Method Article

The effect of action-based entrepreneurship education on intention to become an entrepreneur

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ABSTRACT

The kingdom of Morocco has launched over the last decade major reform projects in order to strengthen youth entrepreneurship. Therefore, it is important to identify factors contributing to enhanced youth entrepreneurship activity. Hence, this method article examines the determinants of public university students’ entrepreneurial intention, by focusing on the importance of action-based entrepreneurship education. Data were collected using a face-to-face questionnaire from management students who had completed a program in action-based entrepreneurship. The data analysis design incorporates both exploratory (PCA using IBM SPSS Statistics 26) and confirmatory factor analysis (PLS-SEM using SmartPLS 3). Findings showed that action-based entrepreneurship education positively and significantly affects attitude towards entrepreneurship, and perceived entrepreneurial capacity. In addition, social norms positively influence attitude towards entrepreneurship and perceived entrepreneurial capacity, which turns to enhance students’ entrepreneurial intention. Managers of Moroccan higher schools of technology may use this method article to pinpoint critical factors for enhancing students’ entrepreneurial intention.

- This method article proposes a practical approach to teaching entrepreneurship based on the learning-by-doing approach.
- This method article can be used as a reference for researchers interested in studying the role of entrepreneurship education in promoting entrepreneurship in universities.
- This method article can be used in order to identify the determinants of entrepreneurial intent among engineering students.

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Method details

With the aim of evaluating the effect of action-based entrepreneurship education on students’ attitude towards entrepreneurship, perceived entrepreneurial capacity, and students’ intentions to start up a business, this study mobilizes the exploratory factor analysis and the confirmatory factor analysis as two complementary approaches [1]. Fig. 1 outputs the different steps of the method implementation.

Table 1 synthesizes the different steps of setting up the exploratory and confirmatory factorial analysis. We performed principal component analysis (PCA) to purify the measurement scales. Further, we performed a structural equation modeling (SEM) to test hypotheses and the research model.

Conceptual model

The conceptual model of this study was built on the expansion of the theory of planned behavior, by adding entrepreneurship education. Fig. 2 outlines the conceptual model, which supposes the direct and positive effect of entrepreneurship education on attitude towards entrepreneurship (H1), and perceived entrepreneurial capacity (H2). This model also indicates that social norms influence attitude towards entrepreneurship (H3), perceived entrepreneurial capacity (H4), and students’ entrepreneurial intentions (H5). In addition, attitude towards entrepreneurship (H6), and perceived entrepreneurial capacity (H7) positively influence students’ entrepreneurial intentions.

Constructs operationalization

For operationalization of the constructs, we used measurement scales selected from existing studies. Therefore, attitude towards entrepreneurship (ATE) was measured with five items [3]. We selected four items to measure social norms (SON) [4]. The measurement scale for perception of entrepreneurial capacity (ENC) comprised 14 items [5]. The students’ entrepreneurial intentions were measured using six items [6]. Entrepreneurship education (ENE) was measured using eight items [7]. As well, a 7-item Likert-type scale ranging from 1 (total disagreement) to 7 (total agreement) was employed to measure the questions related to these variables.

The sampling frame consisted of final-year management students of Laayoune Higher School of Technology, including professional bachelor and university diploma of technology students.
These students underwent 50 hours of entrepreneurship and project management education. At this level, the pedagogical program adopted was designed around the learning by doing approach, which was conducted in three steps. The first step provided students with a theoretical background of entrepreneurship, by focusing on project management methods, entrepreneurial approach, entrepreneurial culture, entrepreneurs’ typology, idea and business opportunity, and business model canvas. The second step consisted of in-group workshops composed of five students, working together on a business idea, market study, and the elaboration of the financial plan. After this second step, the last step consisted in organizing a business plan competition in order to conduct an individual and collective evaluation. This training program is designed to build a positive attitude among management students in terms of self-efficacy and tolerance for ambiguity, as well as to improve their knowledge and skills, particularly in marketing, finance, problem-solving and critical thinking [8].

Data collection technique

The questionnaire was conducted face-to-face among students who validated this training program, during a week-long period in April 2019. At this stage, 98 eligible responses have been obtained. As
Fig. 2. Research model.

H_2

Entrepreneurial education

H_3

Attitude towards entrepreneurship

H_4

Social norms

H_5

Students' entrepreneurial intentions

H_6

H_7

Perceived entrepreneurial capacity
First stage. Principal component analysis
Checking conditions of PCA implementation
Bartlett’s Sphericity Test
Kaiser-Meyer-Oklin (KMO)

Determining the number of factors to be considered
Kaiser criterion
Examination of eigenvalues

Factorial solution
Varimax rotation - Orthogonal rotation: in order to streamline interpretation of the factors

For Reliability analysis
Cronbach alpha

Second stage. CFA - Partial least squares structural equation modeling (PLS-SEM)

A Outer model evaluation (reflective model)

Convergent validity
Cronbach’s alpha
Reliability
Composite reliability
Loadings
Average variance extracted

Discriminant Validity assessment
Cross-loadings
Heterotrait-Monotrait Ratio
Fornell-Larcker criterion

A Second stage: Inner model evaluation

Endogenous latent variables coefficient of determination
R² < 0.19
0.19 ≤ R² < 0.33
0.33 ≤ R² < 0.67
R² ≥ 0.67

Effect size
f² < 0.02
0.02 ≤ f² < 0.15
0.15 ≤ f² < 0.35
f² ≥ 0.35

Predictive relevance
Q Square
GoF < 0.10
0.1 ≤ GoF < 0.25
0.25 ≤ GoF < 0.36
GoF ≥ 0.36

Hypotheses testing
t-value = 1.96
Significant at p-value < 0.05*
t-value = 2.58
Significant at p-value < 0.01**
t-value = 3.29
Significant at p-value < 0.001***.

Table 1
Data analysis steps.

| Steps | Criteria | Accepted value |
|-------|----------|----------------|
| Checking conditions of PCA implementation | Bartlett’s Sphericity Test | p < 0.05 |
|        | Kaiser-Meyer-Oklin (KMO) | KMO < 0.5 Unacceptable |
|        |                      | 0.5 < KMO < 0.6 Miserable |
|        |                      | 0.6 < KMO < 0.7 Mediocre |
|        |                      | 0.7 < KMO < 0.8 Middling |
|        |                      | 0.8 < KMO < 0.9 Meritorious |
|        |                      | KMO > 0.9 Marvelous |
| Determining the number of factors to be considered | Kaiser criterion | % total variance explained > 60% |
|        | Examination of eigenvalues | Selection the factors before inflection point |
| Factorial solution | Varimax rotation - Orthogonal rotation: in order to streamline interpretation of the factors |
|        | by reducing the number of variables with strong correlations on each factorial axis. |
|        | Communalities | value must be higher than 0.4 |
|        | Factor loading | value must be higher than 0.5 |
| Reliability analysis | Cronbach alpha | α ≥ 0.60 |

Illustrated in Fig. 3, the sample included more females (65.3%) than males (34.7%), with the majority of them are aged between 19 and 23 years (68.4%). More than 54 percent of participants in this survey were students of the professional bachelor's degree in human resources management, whereas 45.9 percent of them were studying for a university diploma of technology in management techniques. Further, 58 percent of the interviewed students prefer entrepreneurship training based on the learning by doing approach. The largest proportion of surveyed students (84.7%) had no family background
![Socio-demographic characteristics of the surveyed students.](image)

**Fig. 3.** Socio-demographic characteristics of the surveyed students.
Table 2
Results of measurement scale purification using principal component analysis technique.

| Construct                          | Items          | KMO and Bartlett’s Test | Communalities | Loading | Reliability(α) | Total variance explained |
|-----------------------------------|----------------|-------------------------|---------------|---------|----------------|--------------------------|
|                                   |                | KMO                    | Approx. Chi-Square | df | Sig. |                  |                          |
| Entrepreneurial education (8 items) | ENE1, ENE2, ENE3, ENE4, ENE5, ENE6, ENE7, ENE8 | .855 | 542.537 | 28 | .000 | .645 | .803 | .916 | 63.37% |
| Attitude towards entrepreneurship (5 items) | ATE1, ATE2, ATE3, ATE4, ATE5 | .874 | 390.472 | 10 | .000 | .625 | .791 | .923 | 77.27% |
| Social norms (4 items) | SON1, SON2, SON3, SON4 | .746 | 101.615 | 6 | .000 | .506 | .711 | .767 | 59.35% |
| Perceived entrepreneurial capacity (4 items) | ENC1, ENC2, ENC3, ENC4, ENC5, ENC6, ENC7, ENC8, ENC9, ENC11, ENC12, ENC13, and ENC14 | .771 | 104.206 | 6 | .000 | .609 | .780 | .783 | 60.80% |
| Students’ entrepreneurial intentions (6 items) | ENC10, SEI1, SEI2, SEI3, SEI4, SEI5, SEI6 | .869 | 427.066 | 15 | .000 | .658 | .811 | .914 | 70.61% |

Extraction Method: Principal Component Analysis.

in entrepreneurial activities. Lastly, only 39.8 percent of them have previously been volunteers with associations.

**Finding and discussions**

**PCA results and discussion**

The implementation of the principal component analysis (PCA) procedure allowed the purification of the different measurement scales. Using the IBM SPSS Statistics 26, this technique allowed us to remove ten items serving to measure the perceived entrepreneurial capacity, including ENC2, ENC3, ENC4, ENC6, ENC8, ENC9, ENC11, ENC12, ENC13, and ENC14. These items showed low scores regarding commonality (< 0.4) and loading (< 0.5). In addition, the PCA indicated that for each of the measurement scales only a single factor was retained (Table 2).

**PLS-SEM results and discussion**

Table 3 presents the evaluation of the reflective measurement models. The average variance extracted, the Cronbach’s alpha, the reliability (ρ_A), and the composite reliability (ρ_C) values are higher than 0.5, 0.7, 0.7, and 0.7, respectively. Moreover, discriminant validity is checked using the Fornell-Larcker criterion [9], and the Heterotrait-Monotrait (HTMT) ratio [10]. Likewise, the discriminant validity was assessed according to the cross-loading (Table 4).

Table 5 shows the results of inner model assessment based on the coefficient of determination (R^2), and the predictive relevance (Q^2). The R^2 value of students’ entrepreneurial intentions,
Table 3
Assessment of constructs reliability and validity.

| Latent variable | Convergence validity | Fornell-Larcker criterion. | HTMT criterion. |
|-----------------|----------------------|-----------------------------|----------------|
|                 | AVE | α | ρ_A | ρ_C | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| 1. ATE          | 0.77 | 0.93 | 0.93 | 0.94 | 0.88 | | | | | 0.58 | | | | |
| 2. ENE          | 0.63 | 0.92 | 0.92 | 0.93 | 0.80 | | | | | 0.68 | | | | |
| 3. ENC          | 0.61 | 0.78 | 0.79 | 0.86 | 0.78 | | | | | 0.70 | | | | |
| 4. SON          | 0.59 | 0.77 | 0.78 | 0.85 | 0.57 | 0.77 | | | | 0.61 | | | | |
| 5. SEI          | 0.71 | 0.92 | 0.92 | 0.93 | 0.43 | 0.84 | 0.71 | | | 0.68 | 0.61 | | | |

Table 4
Assessment of constructs discriminant validity using cross loading.

| Latent variable | ATE | ENE | ENC | SON | SEI |
|-----------------|-----|-----|-----|-----|-----|
|                 | ATE1 | ATE2 | ATE3 | ATE4 | ATE5 |
|                 | 0.79 | 0.88 | 0.92 | 0.89 | 0.91 |
|                 | ATE6 | ATE7 | ATE8 | ATE9 | ATE10 |
|                 | 0.45 | 0.52 | 0.49 | 0.42 | 0.48 |
|                 | ENE1 | ENE2 | ENE3 | ENE4 | ENE5 |
|                 | 0.50 | 0.43 | 0.33 | 0.45 | 0.39 |
|                 | ENE6 | ENE7 | ENE8 | ENC1 | ENC5 |
|                 | 0.45 | 0.42 | 0.44 | 0.57 | 0.44 |
|                 | ENC6 | ENC7 | ENC8 | ENC9 | ENC10 |
|                 | 0.39 | 0.36 | 0.36 | 0.36 | 0.41 |
|                 | SON1 | SON2 | SON3 | SON4 | SEI1 |
|                 | 0.50 | 0.41 | 0.36 | 0.55 | 0.60 |
|                 | SON5 | SON6 | SEI2 | SEI3 | SEI4 |
|                 | 0.41 | 0.41 | 0.58 | 0.59 | 0.53 |
|                 | SEI5 | SEI6 | SEI7 | SEI8 | SEI9 |
|                 | 0.52 | 0.46 | 0.61 | 0.45 | 0.46 |

Table 5
Inner model assessment based on R² and Q².

| Latent variable | R Square | R Square Adjusted | Q Square |
|-----------------|----------|-------------------|----------|
| ATE             | 0.44     | 0.42              | 0.324    |
| ENC             | 0.40     | 0.39              | 0.220    |
| SEI             | 0.46     | 0.45              | 0.317    |

attitude towards entrepreneurship, and perceived entrepreneurial capacity are 0.46; 0.44 and 0.40, respectively. Also, the data analysis indicates that the Q square values of all endogenous constructs are above 0, which demonstrates an acceptable predictive relevance [11].

As shown in Table 6, all effect size values of exogenous construct on endogenous construct are acceptable, except the f² value of social norms on students’ entrepreneurial intentions, which is 0.001.

The goodness-of-fit calculation is displayed in Table 7, with a GoF value of 0.54, which is significantly above 0.36; we can confirm the large goodness-of-fit of the model [12].
Fig. 4. Inner model assessment.
Table 6
Inner model assessment based on the effect size values.

| Exogenous construct | Endogenous construct | F Square value | Signification       |
|---------------------|----------------------|----------------|---------------------|
| ENE → ATE           |                      | 0.123          | Small effect size   |
| ENE → ENC           |                      | 0.129          | Small effect size   |
| SON → ATE           |                      | 0.260          | Moderate effect size|
| SON → ENC           |                      | 0.196          | Moderate effect size|
| SON → SEI           |                      | 0.001          | No effect size      |
| ATE → SEI           |                      | 0.300          | Moderate effect size|
| ENC → SEI           |                      | 0.054          | Small effect size   |

Table 7
Inner model assessment based on the goodness-of-fit of the model.

| Latent variable | R Square | AVE | GOF               |
|-----------------|----------|-----|-------------------|
| ENE             | 0.63     |     | GoF = \sqrt{R^2 \times AVE} = 0.54 |
| SON             | 0.59     |     |                   |
| ATE             | 0.44     | 0.77|                   |
| ENC             | 0.40     | 0.61|                   |
| SEI             | 0.46     | 0.71|                   |

Table 8
Inner model assessment - Hypotheses testing.

| Hypotheses | Original Sample | Sample Mean | Standard Deviation | T Statistics | P Values | Outputs |
|------------|-----------------|-------------|--------------------|--------------|----------|---------|
| H₁ ENE → ATE | 0.308 | 0.315 | 0.121 | 2.536 | 0.011 | Accepted |
| H₂ ENE → ENC | 0.325 | 0.319 | 0.131 | 2.481 | 0.013 | Accepted |
| H₃ SON → ATE | 0.447 | 0.443 | 0.120 | 3.716 | 0.000 | Accepted |
| H₄ SON → ENC | 0.400 | 0.405 | 0.133 | 3.011 | 0.003 | Accepted |
| H₅ SON → SEI | -0.026 | -0.039 | 0.152 | 0.170 | 0.865 | Rejected |
| H₆ ATE → SEI | 0.543 | 0.568 | 0.156 | 3.481 | 0.001 | Accepted |
| H₇ ENC → SEI | 0.222 | 0.212 | 0.112 | 1.992 | 0.046 | Accepted |

As indicated in Table 8, the findings show that entrepreneurial education significantly influence on attitude towards entrepreneurship (ENE→ ATE: \( β \)-value= 0.308; \( p \)-value= 0.011), and perceived entrepreneurial capacity (ENE→ ENC: \( β \)-value= 0.325; \( p \)-value= 0.013). Furthermore, social norms positively impact on attitude towards entrepreneurship (SON→ ATE: \( β \)-value= 0.447; \( p \)-value= 0.000), and perceived entrepreneurial capacity (SON→ ENC: \( β \)-value= 0.400; \( p \)-value= 0.003). In addition, attitude towards entrepreneurship (ATE→ SEI: \( β \)-value= 0.543; \( p \)-value= 0.001), and perceived entrepreneurial capacity (ENC→ SEI: \( β \)= 0.222; \( p \)-value= 0.046) significantly and positively influence on students’ entrepreneurial intentions. However, the association between social norms and students’ entrepreneurial intentions (SON→ SEI: \( p \)-value= 0.865) were found to be not significant (Fig. 4).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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CRediT author statement

Omar Boubker: Writing - original draft, Conceptualization, Methodology, Data curation, Formal analysis using SmartPLS. Khaled Naoui: Draft preparation, Reviewing and Editing. Maryem Arroud:
Writing - original draft, draft preparation. **Abdelaziz Ouajdouni**: Review and Editing, translation and reviewing.

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**References**

[1] R. Cudeck, 10 - exploratory factor analysis, in: H.E.A. Tinsley, S.D. Brown (Eds.), Handb. Appl. Multivar. Stat. Math. Model., Academic Press, San Diego, 2000, pp. 265–296, doi: 10.1016/B978-012691360-6/50011-2.

[2] J.F. Hair, J.J. Risher, M. Sarstedt, C.M. Ringle, When to use and how to report the results of PLS-SEM, Eur. Bus. Rev. 31 (2019) 2–24, doi: 10.1108/EBR-11-2018-0203.

[3] M. Bachiri, Les déterminants de l’intention entrepreneuriale des étudiants, quels enseignements pour l’université marocaine? Manag. Avenir. 89 (2016) 109–127, doi: 10.3917/man.089.0109.

[4] J.-P. Boissin, V. Favre-Bonté, S. Fine-Falcy, Diverse impacts of the determinants of entrepreneurial intention: three submodels, three student profiles, Rev. L’Entrepreneuriat. 16 (2017) 17, doi: 10.3917/entre.163.0017.

[5] J. Boissin, B. Chollet, S. Emin, Les déterminants de l’intention de créer une entreprise chez les étudiants : un test empirique, M@n@gement 12 (2009) 28–51, doi: 10.3917/mana.121.0028.

[6] F. Liñán, J.C. Rodríguez-Cohard, J.M. Rueda-Cantuche, Factors affecting entrepreneurial intention levels: a role for education, Int. Entrep. Manag. J. 7 (2011) 195–218, doi: 10.1007/s11365-010-0154-z.

[7] A.A. Adekiya, F. Ibrahim, Entrepreneurship intention among students. The antecedent role of culture and entrepreneurship training and development, Int. J. Manag. Educ. 14 (2016) 116–132, doi: 10.1016/j.ijjme.2016.01.001.

[8] O. Boubker, M. Arroud, A. Ouajdouni, Entrepreneurship education versus management students’ entrepreneurial intentions. A PLS-SEM approach, Int. J. Manag. Educ. 19 (2021) 100450, doi: 10.1016/j.ijjme.2020.100450.

[9] C. Fornell, D.F. Larcker, Evaluating Structural Equation Models with Unobservable Variables and Measurement Error, J. Mark. Res. 18 (1981) 39–50, doi: 10.1177/002224378101800104.

[10] J. Henseler, C.M. Ringle, M. Sarstedt, A new criterion for assessing discriminant validity in variance-based structural equation modeling, J. Acad. Mark. Sci. 43 (2015) 115–135, doi: 10.1007/s11747-014-0403-8.

[11] J.F. Hair, M.C. Howard, C. Nitzl, Assessing measurement model quality in PLS-SEM using confirmatory composite analysis, J. Bus. Res. 109 (2020) 101–110, doi: 10.1016/j.jbusres.2019.11.069.

[12] O. Boubker, K. Douayri, Dataset on the relationship between consumer satisfaction, brand attitude, brand preference and purchase intentions of dairy product: the case of the Laayoune-Sakia El Hamra region in Morocco, Data Brief 32 (2020) 106172, doi: 10.1016/j.dib.2020.106172.