deeper understanding of college students' entrepreneurial aspirations. Self-efficacy, as conceptualized by Bandura (1977), refers to an

individual's belief in their ability to perform a specific task successfully. In the context of entrepreneurship, self-efficacy plays a crucial role in shaping an individual's mindset and emotional responses towards venturing into new business endeavors. The significant and strong predictive impact of self-efficacy on college students' entrepreneurial intentions underscores its importance as a key determinant of entrepreneurial aspirations. This finding aligns with previous research (Na-Allah & Ahmad, 2022; Rahmawati et al., 2022; Wilson et al., 2007) and solidifies the notion that nurturing self-efficacy should be a priority for governments and higher education institutions (HEIs) to empower young adults in making better entrepreneurial decisions.

Secondly, the study's focus on the crisis effect in the post-COVID-19 period offers unique theoretical contributions to the understanding of how external shocks, such as a global pandemic, impact entrepreneurial intentions. While earlier literature has extensively explored the potential effects of crises on entrepreneurial plans, this study delves into the specific implications for college students' aspirations. The finding that the crisis effect itself does not have a direct discernible impact on students' entrepreneurial intentions suggests that the pandemic's lasting influence did not deter young adults from aspiring to start their own businesses. This result is noteworthy and provides insight into the resilience and determination of college students despite facing challenging economic circumstances. However, the significant moderation effect of the crisis on the relationships between TPB components and entrepreneurial intentions reveals that the post-pandemic climate has influenced the interplay between different factors shaping students' entrepreneurial inclinations. This nuanced understanding of the crisis effect offers valuable insights for policymakers and HEIs on designing targeted interventions to support entrepreneurial aspirations in the aftermath of a crisis.

Thirdly, the study's use of both PLS-SEM and ANN approaches for analysis contributes to methodological advancements in entrepreneurial intentions research. By employing PLS-SEM for the initial investigation of path relations and subsequently employing ANN for robustness assessment, the study presents a comprehensive analysis of the relationships between TPB components and entrepreneurial intentions. The combination of these two analytical methods allows for the exploration of non-linear relationships and strengthens the validity and generalizability of the findings. This methodological innovation provides a valuable contribution to the growing body of research on entrepreneurial intentions and sets a precedent for future studies to employ similar approaches. In conclusion, the present study makes several unique theoretical contributions to the field of entrepreneurial intentions research. The integration of self-efficacy and the crisis effect as external variables, along with the use of both PLS-SEM and ANN analysis, enhances the understanding of college students' entrepreneurial aspirations in the post-COVID-19 era. The significant role of self-efficacy, the nuanced impact of the crisis, and the

methodological advancements all contribute to the theoretical richness of this study. The findings have implications for policymakers, HEIs, and educators seeking to foster an entrepreneurial mindset and support young adults in pursuing their entrepreneurial goals despite challenges posed by external crises. Moving forward, further research could explore how specific interventions and educational programs can enhance self-efficacy and empower college students to become successful entrepreneurs in the ever-changing and unpredictable economic landscape.

6. Conclusion, future research agenda and limitations of the study

In conclusion, this study has delved into the realm of entrepreneurial intentions among higher education students in the post-COVID-19 era, utilizing the Theory of Planned Behavior (TPB) as its foundational framework. The incorporation of self-efficacy and the crisis effect as external variables has notably enriched the model's explanatory capacity, shedding illumination on the determinants influencing students' aspirations for entrepreneurship amidst challenging circumstances. The research outcomes have yielded pertinent theoretical and practical ramifications for the academic sphere, policymakers, and higher education institutions. The study's theoretical contributions are particularly noteworthy, showcasing the paramount importance of self-efficacy in nurturing entrepreneurial ambitions among college students. Acknowledging the pivotal role of self-assurance and belief in one's competencies, policymakers and educators are poised to design precision-targeted interventions, invigorating students' entrepreneurial intentions. Furthermore, the incorporation of the crisis effect within the model has unveiled the resiliency of students in persistently pursuing entrepreneurial aspirations, even in the wake of a worldwide pandemic. Policymakers are thus urged to acknowledge this unwavering determination and institute tailored support frameworks, fostering entrepreneurial pursuits even in periods of crisis. In practical terms, the research findings have underscored the significance of cultivating self-efficacy through effective entrepreneurial pedagogies and training regimens. By furnishing students with pragmatic skills and knowledge, they are emboldened to confront entrepreneurial challenges head-on and venture into the entrepreneurial realm with aplomb. Additionally, the study accentuates the necessity for specialized support mechanisms geared towards addressing the distinctive challenges posed by crises. Through the provision of mentorship, financial aid, and resources, policymakers and higher education institutions can cultivate an environment conducive to entrepreneurial advancement, even amid economic downturns.

This study bears substantial relevance for policymakers, governmental bodies, stakeholders of higher education institutions, and educators in crafting a comprehensive framework to enhance the entrepreneurial inclinations of college students. It is imperative for higher education institutions to prioritize the cultivation of students' talents

and problem-solving aptitudes when structuring college curricula, emphasizing skills encompassing effective communication, adept decision-making in moments of uncertainty, adept financial management, and inculcated leadership qualities. Moreover, the integration of a skill-oriented curriculum in alignment with the nation's novel education policy, which underscores youth skills, could further be considered.

The study's findings further warrant the creation of multiple college-level incubation facilities to facilitate young students, especially those in both rural and urban contexts, in initiating their entrepreneurial ventures. The results, indicating a negligible and non-significant influence of the crisis effect on entrepreneurial intentions, suggest that despite the pandemic's adverse economic repercussions, it has engendered a plethora of entrepreneurial opportunities. The surge in online engagements has propelled students towards establishing online businesses, thereby warranting focused entrepreneurship training. The amalgamation of self-efficacy and the crisis effect within the TPB paradigm also implies that higher education institutions must play a pivotal role in fortifying student resilience in the post-pandemic landscape.

Notwithstanding the valuable findings, this research is not without limitations. The study's focus on students' intentions for entrepreneurship solely within the post-pandemic epoch calls for future longitudinal investigations encompassing both pre- and post-pandemic data. Moreover, expanding the scope to encompass a multi-country study could amplify the generalizability of findings, as the current research is confined to a singular nation. Lastly, while this study primarily centers on the Theory of Planned Behavior (TPB) incorporating self-efficacy and the crisis impact as external factors, subsequent research could encompass additional variables such as entrepreneurial education, support systems, and environmental factors, to offer a more comprehensive understanding of the crisis impact.

References

Agu, A. G., Kalu, O. O., Esi-Ubani, C. O., & Agu, P. C. (2021). Drivers of sustainable entrepreneurial intentions among university students: An integrated model from a developing world context. *International Journal of Sustainability in Higher Education*, 22(3), 659–680. <https://doi.org/10.1108/IJSHE-07-2020-0277>

Ahmad, R., Mahli, F., Tehseen, S., Qureshi, Z. H., & Jannat, U. M. U. (2019). Entrepreneurial Intentions Among University's Students In Malaysia. 2019 13th International Conference on Mathematics, Actuarial Science, Computer Science and Statistics (MACS), 1–7. <https://doi.org/10.1109/MACS48846.2019.9024788>

Ajzen, I. (1987). Attitudes, Traits, and Actions: Dispositional Prediction of Behaviour in Personality and Social Psychology. In *Advances in Experimental Social Psychology* (Vol. 20, pp. 1–63). Elsevier. [https://doi.org/10.1016/S0065-2601\(08\)60411-6](https://doi.org/10.1016/S0065-2601(08)60411-6)

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)

Ajzen, I. (2002). Perceived Behavioural Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behaviour 1. *Journal of Applied Social Psychology*, 32(4), 665–683. <https://doi.org/10.1111/j.1559-1816.2002.tb00236.x>

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Prentice-Hall.

Akhtar, S., Albarrak, M. S., Ahmad, A., Akram, H. W., & Ciddikie, M. D. (2022). Drivers of Student Entrepreneurial Intention and the Moderating Role of Entrepreneurship Education: Evidence from an Indian University. *Discrete Dynamics in Nature and Society*, 2022, 1–15. <https://doi.org/10.1155/2022/6767580>

Akour, I. A., Al-Marouf, R. S., Alfaisal, R., & Salloum, S. A. (2022). A conceptual framework for determining metaverse adoption in higher institutions of gulf area: An empirical study using hybrid SEM-ANN approach. *Computers and Education: Artificial Intelligence*, 3, 100052. <https://doi.org/10.1016/j.caeai.2022.100052>

Alam, M. M. D., Alam, M. Z., Rahman, S. A., & Taghizadeh, S. K. (2021). Factors influencing mHealth adoption and its impact on mental well-being during COVID-19 pandemic: A SEM-ANN approach. *Journal of Biomedical Informatics*, 116, 103722. <https://doi.org/10.1016/j.jbi.2021.103722>

Al-Ghani, A., Al-Qaisi, B., & Gaadan, W. (2022). A Study on Entrepreneurial Intention Based on Theory of Planned Behaviour (TPB). 13(1), 10.

Al-Jubari, I. (2019). College Students' Entrepreneurial Intention: Testing an Integrated Model of SDT and TPB. *SAGE Open*, 9(2), 215824401985346. <https://doi.org/10.1177/2158244019853467>

Almohammad, D., Durrah, O., Alkhalaf, T., & Rashid, M. (2021). Entrepreneurship in Crisis: The Determinants of Syrian Refugees' Entrepreneurial Intentions in Turkey. *Sustainability*, 13(15), 8602. <https://doi.org/10.3390/su13158602>

AL-Qadasi, N., & Gongyi, Z. (2020). Entrepreneurship in crisis situations: Determinants of entrepreneurial intentions among University Students in Yemen. *African Journal of Business Management*, 14(7), 196–208. <https://doi.org/10.5897/AJBM2020.9017>

Al-Qadasi, N., Zhang, G., Al-Awlaqi, M. A., Alshebami, A. S., & Aamer, A. (2023). Factors influencing entrepreneurial intention of university students in Yemen: The mediating role of entrepreneurial self-efficacy. *Frontiers in Psychology*, 14, 1111934. <https://doi.org/10.3389/fpsyg.2023.1111934>

Al-Qadasi, N., Zhang, G., Al-Awlaqi, M. A., Alshebami, A. S., & Aamer, A. (2023). Factors influencing entrepreneurial intention of university students in Yemen: The mediating role of entrepreneurial self-efficacy. *Frontiers in Psychology*, 14, 1111934. <https://doi.org/10.3389/fpsyg.2023.1111934>

Amofah, K., & Saladrignes, R. (2022). Impact of attitude towards entrepreneurship education and role models on entrepreneurial intention. *Journal of Innovation and Entrepreneurship*, 11(1), 36. <https://doi.org/10.1186/s13731-022-00197-5>

Anjum, T., Amoozegar, A., Farrukh, M., & Heidler, P. (2022). Entrepreneurial intentions among business students: The mediating role of attitude and the moderating role of university support. *Education + Training*. <https://doi.org/10.1108/ET-01-2021-0020>

Ansell, C., & Boin, A. (2019). Taming Deep Uncertainty: The Potential of Pragmatist Principles for Understanding and Improving Strategic Crisis Management. *Administration & Society*, 51(7), 1079–1112. <https://doi.org/10.1177/0095399717747655>

Armitage, C. J., & Conner, M. (2001). Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40(4), 471–499. <https://doi.org/10.1348/014466601164939>

Arrighetti, A., Caricati, L., Landini, F., & Monacelli, N. (2016). Entrepreneurial intention in the time of crisis: A field study. *International Journal of Entrepreneurial Behaviour & Research*, 22(6), 835–859. <https://doi.org/10.1108/IJEBR-12-2015-0326>

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. *Psychological Review*, 84(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>

Bandura, A. (1978). Self-efficacy: Toward a unifying theory of behavioural change. *Advances in Behaviour Research and Therapy*, 1(4), 139–161. [https://doi.org/10.1016/0146-6402\(78\)90002-4](https://doi.org/10.1016/0146-6402(78)90002-4)

Batista-Canino, R. M., Santana-Hernández, L., & Medina-Brito, P. (2023). A scientometric analysis on entrepreneurial intention literature: Delving deeper into local citation. *Heliyon*, 9(2), e13046. <https://doi.org/10.1016/j.heliyon.2023.e13046>

Bosnjak, M., Ajzen, I., & Schmidt, P. (2020). The theory of planned behaviour: Selected recent advances and applications. *Europe's Journal of Psychology*, 16(3), 352–356. <https://doi.org/10.5964/ejop.v16i3.3107>

Bouarir, H., Diani, A., Boubker, O., & Rharzouz, J. (2023). Key Determinants of Women's Entrepreneurial Intention and Behavior: The Role of Business Opportunity Recognition and Need for Achievement. *Administrative Sciences*, 13(2), 33. <https://doi.org/10.3390/admsci13020033>

Che Nawi, N., Mamun, A. A., Hassan, A. A., Wan Ibrahim, W. S. A. A., Mohamed, A. F., & Permarupan, P. Y. (2022). Agro-Entrepreneurial Intention among University Students: A study under the premises of Theory of Planned Behaviour. *SAGE Open*, 12(1), 215824402110691. <https://doi.org/10.1177/21582440211069144>

Chin, W. W. (2010). How to Write Up and Report PLS Analyses. In V. Esposito Vinzi, W. W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of Partial Least Squares* (pp. 655–690). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-32827-8_29

Chin, W. W., Gopal, A., & Salisbury, W. D. (1997). Advancing the Theory of Adaptive Structuration: The Development of a Scale to Measure Faithfulness of Appropriation. *Information Systems Research*, 8(4), 342–367. <https://doi.org/10.1287/isre.8.4.342>

Christopher Westland, J. (2010). Lower bounds on sample size in structural equation modeling. *Electronic Commerce Research and Applications*, 9(6), 476–487. <https://doi.org/10.1016/j.elerap.2010.07.003>

Cohen, J. (2013). *Statistical Power Analysis for the Behavioural Sciences* (0 ed.). Routledge. <https://doi.org/10.4324/9780203771587>

Davies, J., Foxall, G. R., & Pallister, J. (2002). Beyond the Intention–Behaviour Mythology: An Integrated Model of Recycling. *Marketing Theory*, 2(1), 29–113. <https://doi.org/10.1177/1470593102002001645>

Douglas, E. J., & Shepherd, D. A. (2002). Self-Employment as a Career Choice: Attitudes, Entrepreneurial Intentions, and Utility Maximization. *Entrepreneurship Theory and Practice*, 26(3), 81–90. <https://doi.org/10.1177/104225870202600305>

Easterby-Smith, M., Thorpe, R., & Jackson, P. (2012). *Management research* (4th ed). SAGE.

Elnadi, M., & Gheith, M. H. (2021). Entrepreneurial ecosystem, entrepreneurial self-efficacy, and entrepreneurial intention in higher education: Evidence from Saudi Arabia. *The International Journal of Management Education*, 19(1), 100458. <https://doi.org/10.1016/j.ijme.2021.100458>

Evermann, J., & Tate, M. (2016). Assessing the predictive performance of structural equation model estimators. *Journal of Business Research*, 69(10), 4565–4582. <https://doi.org/10.1016/j.jbusres.2016.03.050>

Fassott, G., Henseler, J., & Coelho, P. S. (2016). Testing moderating effects in PLS path models with composite variables. *Industrial Management & Data Systems*, 116(9), 1887–1900. <https://doi.org/10.1108/IMDS-06-2016-0248>

Fayolle, A., & Gailly, B. (2015). The Impact of Entrepreneurship Education on Entrepreneurial Attitudes and Intention: Hysteresis and Persistence. *Journal of Small Business Management*, 53(1), 75–93. <https://doi.org/10.1111/jsbm.12065>

Foo, P.-Y., Lee, V.-H., Tan, G. W.-H., & Ooi, K.-B. (2018). A gateway to realising sustainability performance via green supply chain management practices: A PLS–ANN approach. *Expert Systems with Applications*, 107, 1–14. <https://doi.org/10.1016/j.eswa.2018.04.013>

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), 39. <https://doi.org/10.2307/3151312>

Godswill Agu, A., Okwara, O. O., Okocha, E. R., & Madichie, N. O. (2022). COVID-19 pandemic and entrepreneurial intention among university students: A contextualisation of the Igbo Traditional Business School. *African Journal of Economic and Management Studies*, 13(1), 89–104. <https://doi.org/10.1108/AJEMS-05-2021-0227>

Gupta, R. K. (2022). Role of University Entrepreneurial Ecosystem and Entrepreneurial Self-Efficacy in Shaping Entrepreneurial Intention: A Study of Indian Students. In I. W. Katono (Ed.), *Advances in Higher Education and Professional Development* (pp. 149–163). IGI Global. <https://doi.org/10.4018/978-1-7998-9581-7.ch008>

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate Data Analysis* (Vol. 6). Pearson Prentice Hall.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (Third edition). SAGE.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>

Hew, J.-J., Leong, L.-Y., Tan, G. W.-H., Ooi, K.-B., & Lee, V.-H. (2019). The age of mobile social commerce: An Artificial Neural Network analysis on its resistances. *Technological Forecasting and Social Change*, 144, 311–324. <https://doi.org/10.1016/j.techfore.2017.10.007>

Jena, R. K. (2020). Measuring the impact of business management Student's attitude towards entrepreneurship education on entrepreneurial intention: A case study. *Computers in Human Behaviour*, 107, 106275. <https://doi.org/10.1016/j.chb.2020.106275>

Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, 15(5–6), 411–432. [https://doi.org/10.1016/S0883-9026\(98\)00033-0](https://doi.org/10.1016/S0883-9026(98)00033-0)

Kumar, R., & Shukla, S. (2022). Creativity, Proactive Personality and Entrepreneurial Intentions: Examining the Mediating Role of Entrepreneurial Self-efficacy. *Global Business Review*, 23(1), 101–118. <https://doi.org/10.1177/0972150919844395>

Lee, V.-H., Hew, J.-J., Leong, L.-Y., Tan, G. W.-H., & Ooi, K.-B. (2020). Wearable payment: A deep learning-based dual-stage SEM-ANN analysis. *Expert Systems with Applications*, 157, 113477. <https://doi.org/10.1016/j.eswa.2020.113477>

Leong, L.-Y., Hew, T.-S., Ooi, K.-B., & Wei, J. (2020). Predicting mobile wallet resistance: A two-staged structural equation modeling-artificial neural network approach. *International Journal of Information Management*, 51, 102047. <https://doi.org/10.1016/j.ijinfomgt.2019.102047>

Liguori, E., & Winkler, C. (2020). From Offline to Online: Challenges and Opportunities for Entrepreneurship Education Following the COVID-19 Pandemic. <https://journals.sagepub.com/doi/full/10.1177/2515127420916738>

Liñán, F. (2008). Skill and value perceptions: How do they affect entrepreneurial intentions? *International Entrepreneurship and Management Journal*, 4(3), 257–272. <https://doi.org/10.1007/s11365-008-0093-0>

Liñán, F., & Chen, Y. (2009). Development and Cross–Cultural Application of a Specific Instrument to Measure Entrepreneurial Intentions. *Entrepreneurship Theory and Practice*, 33(3), 593–617. <https://doi.org/10.1111/j.1540-6520.2009.00318.x>

Lotfi, H., Douayri, K., Bouarir, H., & Boubker, O. (2023). Antecedents of civil engineering students' entrepreneurial intentions: Dataset article. *Data in Brief*, 49, 109410. <https://doi.org/10.1016/j.dib.2023.109410>

Maheshwari, G., & Kha, K. L. (2022). Investigating the relationship between educational support and entrepreneurial intention in Vietnam: The mediating role of entrepreneurial self-efficacy in the theory of planned behaviour. *The International Journal of Management Education*, 20(2), 100553. <https://doi.org/10.1016/j.ijme.2021.100553>

Maritz, A., Perenyi, A., de Waal, G., & Buck, C. (2020). Entrepreneurship as the Unsung Hero during the Current COVID-19 Economic Crisis: Australian Perspectives. *Sustainability*, 12(11), 4612. <https://doi.org/10.3390/su12114612>

Mawardi, M. K., & Baihaqi, A. I. (2020). Impact of Attitudes Towards Entrepreneurship, Subjective Norms and Perceived Behavioural Control in Creating Entrepreneurial Intention: Proceedings of the 2nd Annual International Conference on Business and Public Administration (AICoBPA 2019). <https://doi.org/10.2991/aebmr.k.201116.010>

Miriti, D. G. M. (2020). An Exploration of Entrepreneurial Intentions among University Students in Kenya. 4(12), 9.

Mishra, A., & Singh, P. (2022). Attitude, Subjective Norms, and Perceived Behavioural Control as Predictors of Entrepreneurial Intentions Among Engineering Students. *Prabandhan: Indian Journal of Management*, 15(5), 43.

<https://doi.org/10.17010/pijom/2022/v15i5/169580>

Mohammed, B. S., Fethi, A., & Djaoued, O. B. (2017). The Influence of Attitude, Subjective Norms and Perceived Behaviour Control on Entrepreneurial Intentions: Case of Algerian Students. *American Journal of Economics*, 10.

Mortan, R. A., Ripoll, P., Carvalho, C., & Bernal, M. C. (2014). Effects of emotional intelligence on entrepreneurial intention and self-efficacy. *Revista de Psicología Del Trabajo y de Las Organizaciones*, 30(3), 97–104. <https://doi.org/10.1016/j.rpto.2014.11.004>

Mouselli, S., & Khalifa, B. (2017). Entrepreneurship in Crisis: The Determinants of Syrian Students' Entrepreneurial Intentions. *Business, Management and Education*, 15(2), 159–173.

<https://doi.org/10.3846/bme.2017.386>

Mwiya, B., Wang, Y., Shikaputo, C., Kaulung'ombe, B., & Kayekesi, M. (2017). Predicting the Entrepreneurial Intentions of University Students: Applying the Theory of Planned Behaviour in Zambia, Africa (SSRN Scholarly Paper ID 3023294). Social Science Research Network. <https://doi.org/10.2139/ssrn.3023294>

Na-Allah, S. R., & Ahmad, N. H. (2022). Entrepreneurial Orientation and Venture Creation in Nigerian Context: Assessing Mediating and Moderating Roles of Self-Efficacy and Entrepreneurial Support among Graduates. *Sustainability*, 14(9), 4904. <https://doi.org/10.3390/su14094904>

Nabi, G., Walmsley, A., Liñán, F., Akhtar, I., & Neame, C. (2018). Does entrepreneurship education in the first year of higher education develop entrepreneurial intentions? The role of learning and inspiration. *Studies in Higher Education*, 43(3), 452–467. <https://doi.org/10.1080/03075079.2016.1177716>

Nabil, A.-Q. (2021). Toward a Comprehensive Model on Entrepreneurial Intentions of University Students. *Open Journal of Business and Management*, 09(01), 114–135. <https://doi.org/10.4236/ojbm.2021.91007>

Neneh, B. N. (2022). Entrepreneurial passion and entrepreneurial intention: The role of social support and entrepreneurial self-efficacy. *Studies in Higher Education*, 47(3), 587–603. <https://doi.org/10.1080/03075079.2020.1770716>

Nguyen, P.-H., Tsai, J.-F., Lin, M.-H., & Hu, Y.-C. (2021). A Hybrid Model with Spherical Fuzzy-AHP, PLS-SEM and ANN to Predict Vaccination Intention against COVID-19. *Mathematics*, 9(23), 3075. <https://doi.org/10.3390/math9233075>

Nithya, D. N. (2022). A Psychology Analysis of Entrepreneurial Intention among Indian Students: A Metadata Analysis towards building a Conceptual Framework. 20(5), 25.

Nunnally, J. C. (1967). *Psychometric theory*. (pp. xiii, 640). McGraw-Hill.

Nwosu, H. E., Obidike, P. C., Ugwu, J. N., Udeze, C. C., & Okolie, U. C. (2022). Applying social cognitive theory to placement learning in business firms and students' entrepreneurial intentions. *The International Journal of Management Education*, 20(1), 100602. <https://doi.org/10.1016/j.ijme.2022.100602>

Omidi Najafabadi, M., Zamani, M., & Mirdamadi, M. (2016). Designing a model for entrepreneurial intentions of agricultural students. *Journal of Education for Business*, 91(6), 338–346. <https://doi.org/10.1080/08832323.2016.1218318>

Paray, Z. A., & Kumar, S. (2020). Does entrepreneurship education influence entrepreneurial intention among students in HEI's?: The role of age, gender and degree background. *Journal of International Education in Business*, 13(1), 55–72. <https://doi.org/10.1108/JIEB-02-2019-0009>

Parkinson, J., David, P., & Rundle-Thiele, S. (2017). Self-efficacy or perceived behavioural control: Which influences consumers' physical activity and healthful eating behaviour maintenance? *Journal of Consumer Behaviour*, 16(5), 413–423. <https://doi.org/10.1002/cb.1641>

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioural research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>

Qasem, Y. A. M., Asadi, S., Abdullah, R., Yah, Y., Atan, R., Al-Sharafi, M. A., & Yassin, A. A. (2020). A Multi-Analytical Approach to Predict the Determinants of Cloud Computing Adoption in Higher Education Institutions. *Applied Sciences*, 10(14), 4905. <https://doi.org/10.3390/app10144905>

Rahmawati, N., Darmayanti, Y., & Putri, D. (2022). THE EFFECT OF ABILITY, SOCIO DEMOGRAFI AND SELF EFFICACY ON ENTREPRENEURIAL INTENTION OF MENTAWAI ISLAND INDIGENOUS COMMUNITY. *Jurnal Manajemen Universitas Bung Hatta*, 17(1), 24–32. <https://doi.org/10.37301/jmubh.v17i1.19967>

Ratten, V. (2020). Coronavirus (Covid-19) and the entrepreneurship education community. *Journal of Enterprising Communities: People and Places in the Global Economy*, 14(5), 753–764. <https://doi.org/10.1108/JEC-06-2020-0121>

Ratten, V., & Jones, P. (2021a). Covid-19 and entrepreneurship education: Implications for advancing research and practice. *The International Journal of Management Education*, 19(1), 100432. <https://doi.org/10.1016/j.ijme.2020.100432>

Ratten, V., & Jones, P. (2021b). Entrepreneurship and management education: Exploring trends and gaps. *The International Journal of Management Education*, 19(1), 100431. <https://doi.org/10.1016/j.ijme.2020.100431>

Rehan, M. F., Mumtaz, R., & Khan, Q. I. (2021). Effect of COVID 19 Crises on Entrepreneurship Readiness of University Students in Pakistan. *Sustainable Business and Society in Emerging Economies*, 3(4), 485–495. <https://doi.org/10.26710/sbsee.v3i4.2006>

Roy, R., & Das, N. (2022). Exploring entrepreneurial intention among engineering students in India: A multiple basket approach. *International Journal of Technology and Design Education*, 32(1), 555–584. <https://doi.org/10.1007/s10798-020-09596-9>

Ruiz-Rosa, I., Gutiérrez-Taño, D., & García-Rodríguez, F. J. (2020). Social Entrepreneurial Intention and the Impact of COVID-19 Pandemic: A Structural Model. *Sustainability*, 12(17), 6970. <https://doi.org/10.3390/su12176970>

Santos, F. J., Roomi, M. A., & Liñán, F. (2016). About Gender Differences and the Social Environment in the Development of Entrepreneurial Intentions. *Journal of Small Business Management*, 54(1), 49–66. <https://doi.org/10.1111/jsbm.12129>

Sharma, P. N., Shmueli, G., Sarstedt, M., Danks, N., & Ray, S. (2021). Prediction-Oriented Model Selection in Partial Least Squares Path Modeling. *Decision Sciences*, 52(3), 567–607. <https://doi.org/10.1111/deci.12329>

Shmueli, G., Ray, S., Velasquez Estrada, J. M., & Chatla, S. B. (2016). The elephant in the room: Predictive performance of PLS models. *Journal of Business Research*, 69(10), 4552–4564. <https://doi.org/10.1016/j.jbusres.2016.03.049>

Solesvik, M. Z. (2013). Entrepreneurial motivations and intentions: Investigating the role of education major. *Education + Training*, 55(3), 253–271. <https://doi.org/10.1108/00400911311309314>

Soper, D. S. (2022). A-priori Sample Size Calculator for Structural Equation Model. <https://www.danielsoper.com/statcalc>

Tavousi, M., Hidarnia, A., Montazeri, A., Hajizadeh, E., Taremian, F., & Ghofranipour, F. (2009). Are perceived Behavioural Control and Self-Efficacy Distinct Constructs? *EuroJournals Publishing, Inc.* 2009, 30(1), 146–152.

Teo, A.-C., Tan, G. W.-H., Ooi, K.-B., Hew, T.-S., & Yew, K.-T. (2015). The effects of convenience and speed in m-payment. *Industrial Management & Data Systems*, 115(2), 311–331. <https://doi.org/10.1108/IMDS-08-2014-0231>

Teo, T. S. H., Srivastava, S. C., & Jiang, L. (2008). Trust and Electronic Government Success: An Empirical Study. *Journal of Management Information Systems*, 25(3), 99–132. <https://doi.org/10.2753/MIS0742-1222250303>

Thompson, R., Compeau, D., Higgins, C., & Lupton, N. (2008). Intentions to Use Information Technologies: An Integrative Model. In S. Clarke (Ed.), *Advances in End User Computing* (pp. 79–101). IGI Global. <https://doi.org/10.4018/978-1-59904-295-4.ch006>

Verma, J. (2022). Assessing Government Initiatives Towards the Development of Entrepreneurship in India: In S. Inder, A. Singh, & S. Sharma (Eds.), *Advances in Finance, Accounting, and Economics* (pp. 44–53). IGI Global. <https://doi.org/10.4018/978-1-6684-4745-1.ch004>

Wilson, F., Kickul, J., & Marlino, D. (2007). Gender, Entrepreneurial Self-Efficacy, and Entrepreneurial Career Intentions: Implications for Entrepreneurship Education. *Entrepreneurship Theory and Practice*, 31(3), 387–406. <https://doi.org/10.1111/j.1540-6520.2007.00179.x>

Wongsaichia, S., Naruetharadhol, P., Schrank, J., Phoomsom, P., Sirisoonthonkul, K., Paiyasen, V., Srichaingwang, S., & Ketkaew, C. (2022). Influences of Green Eating Behaviours Underlying the Extended Theory of Planned Behaviour: A Study of Market Segmentation and Purchase Intention. *Sustainability*, 14(13), 8050. <https://doi.org/10.3390/su14138050>

Yeh, C.-H., Lin, H.-H., Wang, Y.-M., Wang, Y.-S., & Lo, C.-W. (2021). Investigating the relationships between entrepreneurial education and self-efficacy and performance in the context of internet entrepreneurship. *The International Journal of Management Education*, 19(3), 100565. <https://doi.org/10.1016/j.ijme.2021.100565>

Zhang, J., & Huang, J. (2021). Entrepreneurial Self-Efficacy Mediates the Impact of the Post-pandemic Entrepreneurship Environment on College Students' Entrepreneurial Intention. *Frontiers in Psychology*, 12, 643184. <https://doi.org/10.3389/fpsyg.2021.643184>

Zhao, H., Seibert, S. E., & Hills, G. E. (2005). The Mediating Role of Self-Efficacy in the Development of Entrepreneurial Intentions. *Journal of Applied Psychology*, 90(6), 1265–1272. <https://doi.org/10.1037/0021-9010.90.6.1265>

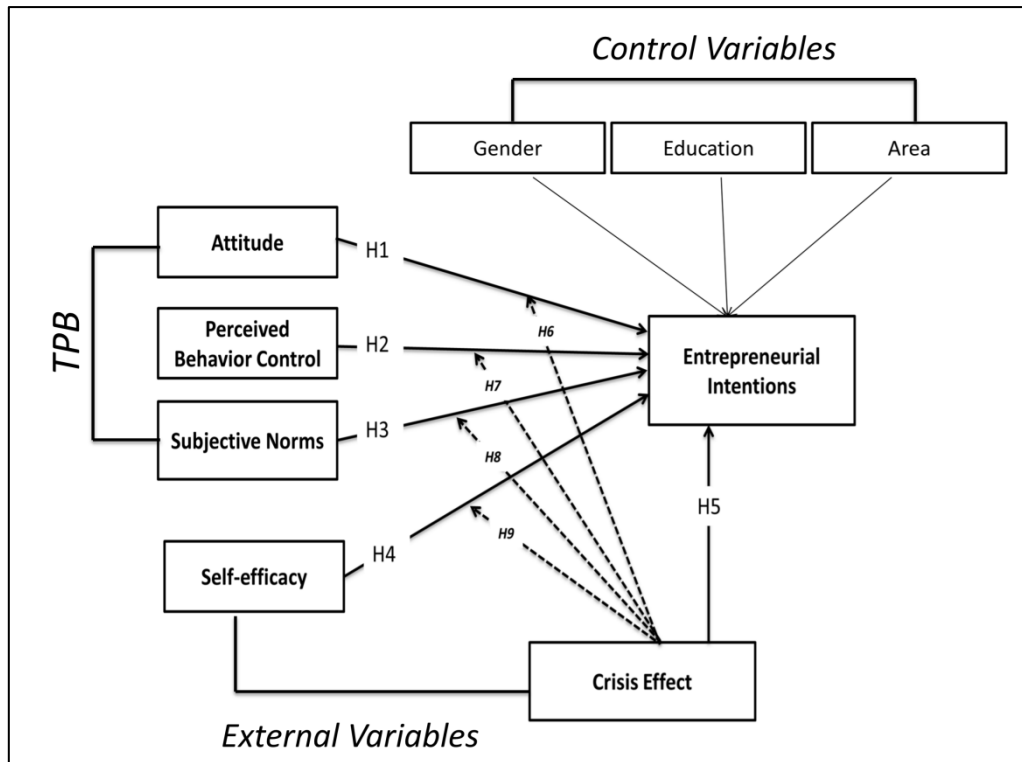


Figure 1. Research model

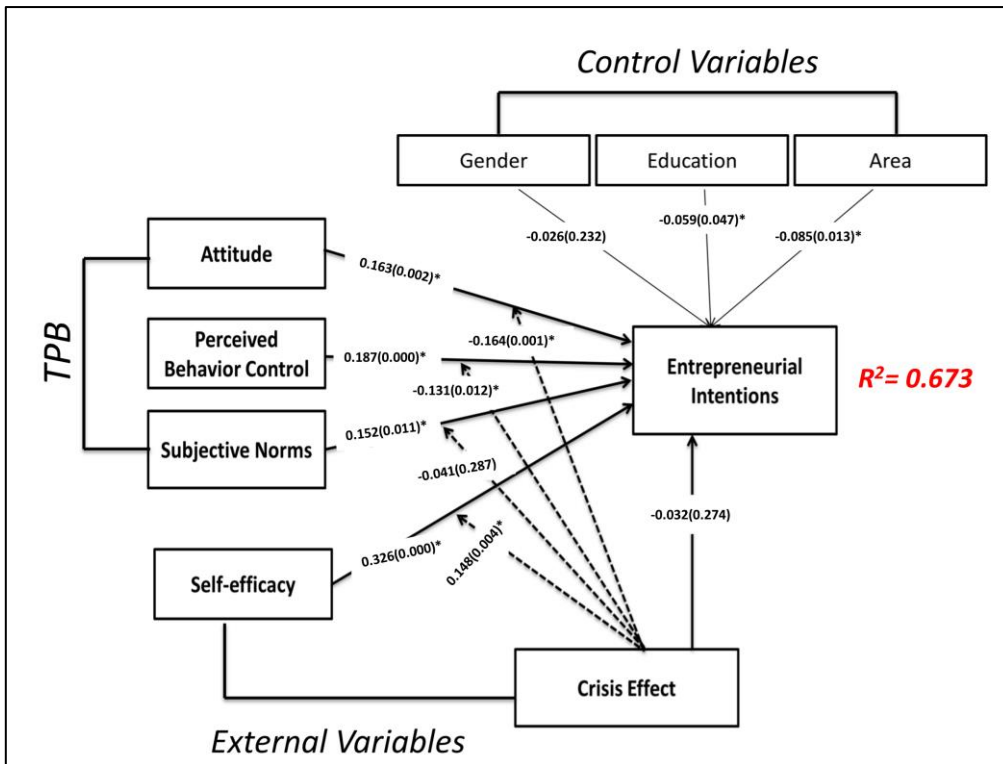


Figure 2. Coefficient path test of the proposed research model

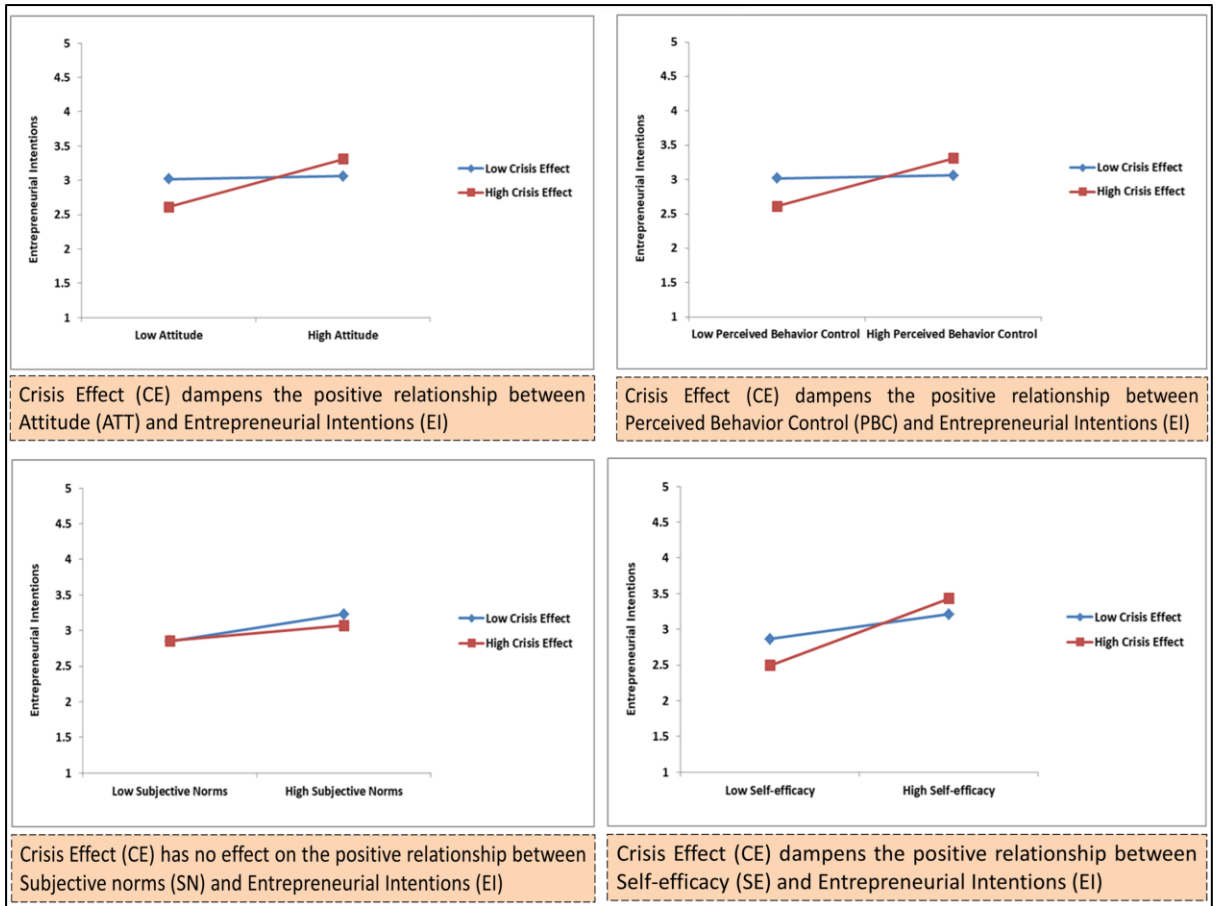
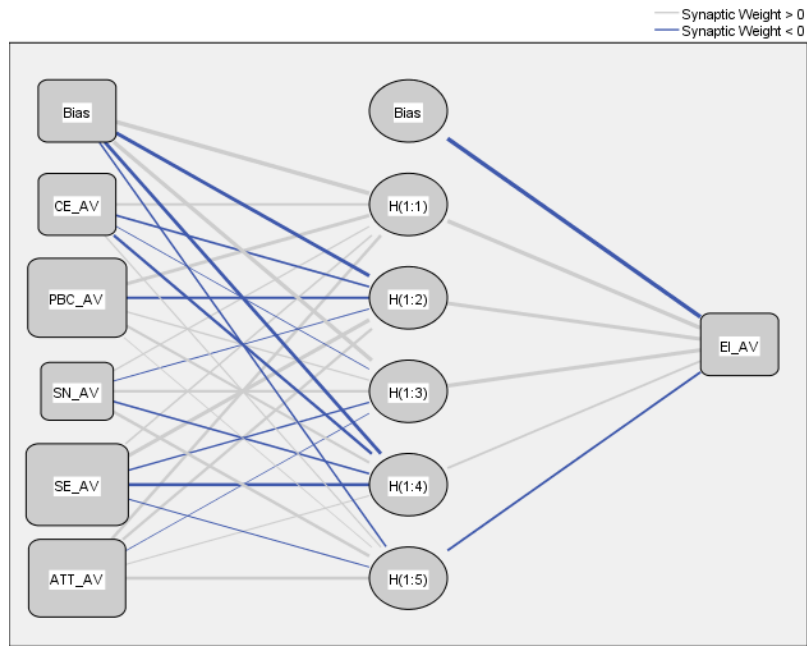


Figure 3. Moderation effects



Hidden layer activation function: Hyperbolic tangent

Output layer activation function: Identity

Figure 4. ANN model

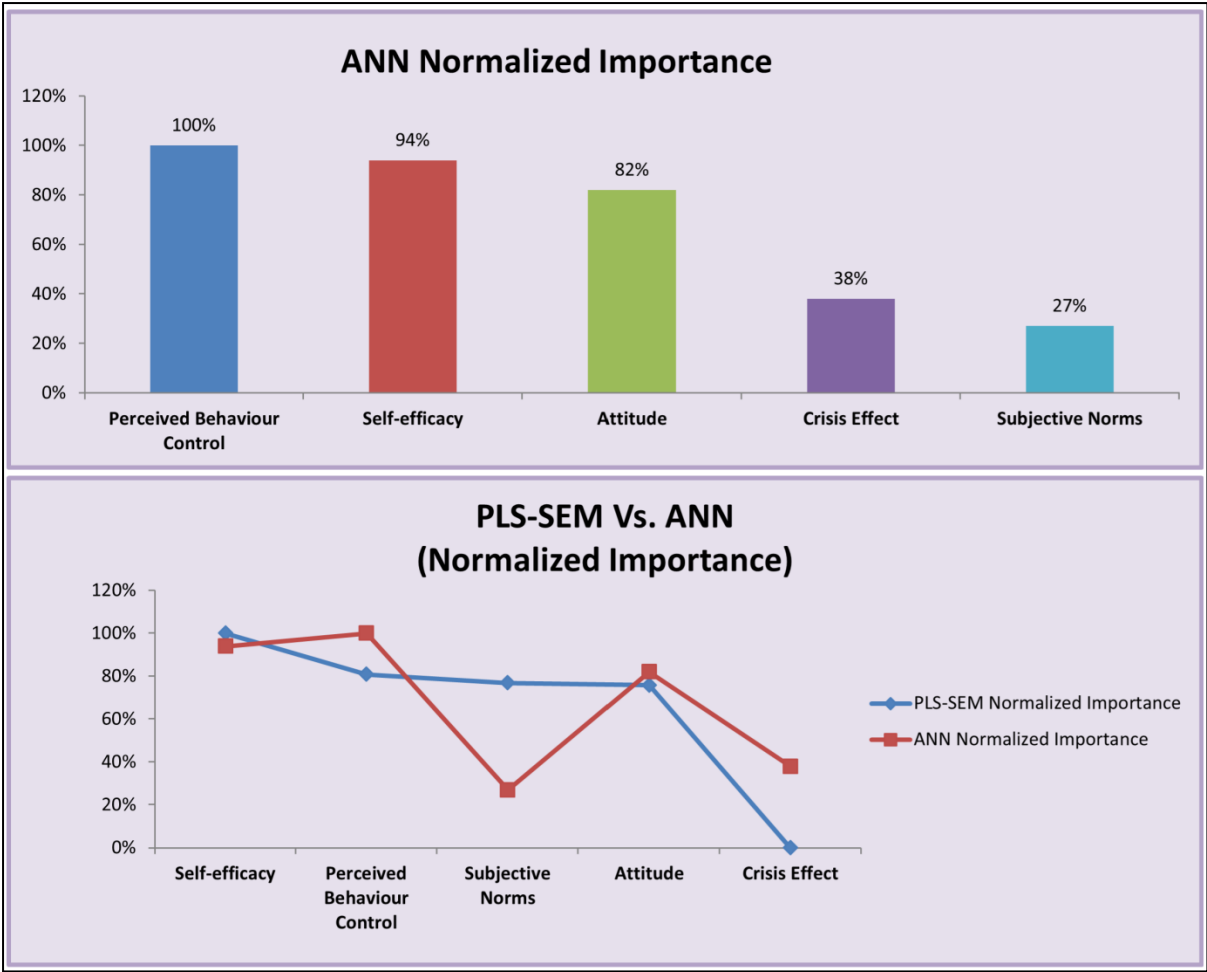


Figure 5. ANN Normalized Importance and comparison among PLS-SEM and ANN

Table 1. Profile of respondents.

| Variable | Categories | Frequencies | Percentage |
|-------------------------|---------------|-------------|------------|
| Gender | Male | 129 | 41.60% |
| | Female | 181 | 58.40% |
| Education Qualification | Postgraduate | 159 | 51.30% |
| | Undergraduate | 151 | 48.70% |
| Area | Urban | 175 | 56.50% |
| | Rural | 135 | 43.50% |
| Stream | Science | 105 | 33.90% |
| | Art | 90 | 29% |
| | Commerce | 115 | 37.10% |

Table 2. Constructs reliability and validity.

| Constructs | Items | Factor loading | Cronbach's alpha | CR | AVE | VIF |
|-----------------------------|-------|----------------|------------------|-------|-------|-------|
| Attitude Towards Behaviour | ATT1 | 0.852 | 0.911 | 0.911 | 0.673 | 2.518 |
| | ATT2 | 0.815 | | | | 2.394 |
| | ATT3 | 0.754 | | | | 2.393 |
| | ATT4 | 0.808 | | | | 2.444 |
| | ATT5 | 0.867 | | | | 2.939 |
| Crisis Effect | CE1 | 0.837 | 0.918 | 0.919 | 0.739 | 2.379 |
| | CE2 | 0.903 | | | | 3.665 |
| | CE3 | 0.861 | | | | 3.633 |
| | CE4 | 0.835 | | | | 2.840 |
| Entrepreneurial Intentions | EI1 | 0.834 | 0.920 | 0.920 | 0.698 | 2.551 |
| | EI2 | 0.843 | | | | 2.925 |
| | EI3 | 0.795 | | | | 2.614 |
| | EI4 | 0.831 | | | | 2.874 |
| | EI5 | 0.872 | | | | 2.690 |
| Perceived Behaviour Control | PBC1 | 0.648 | 0.841 | 0.839 | 0.569 | 1.687 |
| | PBC2 | 0.742 | | | | 2.157 |
| | PBC3 | 0.732 | | | | 2.137 |
| | PBC4 | 0.878 | | | | 1.750 |
| Self-efficacy | SE1 | 0.655 | 0.851 | 0.851 | 0.534 | 1.741 |
| | SE2 | 0.740 | | | | 1.836 |
| | SE3 | 0.802 | | | | 1.890 |
| | SE4 | 0.689 | | | | 1.771 |
| | SE5 | 0.759 | | | | 1.983 |

| | | | | | | |
|------------------|-----|-------|-------|-------|-------|-------|
| Subjective Norms | SN1 | 0.796 | 0.921 | 0.922 | 0.663 | 2.333 |
| | SN2 | 0.817 | | | | 2.595 |
| | SN3 | 0.757 | | | | 2.632 |
| | SN4 | 0.759 | | | | 2.181 |
| | SN5 | 0.860 | | | | 2.840 |
| | SN6 | 0.886 | | | | 3.021 |

Table 3. Fornell-Larckers criterion and HTMT ratio

| Constructs | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|--------------|
| 1. Attitude | 0.820 | | | | | |
| 2. Crisis Effect | 0.657 (0.656) | 0.860 | | | | |
| 3. Entrepreneurial Intentions | 0.664 (0.663) | 0.553 (0.553) | 0.836 | | | |
| 4. Perceived Behaviour Control | 0.389 (0.386) | 0.365 (0.366) | 0.593 (0.589) | 0.754 | | |
| 5. Self-efficacy | 0.716 (0.717) | 0.683 (0.682) | 0.745 (0.743) | 0.471 (0.470) | 0.731 | |
| 6. Subjective Norms | 0.625 (0.625) | 0.602 (0.605) | 0.691 (0.691) | 0.516 (0.517) | 0.715 (0.717) | 0.814 |

Table 4. Results of Hypotheses Testing.

| | Hypothesis | Model 1 | | Model 2 | | Model 3 | |
|-----------------------------|------------|-----------------|--------------|-----------------|--------------|-----------------|--------------|
| | | Sample Mean (M) | P Values | Sample Mean (M) | P Values | Sample Mean (M) | P Values |
| <i>Direct effects</i> | | | | | | | |
| ATT -> EI | H1 | 0.215 | 0.001 | 0.185 | 0.001 | 0.163 | 0.002 |
| PBC -> EI | H2 | 0.230 | 0.000 | 0.196 | 0.000 | 0.187 | 0.000 |
| SN -> EI | H3 | 0.222 | 0.001 | 0.148 | 0.011 | 0.152 | 0.011 |
| SE -> EI | H4 | 0.287 | 0.000 | 0.321 | 0.000 | 0.326 | 0.000 |
| CE -> EI | H5 | 0.008 | 0.886 | -0.038 | 0.237 | -0.032 | 0.274 |
| <i>Moderating variables</i> | | | | | | | |
| CE*ATT -> EI | H6 | | | -0.164 | 0.001 | -0.156 | 0.001 |
| CE*PBC -> EI | H7 | | | -0.131 | 0.012 | -0.126 | 0.011 |
| CE*SN -> EI | H8 | | | -0.041 | 0.287 | -0.052 | 0.238 |
| CE*SE -> EI | H9 | | | 0.148 | 0.004 | 0.148 | 0.004 |
| <i>Control variables</i> | | | | | | | |
| Gender -> EI | | | | | | -0.026 | 0.232 |
| Education -> EI | | | | | | 0.059 | 0.047 |
| Area -> EI | | | | | | -0.085 | 0.013 |

Note: Model 1 only includes direct effects of TPB variables and CE. Model 2 includes the moderating effects, and Model 3 includes the control variables.

Table 5. PLS Predict results.

| PLS | PLS-SEM | | | | LM | | | |
|------------|---------|-------|--------|-------------------------|-------|-------|--------|-------------------------|
| | RMSE | MAE | MAPE | Q ² _predict | RMSE | MAE | MAPE | Q ² _predict |
| EI1 | 1.122 | 0.896 | 23.104 | 0.452 | 1.194 | 0.940 | 24.127 | 0.379 |
| EI2 | 1.221 | 0.953 | 28.224 | 0.450 | 1.285 | 0.978 | 28.991 | 0.391 |
| EI3 | 1.237 | 0.959 | 27.215 | 0.422 | 1.320 | 1.031 | 29.777 | 0.342 |
| EI4 | 1.198 | 0.933 | 25.985 | 0.452 | 1.268 | 0.979 | 27.195 | 0.385 |
| EI5 | 1.202 | 0.935 | 25.266 | 0.480 | 1.272 | 1.006 | 26.498 | 0.418 |

Table 6. ANN- RMSE results.

| Training | | | Testing | | | Total Sample |
|--|--------|----------|--|--------|----------|--------------|
| Inputs: SE, PBC, ATT, SN, CE Output: EI | | | Inputs: SE, PBC, ATT, SN, CE Output: EI | | | |
| N | SSE | RMSE | N | SSE | RMSE | |
| 212 | 28.734 | 0.368154 | 98 | 21.021 | 0.463141 | 310 |
| 225 | 38.434 | 0.413301 | 85 | 13.241 | 0.394685 | 310 |
| 213 | 33.528 | 0.396747 | 97 | 14.324 | 0.384279 | 310 |
| 213 | 34.345 | 0.401552 | 97 | 16.584 | 0.413484 | 310 |
| 216 | 35.236 | 0.403893 | 94 | 14.445 | 0.392008 | 310 |
| 223 | 41.169 | 0.429668 | 87 | 12.586 | 0.380351 | 310 |
| 205 | 29.598 | 0.379974 | 105 | 16.702 | 0.398832 | 310 |
| 215 | 36.595 | 0.412564 | 95 | 14.141 | 0.385814 | 310 |
| 221 | 45.323 | 0.452859 | 89 | 17.993 | 0.449632 | 310 |
| 228 | 38.17 | 0.40916 | 82 | 18.22 | 0.471376 | 310 |
| MEAN | | 0.406787 | | | 0.41336 | |
| SD | | 0.023748 | | | 0.034752 | |

Note: SSE = Sum square of errors, RMSE = Root mean square of errors, N = sample size, SE=Self-Efficacy, PBC=Perceived Behaviour Control, ATT=Attitude, SN=Subjective Norms, CE=Crisis Effect and EI=Entrepreneurial Intentions

Table 7. Sensitivity analysis.

| Sensitivity Analysis (Importance) | | | | | |
|-----------------------------------|-------|-------|-------|-------|-------|
| | CE | PBC | SN | SE | ATT |
| ANN1 | 0.410 | 0.829 | 0.294 | 1.000 | 0.719 |
| ANN2 | 0.227 | 1.000 | 0.144 | 0.982 | 0.596 |
| ANN3 | 0.253 | 0.601 | 0.442 | 1.000 | 0.694 |
| ANN4 | 0.208 | 1.000 | 0.223 | 0.893 | 0.762 |
| ANN5 | 0.389 | 1.000 | 0.316 | 0.792 | 0.583 |
| ANN6 | 0.363 | 0.845 | 0.070 | 0.577 | 1.000 |
| ANN7 | 0.532 | 1.000 | 0.142 | 0.887 | 0.983 |
| ANN8 | 0.467 | 0.801 | 0.283 | 1.000 | 0.672 |
| ANN9 | 0.108 | 1.000 | 0.126 | 0.337 | 0.484 |
| ANN10 | 0.491 | 0.929 | 0.385 | 1.000 | 0.892 |
| Average Importance | 0.345 | 0.901 | 0.242 | 0.847 | 0.739 |
| Normalized Importance | 38% | 100% | 27% | 94% | 82% |
| Rank | 4 | 1 | 5 | 2 | 3 |

Appendix

Appendix A1. Pilot Testing

| Constructs | Items | Reliability |
|-----------------------------|-------|-------------|
| Attitude Towards Behaviour | 5 | 0.933 |
| Crisis Effect | 4 | 0.954 |
| Entrepreneurial Intentions | 5 | 0.925 |
| Perceived Behaviour Control | 4 | 0.792 |
| Self-efficacy | 5 | 0.907 |
| Subjective Norms | 6 | 0.947 |

Notes: Pilot test was conducted on a sample of 60

Appendix A2. Results of Harman single factor analysis

| Total Variance Explained | | | | | | |
|--------------------------|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|
| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 13.19 | 45.482 | 45.482 | 13.19 | 45.482 | 45.482 |
| 2 | 2.335 | 8.052 | 53.534 | | | |
| 3 | 1.666 | 5.745 | 59.279 | | | |
| 4 | 1.531 | 5.28 | 64.559 | | | |
| 5 | 1.262 | 4.353 | 68.911 | | | |
| 6 | 1.093 | 3.771 | 72.682 | | | |
| 7 | 0.618 | 2.131 | 74.813 | | | |
| 8 | 0.596 | 2.054 | 76.867 | | | |
| 9 | 0.555 | 1.915 | 78.782 | | | |
| 10 | 0.502 | 1.73 | 80.512 | | | |
| 11 | 0.471 | 1.624 | 82.135 | | | |
| 12 | 0.426 | 1.471 | 83.606 | | | |
| 13 | 0.387 | 1.333 | 84.939 | | | |
| 14 | 0.376 | 1.297 | 86.236 | | | |
| 15 | 0.365 | 1.258 | 87.494 | | | |
| 16 | 0.344 | 1.187 | 88.681 | | | |
| 17 | 0.33 | 1.138 | 89.819 | | | |
| 18 | 0.319 | 1.099 | 90.919 | | | |
| 19 | 0.301 | 1.039 | 91.958 | | | |
| 20 | 0.298 | 1.026 | 92.984 | | | |
| 21 | 0.285 | 0.984 | 93.968 | | | |
| 22 | 0.266 | 0.917 | 94.885 | | | |
| 23 | 0.247 | 0.85 | 95.735 | | | |
| 24 | 0.241 | 0.83 | 96.565 | | | |
| 25 | 0.236 | 0.814 | 97.379 | | | |
| 26 | 0.224 | 0.773 | 98.152 | | | |
| 27 | 0.207 | 0.715 | 98.867 | | | |
| 28 | 0.173 | 0.598 | 99.465 | | | |
| 29 | 0.155 | 0.535 | 100 | | | |

Appendix A3. Effect size

| | f-square |
|---|----------|
| Area -> EI | 0.02 |
| Attitude -> EI | 0.037 |
| Crisis Effect -> EI | 0.002 |
| Education -> EI | 0.01 |
| Gender -> EI | 0.003 |
| Perceived Behaviour Control -> EI | 0.069 |
| Self-Efficacy -> EI | 0.122 |
| Subjective Norms -> EI | 0.03 |
| Crisis Effect x Attitude -> EI | 0.036 |
| Crisis Effect x Perceived Behaviour Control -> EI | 0.027 |
| Crisis Effect x Subjective Norms -> EI | 0.003 |
| Crisis Effect x Self Efficacy -> EI | 0.029 |

Appendix A4. Goodness of fit

| | Saturated model | Estimated model |
|------------|-----------------|-----------------|
| SRMR | 0.041 | 0.042 |
| d_ULS | 0.888 | 0.921 |
| d_G | 0.436 | 0.438 |
| Chi-square | 777.061 | 779.08 |
| NFI | 0.885 | 0.885 |