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MULTIDIMENSIONAL SKILL DEVELOPMENT AND ENTREPRENEURIAL INTENTION: EVIDENCE FROM VOCATIONAL TRAINING PARTICIPANTS IN INDIA

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Abstract
Vocational training plays an important role in developing occupational capabilities and preparing individuals for employment and self-employment. However, the contribution of vocationally acquired skills to entrepreneurial intention extends beyond technical competence and warrants a broader understanding of skill development. Against this backdrop, the present study examines the relationship between multidimensional skill development and entrepreneurial intention among vocational training participants in India. It considers four dimensions of skill development: cognitive skills (CS), technical skills (TS), socio-entrepreneurial skills (SES), and leadership skills (LS), with the aim of understanding their individual and collective relevance to entrepreneurial intention (EI). Drawing on a quantitative, cross-sectional research design, the study uses primary data collected from 443 individuals who successfully completed vocational training and obtained recognised training certificates. Data were gathered through a structured questionnaire and analysed using descriptive statistics, reliability analysis, Pearson correlation, and simultaneous multiple regression. The study adopts an integrated perspective on skill development by examining how different forms of competencies relate to individuals' entrepreneurial aspirations and their inclination towards pursuing entrepreneurial activities. By moving beyond a narrow emphasis on technical and occupation-specific capabilities, the research contributes to a broader understanding of the skills that may shape entrepreneurial intention in the vocational training context. The study also offers insights for vocational education and training institutions and policymakers seeking to strengthen the entrepreneurial orientation of training programmes through a more comprehensive approach to skill development.

Keywords: Vocational training, skill development, entrepreneurial intention, cognitive skills, technical skills, socio-entrepreneurial skills, leadership skills.

1. Introduction

Vocational education and training (VET) play an important role in developing occupational knowledge and practical competencies required for participation in the labour market. Traditionally, vocational programmes have focused on preparing individuals for employment by equipping them with industry-specific technical skills. However, the changing nature of work, increasing self-employment opportunities and the growing importance of entrepreneurship have broadened the role of vocational education beyond conventional employment preparation. Vocational training can also provide individuals with the capabilities needed to identify business opportunities, develop entrepreneurial ideas, and consider self-

employment as a potential career pathway. This broader perspective has encouraged researchers to examine how technical and vocational education and training (TVET) can contribute to entrepreneurial development (Bahaw et al., 2024; Li & Islam, 2021).

Entrepreneurial intention refers to an individual's conscious commitment or willingness to establish a business in the future. It is an important concept in entrepreneurship research because venture creation generally involves deliberate planning, personal commitment, and the evaluation of potential opportunities. The Theory of Planned Behaviour (TPB) explains intention through three principal determinants: attitude towards the behaviour, subjective norms and perceived behavioural control (Ajzen, 1991). These factors help explain how individuals develop favourable perceptions of entrepreneurship and evaluate their ability to undertake entrepreneurial activities. Although entrepreneurial intention does not necessarily translate into actual business creation, it remains an important indicator of entrepreneurial aspirations and a significant area of investigation (Ajzen, 2020; Schlaegel & Koenig, 2014).

An important consideration in understanding entrepreneurial intention is the range of competencies individuals acquire through vocational training. While technical proficiency enables individuals to perform occupation-specific tasks, entrepreneurship requires capabilities extending beyond the execution of practical activities. Individuals considering business ownership may also need to analyse situations, recognise opportunities, interact with stakeholders, mobilise resources, make decisions and coordinate activities. Consequently, examining skill development as a multidimensional concept may provide a more comprehensive understanding of the competencies associated with entrepreneurial intention. This perspective is consistent with the entrepreneurial competency literature, which recognises that successful entrepreneurial activity involves a combination of knowledge, skills and personal capabilities (Man et al., 2002; Mitchelmore & Rowley, 2010).

Previous studies have established the relevance of entrepreneurial intention in vocational and skills-based educational settings. Li and Islam (2021) examined higher vocational education students and highlighted the role of entrepreneurship education, perceived policy support, and entrepreneurial self-efficacy in explaining entrepreneurial intention. Similarly, Bahaw et al. (2024), through a two-wave longitudinal study of TVET students, reported improvements in entrepreneurial intention following exposure to an entrepreneurship education intervention. Research among polytechnic students in India has also demonstrated the relevance of institutional curriculum, family, peer influence, and other TPB-related factors in understanding entrepreneurial intention (Razi-ur-Rahim et al., 2024). These findings indicate that vocational education institutions can provide an important setting for examining the development of entrepreneurial aspirations.

Despite these contributions, further investigation is required into how distinct dimensions of skill development are associated with entrepreneurial intention. In particular, the contribution of practical and occupational competence needs to be considered alongside cognitive, socio-entrepreneurial and leadership capabilities. Cognitive skills facilitate reasoning, critical thinking and problem-solving; technical skills provide the practical expertise required to produce goods or deliver services; socio-entrepreneurial skills encompass opportunity identification, networking, stakeholder interaction and resource mobilisation; and leadership skills involve initiative, responsibility, coordination and the ability to guide collective efforts. These dimensions represent complementary capabilities that may collectively contribute to an

individual's perceived readiness to pursue entrepreneurship. The broader entrepreneurial intention literature also indicates that intention is shaped by multiple individual and contextual factors rather than by a single competency (Maheshwari et al., 2023; Schlaegel & Koenig, 2014).

Against this background, the present study examines the relationship between four dimensions of skill development—cognitive skills, technical skills, socio-entrepreneurial skills and leadership skills—and entrepreneurial intention among vocational training participants in India. Specifically, it investigates the individual relationships of these dimensions with entrepreneurial intention, assesses their unique contributions when considered simultaneously, and evaluates their combined explanatory power. By examining participants who have completed certified vocational training, the study extends the discussion beyond conventional university-based entrepreneurship research and considers the relevance of a broader skill set within vocational education. Its findings are expected to contribute to the understanding of skill development and entrepreneurial aspirations while offering practical insights for vocational training institutions and policymakers seeking to strengthen the entrepreneurship-oriented dimensions of skill-development programmes.

2. Literature Review

2.1 Entrepreneurial Intention and Vocational Skill Development

Entrepreneurial intention (EI) refers to an individual's conscious willingness and commitment to establish a business or pursue an entrepreneurial career. It represents an important antecedent of entrepreneurial behaviour because venture creation generally involves prior consideration, planning, and commitment. Nevertheless, entrepreneurial intention does not necessarily translate into actual business creation, as individuals may encounter financial, institutional, and social barriers (Ajzen, 1991, 2020).

The Theory of Planned Behaviour (TPB) provides a useful theoretical foundation for understanding EI. According to Ajzen (1991), intention is influenced by attitude towards the behaviour, subjective norms and perceived behavioural control. In the entrepreneurial context, perceived behavioural control reflects an individual's assessment of their ability to undertake business-related activities. Consequently, the knowledge and competencies acquired through vocational training may contribute to entrepreneurial readiness by strengthening individuals' perceptions of their capabilities.

Vocational education is particularly relevant because it develops occupational knowledge and practical competencies that may be converted into self-employment opportunities. However, technical proficiency alone may not equip individuals with all the capabilities required to recognise business opportunities, develop networks, mobilise resources and coordinate business activities. Handayati et al. (2020) found that entrepreneurship education positively influenced entrepreneurial intention and entrepreneurial mindset among vocational students in Indonesia. Similarly, Li and Islam (2021) identified significant relationships among perceived entrepreneurship education, entrepreneurial self-efficacy, and EI in higher vocational education. Martínez-Gregorio et al. (2021), through a meta-analysis, reported small positive effects of entrepreneurship education on EI and self-efficacy, indicating that educational exposure may contribute to entrepreneurial aspirations, although its effects depend partly on

programme characteristics.

These findings suggest the importance of examining the specific skills developed through vocational training rather than considering training exposure alone. Accordingly, the present study investigates CS, TS, SES and LS as distinct dimensions associated with EI.

2.2 Cognitive Skills and Entrepreneurial Intention

Cognitive skills (CS) encompass the abilities to analyse information, think critically, solve problems, evaluate alternatives and make informed decisions. These capabilities are relevant to entrepreneurship because prospective entrepreneurs must identify market opportunities, assess business feasibility, understand customer requirements, and make decisions under uncertainty.

Hassan et al. (2020), examining Indian university students, found that opportunity recognition and entrepreneurial self-efficacy were positively associated with EI. Their findings indicate that the ability to identify potential business opportunities is relevant to entrepreneurial aspirations. Similarly, Costa et al. (2018) demonstrated that cognitive training in opportunity recognition improved students' ability to assess the viability of business opportunities. Maheshwari et al. (2023), in their systematic review of entrepreneurial intention research, also identified cognitive and individual-level factors as important areas in explaining students' entrepreneurial intentions.

Among vocational training participants, CS may help individuals identify how their occupational knowledge can address customer needs or local market problems. The ability to evaluate alternatives, recognise opportunities and solve practical problems may therefore be associated with a greater willingness to consider entrepreneurship. However, cognitive competence does not automatically translate into entrepreneurial intention, making its relationship with EI an important empirical question.

2.3 Technical Skills and Entrepreneurial Intention

Technical skills (TS) refer to the occupation-specific knowledge and practical abilities required to perform tasks within a particular trade or professional field. In vocational education, these skills are generally developed through practical assignments, demonstrations, workshops, and workplace-based learning. They enable participants to perform specialised activities and may provide a foundation for independently producing goods or delivering services.

TS may be relevant to EI because individuals possessing occupational expertise can identify opportunities to convert their competencies into income-generating activities. For instance, training in tailoring, electrical work, food processing, or digital services may provide the practical foundation for establishing a small enterprise. Nevertheless, technical proficiency alone may not provide the business knowledge, opportunity recognition, or confidence required for venture creation.

Karyaningsih et al. (2020) examined entrepreneurial knowledge and intention among vocational students in Indonesia, highlighting the relevance of knowledge and entrepreneurial mindset in vocational entrepreneurship preparation. Handayati et al. (2020) similarly

demonstrated the importance of entrepreneurship education and entrepreneurial mindset among vocational students. Furthermore, Bahaw et al. (2024), through a two-wave longitudinal study involving TVET participants, reported improvements in entrepreneurial intention following exposure to entrepreneurship education interventions. Although these studies primarily examine entrepreneurial education and knowledge rather than occupational TS independently, they support the broader argument that competencies developed in vocational settings may be relevant to entrepreneurial aspirations.

Therefore, examining TS alongside other skill dimensions is necessary to determine whether occupational competence has an independent association with EI.

2.4 Socio-Entrepreneurial Skills and Entrepreneurial Intention

Socio-entrepreneurial skills (SES) encompass the abilities required to identify business opportunities, establish professional networks, interact with stakeholders, mobilise resources, collaborate effectively and address challenges associated with venture development. These competencies are important because entrepreneurship involves not only individual expertise but also the ability to develop relationships, access resources and translate opportunities into viable business initiatives.

The relevance of social capital to entrepreneurial intention has been demonstrated by Henley et al. (2017), who examined leadership skills and social capital among Colombian business students. Their findings indicated that leadership-related social capital was associated with entrepreneurial intentions through the core TPB constructs. Similarly, Tiwari et al. (2017), examining social entrepreneurial intention among Indian university students, highlighted the relevance of creativity and other individual-level factors in explaining entrepreneurial aspirations. Research by Nwibe and Ogbuanya (2024) also demonstrated the relevance of individual competencies and self-efficacy-related mechanisms in understanding EI, although their focus was emotional intelligence rather than SES.

These studies provide a rationale for examining SES among vocational training participants. The ability to recognise opportunities, develop networks, collaborate with stakeholders, and mobilise resources may strengthen individuals' readiness to pursue entrepreneurial activities. Accordingly, the present study investigates the relationship between SES and EI as a distinct dimension of skill development.

2.5 Leadership Skills and Entrepreneurial Intention

Leadership skills (LS) involve taking initiative, coordinating activities, making decisions, accepting responsibility, and guiding individuals or teams towards common objectives. These capabilities are relevant to prospective entrepreneurs because establishing and managing a business frequently requires the coordination of people, resources, and operational activities.

Henley et al. (2017) provided empirical evidence of the relationship between leadership skills and entrepreneurial intentions, conceptualising leadership capability as a source of bridging social capital. Their findings suggest that leadership-related capabilities may contribute to entrepreneurial intention through perceived desirability and feasibility. Bergner (2020) also highlighted the complementary relevance of individual characteristics, vocational interests,

and cognitive ability in understanding leadership and entrepreneurial outcomes.

Within vocational training settings, LS may be developed through group assignments, practical projects, team coordination, and responsibilities associated with completing tasks. Such experiences may strengthen participants' confidence in taking initiative and managing activities. Consequently, individuals possessing stronger LS may be more willing to consider establishing and operating an enterprise. However, the specific contribution of LS should be examined alongside CS, TS and SES to establish whether it retains an independent statistical association with EI.

2.6 Multidimensional Skill Development and Entrepreneurial Intention

The preceding literature indicates that EI may be associated with multiple capabilities rather than a single category of skill. CS supports opportunity recognition and decision-making; TS provides occupation-specific expertise; SES facilitates networking, stakeholder interaction, and resource mobilisation; and LS supports initiative, coordination, and responsibility. These dimensions represent complementary capabilities that may contribute to an individual's readiness to consider entrepreneurship.

This multidimensional perspective is consistent with the broader entrepreneurial intention literature. Maheshwari et al. (2023) identified cognitive, personal, educational, and contextual factors as important determinants examined across previous studies. Similarly, Handayati et al. (2020) and Li and Islam (2021) highlighted the relevance of entrepreneurship education, mindset, and self-efficacy in vocational education settings. However, these constructs do not necessarily capture the separate contributions of the four skill dimensions considered in the present study.

Moreover, the available evidence does not establish that all skill dimensions have equal relationships with EI. Their contributions may vary according to participants' capabilities, training experiences, and entrepreneurial circumstances. Examining CS, TS, SES and LS simultaneously therefore provides an opportunity to assess both their individual associations and their unique contributions after accounting for the overlap among the dimensions.

2.7 Research Gap and Study Rationale

The reviewed literature establishes EI as an important area of entrepreneurship research and identifies the relevance of cognitive, occupational, social, educational, and leadership-related capabilities. Previous studies have examined entrepreneurial education, opportunity recognition, entrepreneurial mindset, self-efficacy, and social capital among university and vocational students. Nevertheless, comparatively less attention has been given to examining CS, TS, SES and LS together as distinct predictors of EI among certified vocational training participants in the Indian context.

In particular, existing research frequently focuses on entrepreneurship education or broad psychological constructs rather than distinguishing between the different capabilities developed through vocational training. This creates a rationale for examining how occupational, cognitive, socio-entrepreneurial, and leadership competencies are individually and jointly associated with entrepreneurial intention.

To address this gap, the present study investigates the relationships between CS, TS, SES, and LS and EI among vocational training participants across India. It further assesses the unique contribution of each dimension while statistically controlling for the others and evaluates their combined explanatory power. By adopting a multidimensional approach, the study seeks to provide a more differentiated understanding of the relationship between skill development and entrepreneurial intention in the vocational training context.

3. Research Hypotheses and Theoretical Framework

The development of entrepreneurial intention (EI) is influenced by several individual, educational, and contextual factors. Among these, the knowledge and competencies acquired through vocational training may play an important role in shaping individuals' perceptions of their entrepreneurial capabilities and their willingness to pursue business activities. While vocational education traditionally emphasises occupational and technical proficiency, entrepreneurial readiness may require a broader combination of cognitive, practical, socio-entrepreneurial and leadership capabilities. Accordingly, the present study examines four dimensions of skill development: Cognitive Skills (CS), Technical Skills (TS), Socio-entrepreneurial Skills (SES) and Leadership Skills (LS), and their relationships with EI among vocational training participants in India.

The theoretical foundation of the study draws upon three complementary perspectives: the Theory of Planned Behavior (TPB), Social Cognitive Theory (SCT), and Human Capital Theory (HCT). TPB explains how individuals develop intentions towards particular behaviours, SCT highlights the role of personal capabilities and learning experiences, while HCT emphasises the value of knowledge and competencies acquired through education and training. Together, these perspectives provide a basis for understanding why individuals possessing different skill-based capabilities may demonstrate varying levels of entrepreneurial intention.

3.1 Theoretical Foundation

3.1.1 Theory of Planned Behavior

The Theory of Planned Behavior, proposed by Ajzen (1991), provides an established framework for explaining the formation of behavioural intentions. According to TPB, intention is primarily determined by three factors: attitude towards the behaviour, subjective norms and perceived behavioural control. Attitude represents an individual's favourable or unfavourable evaluation of performing a particular behaviour; subjective norms refer to perceived social expectations and approval; and perceived behavioural control reflects an individual's perception of the ease or difficulty of performing the behaviour. These three elements jointly influence behavioural intention and may subsequently contribute to actual behaviour.

In the context of entrepreneurship, TPB explains why individuals may consider establishing and operating a business as a possible career choice. Individuals are more likely to develop entrepreneurial intentions when they evaluate entrepreneurship positively, perceive encouragement from important social groups, and believe that they possess the capabilities and resources required to establish a venture. Liñán and Chen (2009) applied this theoretical perspective to develop and validate an instrument for measuring entrepreneurial intention. Similarly, Schlaegel and Koenig (2014), through a meta-analysis of entrepreneurial intention

research, established the relevance of attitudinal, normative and control-related factors in explaining entrepreneurial intentions. Ajzen (2020) further clarified the role of perceived behavioural control in situations where performing a behaviour depends on an individual's abilities, resources and available opportunities.

The relevance of TPB to the present study lies particularly in the connection between skill development and perceived behavioural control. Individuals with stronger CS may feel better equipped to identify business opportunities, evaluate alternatives and address entrepreneurial challenges. TS may provide the practical expertise needed to produce goods or deliver services, whereas SES may facilitate stakeholder interaction, business networking and resource mobilisation. Similarly, LS may strengthen individuals' confidence in taking initiative, coordinating activities and accepting responsibility for business operations. These capabilities may contribute to individuals' perceptions of their preparedness to undertake entrepreneurial activities.

However, the present study does not directly measure attitude, subjective norms or perceived behavioural control as separate constructs. TPB is therefore used to explain the theoretical relevance of the skill dimensions to EI rather than as a complete empirical test of the original theory.

3.1.2 Social Cognitive Theory

Social Cognitive Theory, developed by Bandura (1986), explains human behaviour through the reciprocal interaction of personal factors, behavioural patterns and environmental influences. One of its central concepts is self-efficacy, which refers to an individual's belief in their ability to organise and execute the actions required to achieve particular outcomes. Self-efficacy influences the activities individuals undertake, the effort they invest, and their persistence when confronted with difficulties. Consequently, individuals who believe that they possess the capabilities required to perform a task may be more willing to engage in challenging activities, including entrepreneurship.

SCT is particularly relevant to vocational training because practical learning, task completion, observation, and feedback provide experiences through which individuals can develop confidence in their abilities. For example, successfully performing occupational tasks may strengthen TS, while problem-solving activities may contribute to CS. Opportunities to interact with stakeholders, establish professional relationships, and participate in group activities may help develop SES and LS. Such learning experiences can influence how individuals evaluate their ability to undertake entrepreneurial responsibilities.

Newman et al. (2019), in their systematic review of entrepreneurial self-efficacy, identified SCT as an important theoretical foundation for understanding the antecedents and outcomes of entrepreneurial self-efficacy. Their review highlighted the relevance of mastery experiences, observational learning, and social persuasion in shaping individuals' beliefs about their entrepreneurial capabilities. Rauch and Hulsink (2015) also examined how entrepreneurship education may influence entrepreneurial behaviour through the development of entrepreneurial intentions and perceived capabilities.

In the present study, SCT provides a theoretical explanation for why vocational training

participants possessing different skill-based capabilities may demonstrate varying levels of EI. CS, TS, SES and LS may contribute to individuals' perceptions of their preparedness to identify, initiate and manage entrepreneurial activities. Nevertheless, self-efficacy is not directly included as a measured variable and is therefore considered a theoretical explanation rather than an empirically tested mediating mechanism.

3.1.3 Human Capital Theory

Human Capital Theory considers education, knowledge, training, and skills as investments that enhance individuals' productive capabilities and economic opportunities. Becker (1993) explains that investment in education and training contributes to the accumulation of human capital, which can improve productivity and individual economic outcomes. From an entrepreneurial perspective, the knowledge and competencies acquired through training may provide individuals with a foundation for identifying business opportunities, developing products and services, and managing the activities associated with venture creation.

Vocational education represents an important mechanism for human capital development because it provides occupational knowledge and practical competencies. However, entrepreneurial readiness may require capabilities beyond technical proficiency. CS can support analytical thinking, opportunity evaluation, and business-related decision-making, while TS provides the occupational expertise required to produce goods or deliver services. SES may facilitate professional networking, stakeholder relationships, collaboration and resource mobilisation. LS may support initiative, coordination, and responsibility in business operations.

Aboobaker and Renjini (2020) examined the relationship between human capital, entrepreneurship education and entrepreneurial intentions, highlighting the relevance of acquired capabilities in explaining entrepreneurial aspirations. Similarly, Li and Islam (2021) investigated EI in higher vocational education and demonstrated the importance of educational and individual-level factors in understanding entrepreneurial intentions. These perspectives support the argument that vocational training should be understood as a broader process of capability development rather than being limited to occupational proficiency.

HCT therefore provides a foundation for examining whether CS, TS, SES, and LS are associated with EI among vocational training participants. It also highlights the potential relevance of developing a combination of competencies that can support both employment and entrepreneurial activities.

3.1.4 Integration of Theoretical Perspectives

The three theoretical perspectives offer complementary explanations for the proposed relationship between multidimensional skill development and EI. TPB explains the formation of entrepreneurial intention through attitudes, subjective norms, and perceived behavioural control. SCT highlights how personal capabilities and learning experiences may influence individuals' confidence in undertaking entrepreneurial activities. HCT explains how education and training contribute to the accumulation of knowledge and competencies that may support entrepreneurial pursuits.

Their integration provides a theoretical rationale for considering CS, TS, SES and LS as distinct

but complementary predictors of EI. CS may facilitate opportunity recognition, problem-solving and decision-making; TS may provide the practical foundation for developing products and delivering services; SES may support networking, stakeholder interaction and resource mobilisation; and LS may facilitate initiative, coordination and the management of business responsibilities.

Although these dimensions may complement one another, each represents a different aspect of individual capability. Examining them separately allows the study to identify their individual relationships with EI and determine whether each dimension makes a distinct contribution when the remaining dimensions are considered simultaneously. Their collective contribution can also provide a broader understanding of how multidimensional skill development is associated with entrepreneurial intention among vocational training participants.

3.2 Research Objectives and Hypotheses

The present study is guided by the following research objectives:

1. To examine the relationships between cognitive, technical, socio-entrepreneurial, and leadership skills and entrepreneurial intention among vocational training participants.
2. To assess the unique contribution of each skill dimension to entrepreneurial intention when all four dimensions are considered simultaneously.
3. To evaluate the combined explanatory power of the four skill dimensions in predicting entrepreneurial intention.

Based on the theoretical arguments and previous empirical research, the following hypotheses are developed.

3.2.1 Cognitive Skills and Entrepreneurial Intention

CS encompasses the abilities to understand information, analyse situations, solve problems, evaluate alternatives and make informed decisions. These capabilities are relevant to entrepreneurship because individuals intending to establish a business must recognise potential opportunities, assess market conditions, anticipate challenges and make decisions under uncertainty. Entrepreneurial cognition therefore extends beyond the possession of knowledge to include opportunity recognition, creative thinking and strategic evaluation.

Liao et al. (2022), through a meta-analysis of 89 studies involving 51,919 participants, examined entrepreneurial knowledge and cognitive antecedents of EI and highlighted the relevance of individual-level cognitive factors in understanding entrepreneurial intentions. Similarly, Arafat and Saleem (2017), using Indian Global Entrepreneurship Monitor data, examined start-up intention through a cognitive perspective and identified the relevance of perceived opportunities and self-efficacy. These findings suggest that individuals possessing stronger analytical and problem-solving capabilities may be better equipped to identify and evaluate potential business opportunities.

Among vocational training participants, CS may facilitate the translation of acquired knowledge into entrepreneurial possibilities by enabling individuals to assess the feasibility of self-employment and respond to business-related challenges. Accordingly, the following

hypotheses are proposed:

H1a: CS have a significant positive relationship with EI among vocational training participants.

H2a: CS make a significant positive contribution to EI when the other skill dimensions are controlled for.

3.2.2 Technical Skills and Entrepreneurial Intention

TS refer to the practical and occupational competencies required to perform specialised tasks, operate equipment, produce goods or deliver services within a particular vocational field. These capabilities constitute an important outcome of vocational training because they equip individuals with the practical expertise required for employment and potentially for independent business activities. In an entrepreneurial context, technical competence may provide the foundation for developing products, delivering services, and establishing ventures based on occupational knowledge.

HCT provides a theoretical basis for understanding the relevance of TS, as education and training contribute to the development of productive knowledge and capabilities that can improve individuals' economic opportunities (Becker, 1993). From an entrepreneurial perspective, occupational expertise may enable vocationally trained individuals to identify self-employment possibilities within their respective fields. Li and Islam (2021) examined EI among higher vocational education students and highlighted the relevance of educational and institutional factors in shaping entrepreneurial aspirations. Similarly, Razi-ur-Rahim et al. (2024), studying polytechnic students in India, demonstrated the importance of educational curriculum, peer influence, and institutional support in understanding EI.

Possessing relevant technical expertise may reduce perceived difficulties associated with establishing a business in a particular occupational area. For instance, individuals with production, repair, manufacturing, or service-related competencies may be better positioned to convert their practical knowledge into potential business activities. Nevertheless, technical proficiency alone may not ensure entrepreneurial readiness, as venture creation also involves cognitive, socio-entrepreneurial and leadership capabilities. Therefore, the following hypotheses are proposed:

H1b: TS have a significant positive relationship with EI among vocational training participants.

H2b: TS make a significant positive contribution to EI when the other skill dimensions are controlled for.

3.2.3 Socio-Entrepreneurial Skills and Entrepreneurial Intention

SES encompass the abilities required to identify and pursue business opportunities, establish professional networks, interact effectively with stakeholders, mobilise resources, collaborate with others and develop relationships that support entrepreneurial activities. These capabilities are relevant because establishing and managing a business requires individuals to engage with customers, suppliers, business partners and other stakeholders. Entrepreneurs must also recognise market opportunities, build collaborative relationships and access

resources to convert business ideas into viable ventures.

Mitchelmore and Rowley (2010), in their review of entrepreneurial competencies, identified a broad range of capabilities associated with entrepreneurial activity, including opportunity recognition, networking, relationship development and the effective management of business resources. Tiwari et al. (2017), in their study of social entrepreneurial intention among Indian university students, also highlighted the relevance of individual and social factors, including creativity, in explaining entrepreneurial aspirations. Although social entrepreneurial intention is distinct from general EI, their findings reinforce the importance of capabilities extending beyond technical expertise.

For vocational training participants, SES may facilitate the identification of business opportunities, development of professional connections, and mobilisation of resources required for venture creation. Such capabilities may strengthen individuals' perceptions of entrepreneurial feasibility and their willingness to pursue self-employment. Accordingly, the following hypotheses are proposed:

H1c: SES has a significant positive relationship with EI among vocational training participants.

H2c: SES makes a significant positive contribution to EI when the other skill dimensions are controlled for.

3.2.4 Leadership Skills and Entrepreneurial Intention

LS involve the ability to take initiative, guide and coordinate people, communicate objectives, assume responsibility, make decisions and influence others towards common goals. These capabilities are relevant to entrepreneurship because establishing and managing a business requires individuals to coordinate resources, communicate a business vision, manage working relationships and make decisions concerning venture development.

The entrepreneurial competency perspective emphasises that entrepreneurial activity requires a combination of functional, strategic, interpersonal and managerial capabilities rather than technical expertise alone (Mitchelmore & Rowley, 2010). Bergner (2020) similarly highlighted that leadership and entrepreneurial outcomes cannot be explained exclusively through cognitive ability, suggesting the relevance of additional individual characteristics and competencies. Furthermore, TPB (Ajzen, 1991) provides a basis for understanding how individuals' perceptions of their ability to undertake challenging activities may contribute to their intentions.

In vocational training settings, LS may help participants move beyond the execution of individual occupational tasks towards the coordination and management of business activities. Individuals who demonstrate initiative, decision-making ability and confidence in assuming responsibility may be more willing to consider entrepreneurship as a career option. However, the distinct contribution of LS needs to be examined alongside CS, TS and SES. Accordingly, the following hypotheses are proposed:

H1d: LS has a significant positive relationship with EI among vocational training participants.

H2d: LS makes a significant positive contribution to EI when the other skill dimensions are controlled for.

3.2.5 Combined Contribution of Multidimensional Skill Development

The development of EI is unlikely to depend on a single capability. Rather, it may involve the combined contribution of cognitive, technical, socio-entrepreneurial and leadership competencies. CS facilitate opportunity recognition, problem-solving and decision-making, whereas TS provide the occupational expertise required to develop products and deliver services. SES contribute to networking, stakeholder interaction, resource mobilisation and the development of entrepreneurial relationships, while LS support initiative, coordination and responsibility in pursuing business objectives.

This multidimensional perspective is consistent with HCT, which considers education and training as investments in individuals' productive capabilities (Becker, 1993). TPB (Ajzen, 1991) further explains the formation of intention through attitudes, subjective norms and perceived behavioural control, while SCT (Bandura, 1986) emphasises the role of individual capabilities, self-efficacy and environmental influences in shaping behaviour. Together, these perspectives provide a theoretical foundation for examining the four skill dimensions as complementary predictors of EI.

Previous research also supports the need to consider multiple dimensions when investigating entrepreneurial readiness. Liao et al. (2022) highlighted the contribution of entrepreneurial knowledge and cognitive antecedents, while Maheshwari et al. (2023), through a systematic review of entrepreneurial intention research, identified a broad range of individual, educational and contextual factors associated with students' EI. Research among vocational students has further demonstrated the relevance of entrepreneurship education and institutional experiences in developing entrepreneurial aspirations (Handayati et al., 2020; Li & Islam, 2021). Bahaw et al. (2024) also examined the relationship between entrepreneurship education interventions and vocational entrepreneurial intention through a longitudinal study.

Therefore, examining CS, TS, SES, and LS collectively may provide a broader understanding of their contribution to EI among vocational training participants. The following overall hypothesis is proposed:

H3: CS, TS, SES and LS collectively have significant explanatory power in predicting EI among vocational training participants.

3.3 Regression Model Specification

To examine the individual and combined contributions of the four skill development dimensions, the following multiple linear regression model is specified:

$$\mathbf{EI} = \beta_0 + \beta_1 \mathbf{CS} + \beta_2 \mathbf{TS} + \beta_3 \mathbf{SES} + \beta_4 \mathbf{LS} + \varepsilon$$

Where:

- EI = Entrepreneurial Intention

- CS = Cognitive Skills
- TS = Technical Skills
- SES = Socio-entrepreneurial Skills
- LS = Leadership Skills
- β_0 = Regression intercept (constant)
- β_1, β_2, β_3 and β_4 = Regression coefficients
- ε = Error term

The regression model estimates the unique contribution of each skill dimension to EI while statistically controlling for the remaining dimensions. The overall explanatory power of the model is assessed through the coefficient of determination (R^2), adjusted R^2, and F-statistic. The individual regression coefficients indicate the direction and magnitude of the relationship between each skill dimension and EI, holding the other predictors constant.

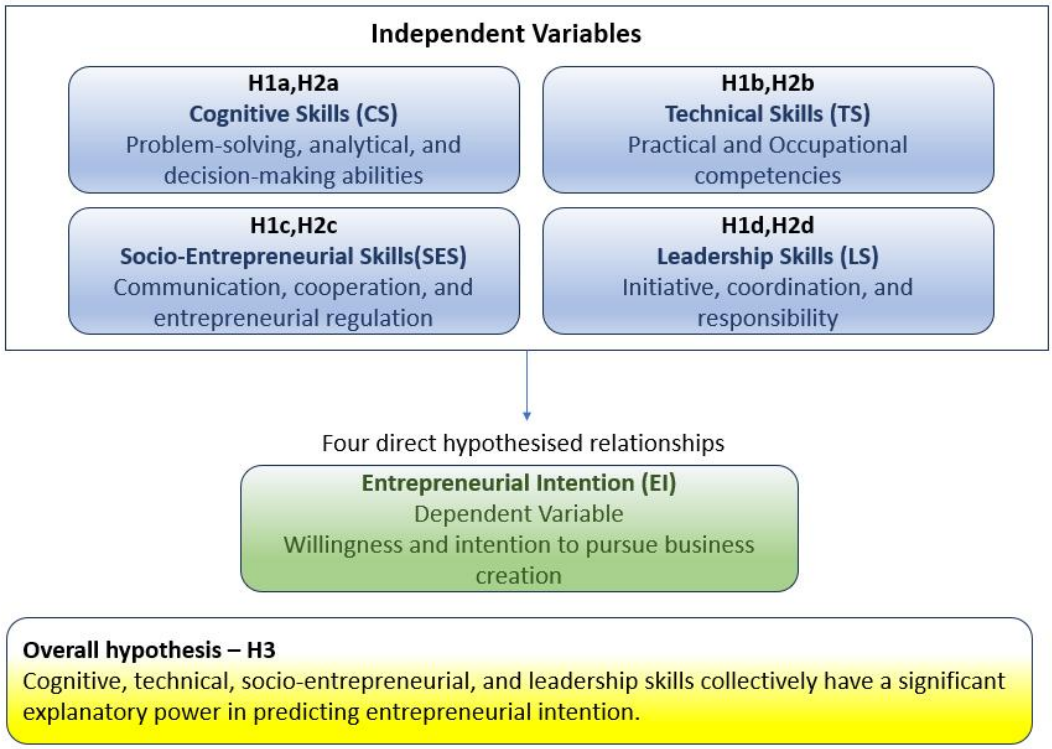
3.4 Conceptual Framework

Based on the theoretical arguments and proposed hypotheses, the study develops a conceptual framework in which CS, TS, SES, and LS are considered four distinct independent variables, while EI represents the dependent variable.

The framework proposes that each skill dimension has an individual positive relationship with EI (H1a–H1d). It further proposes that each dimension makes a distinct positive contribution when all four predictors are considered simultaneously (H2a–H2d). Finally, the framework examines whether the four dimensions collectively explain a statistically significant proportion of the variation in EI (H3).

Figure 1. Proposed conceptual framework

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Independent variables: CS, TS, SES, and LS → Dependent variable: EI. Source: Developed by the authors based on the reviewed literature and proposed research hypotheses.

Here,

- H1a–H1d represent the four individual relationships.
- H2a–H2d represent the unique contributions of the four dimensions while controlling for the remaining predictors.
- H3 represents the collective explanatory power of the four independent variables.

The proposed framework is examined through Pearson correlation and multiple regression analysis. Pearson correlation is used to assess the individual relationships between each skill dimension and entrepreneurial intention, while multiple regression is used to determine the unique contribution of each dimension after accounting for the other three predictors. The overall explanatory contribution of the four dimensions is assessed through the model's coefficient of determination and overall F-test.

Summary of research hypotheses

Objective	Hypothesis	Proposed relationship
Objective 1	H1a	Cognitive skills → Entrepreneurial intention (+)
	H1b	Technical skills → Entrepreneurial intention (+)
	H1c	Socio-entrepreneurial skills → Entrepreneurial intention (+)
	H1d	Leadership skills → Entrepreneurial intention (+)
Objective 2	H2a	Cognitive skills make a positive unique contribution to EI
	H2b	Technical skills make a positive unique contribution to EI
	H2c	Socio-entrepreneurial skills make a positive unique contribution to EI

	H2d	Leadership skills make a positive unique contribution to EI
Objective 3	H3	All four skill dimensions jointly explain a significant proportion of EI

4. Research Methodology

4.1 Research Design

The present study adopted a quantitative, cross-sectional research design to examine the relationship between multidimensional skill development and entrepreneurial intention among vocational training participants in India. A quantitative approach was considered appropriate because the study aimed to assess the relationships between four dimensions of skill development—cognitive skills, technical skills, socio-entrepreneurial skills, and leadership skills—and entrepreneurial intention using statistical techniques. The study also sought to compare the relative contribution of these skill dimensions when examined simultaneously.

4.2 Sample and Data Collection

The study was conducted among vocational training participants, with a final analytical sample of 443 respondents. Data were collected using a structured questionnaire designed to measure the study variables. Responses were recorded on a five-point Likert scale, ranging from 1 to 5, with higher scores representing higher levels of the measured constructs.

Sampling and Data Collection Details

Particulars	**Description**
Sampling Technique	A combination of purposive sampling and snowball sampling was employed to identify and recruit eligible respondents from the target population.
Data Collection Period	Data were collected during the period 2025–2026.
Geographical Coverage	The study covered vocational training participants across India.
Participant Eligibility Criteria	• Individuals who were about to complete their training and • Individuals who had completed vocational training and obtained a valid training completion certificate were considered eligible to participate in the study.
Independent variables	Cognitive Skills (CS), Technical Skills (TS), Socio-entrepreneurial Skills (SES) and Leadership Skills (LS)
Dependent variable	Entrepreneurial Intention (EI)

The collected responses were processed to obtain composite mean scores for each construct. These scores were subsequently used in the descriptive, correlation, and regression analyses.

4.3 Measurement of Variables

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The study examined four independent variables and one dependent variable. Cognitive skills (CS), technical skills (TS), socio-entrepreneurial skills (SES), and leadership skills (LS) represented the independent variables, while entrepreneurial intention (EI) was the dependent variable.

Each construct was represented by a composite mean score calculated from its corresponding questionnaire items. The measurement structure comprised three items for each skill dimension and five items for entrepreneurial intention. Consequently, the analysis used five composite variables: CS_Mean, TS_Mean, SES_Mean, LS_Mean, and EI_Mean.

Using composite means allowed the study to examine the relationship between each overall skill dimension and entrepreneurial intention without treating individual questionnaire items as separate predictors.

Objective-wise research methodology and statistical techniques

Research objective	**Variables and analytical focus**	**Statistical technique**	**Purpose and interpretation**	**Supporting methodological literature**
Objective 1: To examine the relationships between cognitive, technical, socio-entrepreneurial and leadership skills and entrepreneurial intention among vocational training participants.	CS, TS, SES and LS as independent variables; EI as the dependent variable.	Pearson Product-Moment Correlation	To determine the direction, strength and statistical significance of the individual linear relationships between each skill dimension and entrepreneurial intention. The correlation coefficient (r) indicates the direction and strength of association.	Schober et al. (2018); Bewick et al. (2003); Wisniewski and Brannan (2024).
Objective 2: To assess the unique contribution of each skill dimension to entrepreneurial intention when all four dimensions are considered simultaneously.	Four independent variables (CS, TS, SES and LS) entered simultaneously to predict EI.	Multiple Linear Regression (Enter Method)	To estimate the individual contribution of each skill dimension while statistically controlling for the other three dimensions. Standardised regression coefficients (β), unstandardised coefficients (B), t-statistics, p-values and confidence intervals are examined.	Cohen et al. (2003); Osborne and Waters (2002); Bzovsky et al. (2022).
Objective 3: To evaluate the combined explanatory power of the four skill dimensions in	Joint effect of CS, TS, SES and LS on EI.	Overall Multiple Regression Model Assessment	To determine whether the four skill dimensions collectively explain a statistically significant proportion of the variance in entrepreneurial	Huberty (2003); Shieh and Kung (2007); Bzovsky et al. (2022).

predicting entrepreneurial intention.			intention. The coefficient of determination (R^2), adjusted (R^2), F-statistic and associated significance value are examined.	

Source: Developed by the authors based on the research objectives and established statistical methodology.

5. Analysis

5.1 Analytical Strategy

The data analysis was undertaken in sequential stages to examine the measurement consistency, distribution, associations, and predictive relationships among the study variables. Internal consistency was evaluated using Cronbach's alpha, while descriptive statistics were used to summarise the constructs. Pearson's correlation analysis examined the direction and strength of the bivariate relationships. Multiple linear regression was then used to assess the independent contribution of each skill dimension to entrepreneurial intention.
Because the diagnostic analysis indicated heteroscedasticity, a supplementary bootstrap analysis was conducted using 2,000 samples and 95% percentile confidence intervals. The bootstrap estimates were considered alongside the original regression results rather than as evidence that the heteroscedasticity had been corrected.

Step	Statistical technique	Purpose
1	Data screening and composite-score preparation	Prepare the five construct-level mean variables for analysis.
2	Cronbach's alpha reliability analysis	Assess the internal consistency of the questionnaire items within each construct.
3	Descriptive statistics	Examine the means, standard deviations, and observed ranges of the study variables.
4	Pearson's correlation analysis	Assess the direction, strength, and statistical significance of the bivariate relationships among the constructs.
5	Multiple linear regression using the Enter method	Examine the joint relationship of CS, TS, SES, and LS with EI and estimate each predictor's contribution while controlling for the other predictors.
6	Multicollinearity diagnostics	Examine tolerance and variance inflation factor (VIF) values to assess whether correlations among predictors create a serious estimation concern.
7	Regression diagnostic assessment	Examine residual plots, the histogram, the normal probability plot, and influential-case diagnostics.
8	Breusch–Pagan heteroscedasticity test	Assess whether the residual variance was consistent across observations.
9	Supplementary bootstrap regression	Examine the stability of coefficient estimates and percentile confidence intervals using 2,000 bootstrap samples.
10	Integrated interpretation	Compare the original regression estimates with the

		supplementary bootstrap results and interpret the findings in light of the diagnostic limitations.

5.2 Descriptive Statistics

Descriptive statistical analysis was conducted to examine the distribution of the composite scores for cognitive skills (CS), technical skills (TS), socio-entrepreneurial skills (SES), leadership skills (LS), and entrepreneurial intention (EI). The analysis was based on 443 valid respondents, with all five constructs measured on a five-point Likert scale ranging from 1 to 5.

Table 1. Descriptive Statistics of the Study Constructs

Construct	N	Minimum	Maximum	Mean	Std. deviation
Cognitive Skills (CS)	443	1.00	5.00	4.0971	0.79044
Technical Skills (TS)	443	1.00	5.00	3.9970	0.77964
Socio-Entrepreneurial Skills (SES)	443	1.00	5.00	4.1701	0.76380
Leadership Skills (LS)	443	1.00	5.00	4.1558	0.71546
Entrepreneurial Intention (EI)	443	1.00	5.00	3.9756	0.94765

Note: N represents the number of valid observations for each construct. All constructs were scored on a five-point scale.
Source: Author's analysis of survey data using SPSS.

5.3 Descriptive Statistics

The descriptive results indicate that SES recorded the highest mean score (M = 4.1701, SD = 0.76380), followed by LS (M = 4.1558, SD = 0.71546), CS (M = 4.0971, SD = 0.79044), and TS (M = 3.9970, SD = 0.77964). EI recorded a mean of 3.9756 (SD = 0.94765), with comparatively greater variation in respondents' scores. Overall, the findings reflect relatively high average ratings across all four skill dimensions and EI. However, these descriptive results do not establish statistically significant differences between the mean scores or the predictive contribution of individual skills. Therefore, reliability, correlation, and regression analyses are required to further examine the measurement consistency and relationships among the study variables.

5.4 Reliability Analysis

The internal consistency of the measurement scales was assessed using Cronbach's alpha. The results indicated acceptable to excellent reliability across all five constructs.

Table: Reliability Analysis of the Study Constructs

Construct	No. of Items	Cronbach's Alpha	Recommended Threshold	Acceptance/ Interpretation	Decision
Cognitive Skills (CS)	3	0.820	≥ 0.70	Good reliability	Accepted
Technical Skills (TS)	3	0.764	≥ 0.70	Acceptable reliability	Accepted
Socio-	3	0.754	≥ 0.70	Acceptable reliability	Accepted

Entrepreneurial Skills (SES)					
Leadership Skills (LS)	3	0.750	≥ 0.70	Acceptable reliability	Accepted
Entrepreneurial Intention (EI)	5	0.916	≥ 0.70	Excellent reliability	Accepted
Overall	17	—	≥ 0.70 per construct	All constructs meet the recommended threshold	All accepted

Note: Cronbach's alpha values of 0.70 or above are generally considered acceptable for research, with values around 0.80 indicating good reliability and values above 0.90 indicating excellent internal consistency. The overall alpha has not been calculated; therefore, it is not reported. Reliability was assessed separately for each construct.
Source: Author's analysis of survey data using SPSS.
Cognitive skills demonstrated good internal consistency (α = .820), while technical skills (α = .764), socio-entrepreneurial skills (α = .754), and leadership skills (α = .750) showed acceptable reliability. Entrepreneurial intention exhibited excellent internal consistency (α = .916). Furthermore, the corrected item-total correlations ranged from .549 to .801, exceeding the commonly used screening threshold of .30. The Cronbach's alpha values obtained after deleting individual items were lower than the corresponding overall alpha values for every construct. Therefore, no items were removed on the basis of the reliability analysis. These findings support the internal consistency of the measures used for the subsequent correlation and multiple regression analyses.

5.5 Correlation Analysis

Pearson's correlation analysis was conducted to examine the relationships between cognitive skills, technical skills, socio-entrepreneurial skills, leadership skills, and entrepreneurial intention among 443 respondents. The results revealed positive and statistically significant correlations between all four skill dimensions and entrepreneurial intention ($p < .001$).
Correlation analysis results-
Table 1. Pearson correlation matrix of skill dimensions and entrepreneurial intention (N = 443)

Variables	**1**	**2**	**3**	**4**	**5**
1. Cognitive Skills (CS)	1				
2. Technical Skills (TS)	.578**	1			
3. Socio-Entrepreneurial Skills (SES)	.576**	.507**	1		
4. Leadership Skills (LS)	.606**	.638**	.557**	1	
5. Entrepreneurial Intention (EI)	.509**	.507**	.527**	.551**	1

Note: $p < .01$ (two-tailed). All reported correlations are statistically significant at $p < .001$; SPSS displays these significance values as .000, which should be reported as $p < .001$, not $p = .000$.

Source: Author's analysis of survey data using SPSS.

Leadership skills exhibited the strongest bivariate association with entrepreneurial intention (r = .551), followed by socio-entrepreneurial skills (r = .527), cognitive skills (r = .509), and technical skills (r = .507). These findings suggest that higher reported levels of each skill dimension are associated with higher entrepreneurial intention among the surveyed vocational training participants.

The skill dimensions were also positively correlated with one another, with coefficients ranging from .507 to .638. The strongest association was observed between technical skills and leadership skills (r = .638). Although these intercorrelations suggest that the dimensions are related, they do not by themselves establish problematic multicollinearity. Therefore, tolerance and variance inflation factor statistics will be examined during the subsequent multiple regression analysis. Overall, the correlation results provide preliminary support for the proposed relationships between the four skill dimensions and entrepreneurial intention. Multiple regression analysis is required to assess the unique contribution of each dimension after controlling for the others.

5.6 Multiple Regression Analysis

Multiple linear regression was employed to examine the unique associations of cognitive skills, technical skills, socio-entrepreneurial skills, and leadership skills with entrepreneurial intention among vocational training participants. Entrepreneurial intention was specified as the dependent variable, while the four skill dimensions were entered simultaneously as independent variables using the Enter method. The analysis was conducted using data from 443 respondents.

Model summary

Table 2. Multiple regression model summary

Statistic	**Value**
Sample size (N)	443
Multiple correlation (R)	.636
R^2	.404
Adjusted R^2	.399
Standard error of the estimate	.73477
Predictors	CS, TS, SES, LS
Dependent variable	EI

Source: Author's analysis of survey data using SPSS.

Interpretation: The model explains 40.4% of the variance in entrepreneurial intention. The adjusted R^2 of .399 is close to the unadjusted R^2, suggesting that the model's explanatory power changes little after accounting for the number of predictors.

ANOVA results

Table 3. Overall significance of the multiple regression model

Source	Sum of squares	df	Mean square	F	p-value
Regression	160.465	4	40.116	74.304	< .001
Residual	236.472	438	.540	—	—
Total	396.937	442	—	—	—

Note: Dependent variable = EI. Predictors = CS, TS, SES, and LS. Source: Author's analysis of survey data using SPSS.
Interpretation: The regression model is statistically significant
(F(4,438)=74.304, p<.001). Thus, the four skill dimensions jointly have a statistically significant relationship with entrepreneurial intention. This finding supports evaluating their individual regression coefficients to determine whether each dimension contributes uniquely to the model.

The overall regression model was statistically significant, $F(4, 438) = 74.304$, $p < .001$. The model yielded an R^2 of .404 and an adjusted R^2 of .399, indicating that the four skill dimensions jointly explained 40.4% of the observed variance in entrepreneurial intention. The adjusted coefficient of determination remained close to the unadjusted value, suggesting that the model's explanatory power was relatively stable after accounting for the number of predictors.

Table 4: Regression coefficients
(Multiple regression coefficients for entrepreneurial intention)

Predictor	B	SE	Standardized β	t	p-value	95% CI for B	VIF
Constant	.014	.233	—	.061	.951	[−.443, .471]	—
Cognitive skills (CS)	.168	.062	.140	2.723	.007	[.047, .289]	1.938
Technical skills (TS)	.189	.062	.156	3.055	.002	[.067, .311]	1.908
Socio-entrepreneurial skills (SES)	.294	.060	.237	4.926	< .001	[.177, .411]	1.701
Leadership skills (LS)	.311	.070	.235	4.412	< .001	[.172, .450]	2.082

Note: B = unstandardized regression coefficient; SE = standard error; β = standardized regression coefficient; CI = confidence interval; VIF = variance inflation factor. Tolerance values were .516 for CS, .524 for TS, .588 for SES, and .480 for LS. Source: Author's analysis of survey data using SPSS.

Regression equation
Based on the unstandardized coefficients, the estimated regression equation is:
EI =0.014 + 0.168(CS) + 0.189(TS) + 0.294(SES)+ 0.311(LS)
Here, EI is the predicted entrepreneurial intention mean score, and CS, TS, SES, and LS are the respective composite mean scores. The equation represents adjusted statistical associations, not causal effects.
The regression coefficients revealed positive and statistically significant associations for all four skill dimensions. Cognitive skills were positively associated with entrepreneurial intention ($B = .168$, $\beta = .140$, $t = 2.723$, $p = .007$). Technical skills also demonstrated a positive and significant association ($B = .189$, $\beta = .156$, $t = 3.055$, $p = .002$). These results indicate that both cognitive and

technical skills contributed uniquely to the prediction of entrepreneurial intention after controlling for the other dimensions.

Socio-entrepreneurial skills exhibited a positive and statistically significant coefficient (B = .294, β = .237, t = 4.926, p < .001). Leadership skills were likewise positively associated with entrepreneurial intention (B = .311, β = .235, t = 4.412, p < .001). Among the standardized coefficients, socio-entrepreneurial skills had the largest numerical value, closely followed by leadership skills. This pattern suggests that these two dimensions had comparatively strong unique associations with entrepreneurial intention in the estimated model. However, the difference between their coefficients was not formally tested and should not be interpreted as evidence that one dimension is statistically stronger than the other.

Multicollinearity diagnostics did not indicate a serious concern. The variance inflation factor values ranged from 1.701 to 2.082, and tolerance values ranged from .480 to .588. These findings suggest that the observed interrelationships among the skill dimensions did not create substantial multicollinearity under commonly used screening criteria.

5.7 Hypothesis-testing summary

Hypothesis	Proposed relationship	Result	Decision
H1	CS → EI (positive)	β = .140, p = .007	Supported
H2	TS → EI (positive)	β = .156, p = .002	Supported
H3	SES → EI (positive)	β = .237, p < .000***	Supported
H4	LS → EI (positive)	β = .235, p < .000***	Supported

The decisions refer to the statistical results from this regression model; they do not establish causality.

Overall, the results indicate that cognitive, technical, socio-entrepreneurial, and leadership skills each made a positive and statistically significant unique contribution to the prediction of entrepreneurial intention. The findings provide support for the four hypothesized relationships within the study sample and highlight the relevance of examining skill development as a multidimensional construct rather than focusing exclusively on technical competence. Because the data are observational, the findings should be interpreted as adjusted associations rather than evidence of causal effects.

5.8 Supplementary Bootstrap Analysis

A supplementary bootstrap analysis was conducted using 2,000 bootstrap samples and 95% percentile confidence intervals. The bootstrap results continued to indicate positive associations for technical skills (B=.189, p=.030), socio-entrepreneurial skills (B=.294, p<.001), and leadership skills (B=.311, p=.001). Their respective bootstrap confidence intervals excluded zero.

Supplementary bootstrap coefficients

Predictor	B	Bootstrap SE	Bootstrap p	95% percentile CI

CS	.168	.084	.041	[−.009, .315]
TS	.189	.086	.030	[.023, .364]
SES	.294	.073	.001*	[.155, .436]
LS	.311	.089	.001*	[.144, .492]

*For SES, SPSS displayed .000; report p < .001. The bootstrap p-value and confidence interval for CS are not fully consistent, so do not label its bootstrap result definitively robust.

For cognitive skills, the bootstrap p-value was .041; however, the reported 95% percentile confidence interval ranged from −.009 to .315 and therefore included zero. This discrepancy means that the bootstrap evidence for cognitive skills requires cautious interpretation. Accordingly, the bootstrap analysis provides supplementary support for the technical, socio-entrepreneurial, and leadership skill findings, whereas the robustness of the cognitive-skills association remains less conclusive.

5.9 Assessment of Heteroscedasticity

A Breusch–Pagan test was conducted using an auxiliary regression of the squared residuals on the four predictors. The auxiliary regression produced (R^2=.036), based on 443 observations. The approximate test statistic, calculated as (N R^2), was 15.95 with four degrees of freedom, indicating evidence of heteroscedasticity (p-approx.003).
This result suggests that the assumption of constant error variance may not hold. Consequently, the conventional regression standard errors and associated significance tests should be interpreted with caution. Although bootstrapping was used as a supplementary analysis, it does not, by itself, establish that the heteroscedasticity concern has been resolved. The findings should therefore be regarded as evidence of positive conditional associations, subject to this limitation.

5.10 Objective-wise assessment

All three objectives addressed

Research objective	Analysis used	Findings	Status
1. Examine the relationships between cognitive, technical, socio-entrepreneurial and leadership skills and entrepreneurial intention.	Pearson's correlation analysis	All four dimensions showed positive and statistically significant correlations with EI (p < .001). CS: r = .509; TS: r = .507; SES: r = .527; LS: r = .551.	Answered
2. Assess the unique contribution of each skill dimension to entrepreneurial intention when all four	Multiple linear regression (Enter method)	All four predictors had positive and significant coefficients: CS β = .140 (p = .007); TS β = .156 (p = .002);	Answered, with qualification

dimensions are considered simultaneously.		SES β = .237 (p < .001); LS β = .235 (p < .001).	
3. Evaluate the combined explanatory power of the four skill dimensions in predicting entrepreneurial intention.	Regression model summary and ANOVA	R = .636; R^2 = .404; adjusted R^2 = .399; F(4,438) = 74.304, p < .001. The four dimensions jointly explained 40.4% of the variance in EI.	Answered

6. Discussion

6.1. Overview of the Findings

The present study examined the relationship between four dimensions of skill development—cognitive skills (CS), technical skills (TS), socio-entrepreneurial skills (SES), and leadership skills (LS)—and entrepreneurial intention (EI) among vocational training participants in India. The multiple regression model was statistically significant ($F(4, 438) = 74.304$, $p < .001$), explaining 40.4% of the variance in EI ($R^2 = .404$; adjusted $R^2 = .399$). All four dimensions demonstrated positive and statistically significant coefficients in the original regression model.

These findings indicate that EI among vocational training participants is associated with a combination of occupational, cognitive, socio-entrepreneurial and leadership capabilities rather than technical competence alone. This perspective is consistent with the Theory of Planned Behaviour (TPB), which identifies attitudes, subjective norms and perceived behavioural control as important determinants of behavioural intention (Ajzen, 1991). The findings also complement research highlighting the relevance of educational experiences, entrepreneurial self-efficacy and individual capabilities in vocational students' entrepreneurial intentions (Li & Islam, 2021; Maheshwari et al., 2023).

6.2. Multidimensional Skills and Entrepreneurial Intention

The combined explanatory contribution of the four skill dimensions suggests that EI is associated with multiple forms of individual capability. CS may support opportunity evaluation and decision-making, TS provides occupational expertise, SES facilitates business relationships and resource mobilisation, while LS supports initiative and coordination. Together, these capabilities represent different aspects of preparedness for considering entrepreneurial activities.

This interpretation is supported by Human Capital Theory, which views education and training as investments in individuals' knowledge and productive capabilities (Becker, 1993). It is also consistent with Social Cognitive Theory, which emphasises the role of personal capabilities and self-efficacy in shaping individuals' actions and intentions (Bandura, 1986). However, the present study did not directly test these theoretical mechanisms. They provide a basis for interpreting the observed relationships rather than evidence of specific causal pathways.

Li and Islam (2021) found that entrepreneurial education and policy perceptions were associated with entrepreneurial intention and self-efficacy among higher vocational students.

Similarly, Maheshwari et al. (2023) highlighted the importance of individual, educational and contextual factors in explaining students' entrepreneurial intentions. The present study extends this discussion by examining four distinct skill dimensions simultaneously among vocational training participants in India.

6.3. Individual Skill Dimensions and Entrepreneurial Intention

CS demonstrated a positive association with EI (β = .140, p = .007). Cognitive capabilities such as problem-solving, analysis, and decision-making may help individuals evaluate business opportunities and consider alternative ways of applying their occupational knowledge. Tiwari et al. (2017), in their study of Indian university students, identified creativity and other individual capabilities as relevant to social entrepreneurial intention. Their findings provide related evidence that entrepreneurial intentions may involve capabilities beyond technical knowledge. Nevertheless, the supplementary bootstrap confidence interval for CS included zero (–.009 to .315). Therefore, the evidence for its unique contribution requires cautious interpretation.

TS also demonstrated a positive and significant association with EI (β = .156, p = .002). Technical competence may provide individuals with the practical foundation required to develop products, deliver services, and consider self-employment within their occupational fields. This finding complements Li and Islam's (2021) work on entrepreneurial intention in higher vocational education, which highlights the relevance of educational experiences and perceived capabilities. The supplementary bootstrap confidence interval for TS (.023 to .364) also excluded zero, providing additional support for this relationship. However, technical competence alone may not address the broader requirements of establishing and managing a business.

SES demonstrated a positive contribution to EI (β = .237, p < .001). These skills include the ability to identify entrepreneurial opportunities, establish networks, interact with stakeholders, mobilise resources and collaborate in business-related activities. Such capabilities may help vocational training participants recognise how their occupational knowledge can be translated into potential business opportunities. Tiwari et al. (2017) provide related evidence from the Indian context by examining individual capabilities associated with social entrepreneurial intention. The supplementary bootstrap confidence interval for SES (.155 to .436) further supports its positive association with EI.

LS also exhibited a positive and significant association with EI (β = .235, p < .001). Leadership capabilities involving initiative, decision-making, coordination, and responsibility may be relevant to individuals considering business ownership, as entrepreneurial activities frequently require individuals to organise resources and manage different responsibilities. Bergner (2020) similarly highlighted the relevance of individual characteristics beyond cognitive ability in explaining leadership and entrepreneurial outcomes. The bootstrap confidence interval for LS (.144 to .492) also excluded zero, providing additional support for this finding.

6.4. Relative Contribution of Skill Dimensions

A comparison of the standardised coefficients indicates that SES (β = .237) and LS (β = .235) had the largest estimated unique associations with EI, followed by TS (β = .156) and CS (β

= .140). The closeness of the SES and LS coefficients suggests that both dimensions are relevant to understanding entrepreneurial intention in the present sample. However, their difference is very small, and no formal statistical comparison of the coefficients was conducted. Therefore, it would be inappropriate to conclude that SES has a statistically stronger association than LS.

The findings nevertheless draw attention to the relevance of capabilities extending beyond occupational proficiency. While technical competence provides a practical foundation for potential business activities, socio-entrepreneurial and leadership capabilities may be relevant to developing networks, coordinating activities, and managing business-related responsibilities. The positive coefficients across all four dimensions support a multidimensional understanding of skill development in relation to EI.

6.5. Implications and Limitations

The findings suggest that vocational training programmes may benefit from integrating entrepreneurial capability development alongside occupational instruction. Training activities could include problem-solving exercises, practical enterprise projects, opportunity identification, business networking, resource mobilisation and leadership-based assignments. Such activities may provide participants with opportunities to apply their occupational knowledge in potential entrepreneurial contexts.

Programme evaluation could also extend beyond technical proficiency to consider CS, SES and LS alongside TS. This broader assessment may provide a more comprehensive understanding of participants' perceived preparedness for self-employment. However, the findings do not establish that these interventions will necessarily increase entrepreneurial intention or lead to business creation.

The results should also be interpreted in light of the study's methodological limitations. The Breusch–Pagan test indicated heteroscedasticity ($p = .003$), suggesting that the constant variance assumption may not hold. Although supplementary bootstrap analysis was conducted using 2,000 resamples, percentile bootstrapping does not automatically correct heteroscedasticity. In addition, the confidence interval for CS included zero, making its unique contribution less conclusive than those of the other dimensions. Future studies could employ heteroscedasticity-consistent standard errors and longitudinal designs to examine the robustness of these relationships and whether entrepreneurial intentions translate into actual business activity.

Overall, the study demonstrates that EI among vocational training participants is associated with multiple dimensions of skill development. By examining CS, TS, SES, and LS together, it highlights the relevance of a broader skill-development perspective in understanding entrepreneurial intention beyond technical competence alone.

7. Suggestions and Recommendations

The findings provide useful insights into the relationship between multidimensional skill development and entrepreneurial intention among vocational training participants. Based on the three research objectives and empirical results, the following recommendations are proposed.

First, vocational training institutions should adopt an integrated approach to skill development. The positive correlations between CS, TS, SES, LS, and EI indicate that entrepreneurship-oriented training should extend beyond occupation-specific competencies to include a broader range of skills relevant to business development.

Second, particular attention should be given to SES and LS, which recorded the highest standardised regression coefficients (β = .237 and β = .235, respectively). Training institutions should incorporate networking activities, stakeholder interaction, teamwork, resource mobilisation, and leadership assignments into their programmes. However, the coefficients are numerically close, and their difference cannot be considered statistically significant without a formal comparison.

Third, the positive contribution of TS highlights the importance of connecting vocational competencies with practical business applications. Product development, customer-oriented projects, quality management, and demonstrations of how occupational skills can be converted into marketable goods or services could help participants explore self-employment opportunities.

Fourth, CS should be strengthened through activities involving critical thinking, creativity, problem-solving, and business opportunity recognition. Trainees could be encouraged to identify local market needs, evaluate business ideas, and prepare basic business plans. Nevertheless, the supplementary bootstrap confidence interval for CS included zero, suggesting that its independent contribution requires further investigation.

Fifth, the four skill dimensions collectively explained 40.4% of the variance in EI. Accordingly, policymakers should integrate entrepreneurship education into vocational training programmes through modules covering financial literacy, market research, business planning, digital marketing and enterprise-support schemes. Collaboration with entrepreneurs, industry associations and incubation centres could provide additional practical exposure and mentoring.

Finally, training institutions should periodically evaluate whether skill-development initiatives are associated with changes in EI and subsequent business-related activities. Longitudinal assessments could help identify how different skill dimensions contribute to entrepreneurial development over time.

Overall, vocational training programmes should combine occupational competence with the development of CS, TS, SES and LS to strengthen entrepreneurial aspirations. Since the present study establishes statistical associations rather than causal relationships, future longitudinal research is recommended to examine how these competencies influence entrepreneurial intention over time.

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