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INFLUENCE OF CREATIVE, SOCIAL, AND PRACTICAL IMAGINATIVENESS ON SELF-EFFICACY AND ENTREPRENEURIAL INTENTION OF ENGINEERING STUDENTS

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Abstract. Despite the importance of imagination to entrepreneurship, it is underexplored by researchers in the field. Imaginativeness is a cognitive ability that coalesces the capacity for imagination with the knowledge required to rationally conjure up a variety of task-related scenarios. It is especially helpful for those who lack prior experience and therefore can be beneficial for recent graduates and anyone who wants to launch their own business. In our study, we examine whether imaginativeness, in its three forms, can influence engineering students' entrepreneurial self-efficacy and entrepreneurial intention. Our study recorded 216 responses to prove the hypotheses employing partial least squares path modeling using *SmartPLS3*, and we inferred that creative imaginativeness, social imaginativeness, and practical imaginativeness are positively related to entrepreneurial self-efficacy thereby strengthening entrepreneurial intention. The study provides distinctive insights into the study of imagination in the formation of entrepreneurial intention among engineering students in a developing economy, where studies are few.

Keywords: creative imaginativeness, emerging economy, engineering students, entrepreneurial intention, entrepreneurial self-efficacy, practical imaginativeness, social imaginativeness.

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1. Introduction

Entrepreneurship usually begins with one or more people dreaming of new business ventures and developing optimistic opinions about one of them. Based on their previous knowledge, continuing experiences, the numerous stimuli they have undergone, and their imagination, some individuals come to the certitude that creating a new product or service to address a specific issue in the market may be a meaningful concept that could be pursued with the resources and talent (Kier & McMullen, 2018).

Entrepreneurial imagination starts with ideas about communication and information, with knowledge consisting of categories that are perceived and decided upon but are incomplete and changeable. It is believed to bring about continual novelty, extensive heterogeneity, and significant dynamism in the entrepreneurial processes (Chiles et al., 2021). Kier and McMullen (2018) consider imaginativeness as a critical ingredient for new venture ideation as the recognition of opportunities is ultimately defined by the entrepreneur's creative imagination and social skill. Despite its espoused significance to entrepreneurial action, entrepreneurship

academics seldom analyse, much less describe or quantify imagination (Suddaby et al., 2015). For predicting the validity of new venture idea generation and selection, the three types of imaginativeness identified by Kier and McMullen (2018) – creative, social, and practical – variate between people, and each predicts the quantity and caliber of new business ideas in a unique way. Past research has demonstrated a review of the literature on the measurements and antecedents of entrepreneurial self-efficacy but not much scholarly attention has been given to the combined influence of imaginativeness and entrepreneurial self-efficacy. One of the main reasons for this could be that imaginativeness in itself is a novel concept in entrepreneurial literature.

Despite the fact that the majority of the population is employed in agriculture and allied sectors, economy of India, which ranks third in purchasing power parity and fifth in nominal gross domestic product (GDP), is undergoing fast transition. However, the considerable GDP contributions of manufacturing and techno/digital services, at 29% and 54%, respectively, suggest the importance and necessity of technological entrepreneurship and innovation as the primary drivers of social and economic growth (Chakrabarty et al., 2021). The 1.4 million engineering students who graduate from Indian engineering institutions each year represent the largest reservoir of entrepreneurial talent that might potentially revolutionize the country's technology economy (Lingappa et al., 2020). If elements influencing engineering students' entrepreneurial intention are thoroughly understood, the formidable task of finding jobs for the many engineering students that graduate each year can be transformed into a huge opportunity.

In light of the dynamic tangle of financial, societal, and political interactions, conventional methods of entrepreneurship education have proven to be less effective overall and even counterproductive at times, especially in developing nations. Clearly, an amendment in the education system and entrepreneurial training is essential if academic institutions are to fully engage in energizing their national economic situation and enabling companies with the critical entrepreneurial edge to succeed in a global economy. It has been acknowledged that design thinking, heuristic analogies, and metaphorical reasoning are often touted as enabling entrepreneurial action by relaxing the grip of pre-existing notions while stimulating entrepreneurial imagination (Grimes & Vogus, 2021). Cultivation of imaginativeness and hence building the entrepreneurial spirit will be significant in predicting intentions for new venture ideation (Kier & McMullen, 2018).

In our study, we wish to examine whether imaginativeness might be the source of entrepreneurial self-efficacy influencing their intentions toward new venture ideation. The objectives of our study are as given below:

1. To study the influence of imaginativeness in its three main forms namely creative, social, and practical imaginativeness on entrepreneurial self-efficacy;
2. To investigate the influence of entrepreneurial self-efficacy on entrepreneurial intention of engineering students.

The organization of the article is as follows: a review and summary of the insights from earlier studies are shown in the next section. Later, the methodology section describes the research methods adopted. The key findings of the statistical analysis are then put forth followed by the discussion and finally the conclusions section. Finally, implications of the research, limitations, and scope for further research are given.

2. Literature review and hypotheses development

The proposed conceptual model involves three primary constructs: imaginativeness which has three main forms: 1) creative, social, and practical imaginativeness; 2) entrepreneurial self-efficacy; and 3) entrepreneurial intention.

2.1. Entrepreneurial intention

Bird (1988) proposed an entrepreneurial intention framework that addresses the conscious undertaking of new venture formation. According to Tubbs and Ekeberg (1991), an intention is a cognitive description of both the purpose and the target that one aims for and the action plan that one intends to use to achieve that goal. Past research has found that making career decisions are planned, conscious and voluntary decisions and not simply a conditioned response to the stimulus (Krueger Jr. et al., 2000). To start up, one has to have some cognitive and social abilities, and these are termed motivational antecedents (Ajzen, 1991). It is believed that more of these favourable antecedents increase one's intention to start up.

2.2. Entrepreneurial self-efficacy

Self-efficacy refers to self-perception of one's own talents that influences one's choices, ambition, effort, and perseverance in the face of disappointments (Wood & Bandura, 1989; Bandura & Jourden, 1991). According to Bandura (1997), mastery and vicarious experiences, social influences, and physiological and affective conditions are all causes of self-efficacy. Self-efficacy influences performance through interest, motivation, and perseverance, while performance offers input information used to assess and modify self-efficacy (Chen et al., 1998). Entrepreneurial self-efficacy is derived from the larger idea of self-efficacy based on social cognition theory and emphasizes the relevance of observation and replication of action in the formation of self-efficacy beliefs in social learning. It is widely accepted that entrepreneurial self-efficacy has a significant impact on whether people pursue entrepreneurial professions and engage in entrepreneurial activities.

de Noble et al. (1999) expound six dimensions constituting entrepreneurial self-efficacy. A person's belief in their ability to produce new products is a factor in the first dimension, which deals with creating new products and market prospects. The ability to inspire others to take inventive action is a component of the second dimension, which deals with creating an innovative atmosphere. A person's confidence in their ability to obtain funds for their project is reflected in the third component, enabling investor contacts. A person's trust in their capacity to be clear about their aim, retain it, and convey it to their team and investors makes up the fourth dimension, establishing core purpose. The ability to deal with doubt and vagueness in a new endeavour is the fifth dimension, which is coping with unanticipated challenges. The assumption that one will be able to attract and keep significant and talented people who can improve the enterprise is the sixth dimension, creating essential human resources.

2.3. Imaginativeness

Imagination, in the context of entrepreneurship, is comprised of a variety of information interactions that result in an opportunity and affect long-term plans to create a new venture. When knowledge needed to perform various entrepreneurial processes such as innovation, persuasion, and administration are combined with this cognitive ability of imagination, it becomes the cognitive skill of imaginativeness that helps in accelerating the mental process of generating new ideas for new venture ideation (Kier & McMullen, 2018). Imaginativeness could be easily mistaken for creativity but there is a fundamental difference that exists between the two. According to Mumford (2003), while creativity may often result in the invention of new and useful, imaginativeness is purely limited to the mental simulation of tasks and therefore can be considered a part of creativity. Entrepreneurs are individuals who have been imaginative in a commercial setting as they have not only used their creative thinking but have also thought from others' perspectives and have analysed all the business outcomes before founding and leading a firm (McMullen & Kier, 2017). In fact, it is shown that social entrepreneurs who were more empathetic possessed higher levels of entrepreneurial imaginativeness and experienced higher expectations of growth in terms social impact (Yao Addae, 2021).

According to Kier and McMullen (2018), the cognitive ability for imagination combines with the information required to mentally simulate various task-related scenarios in entrepreneurship, such as innovation, communication, and administration, to produce the measurable skills of creative, social, and practical imaginativeness, respectively.

2.4. Creative imaginativeness

For a long time, researchers have been intrigued by the possibility of a connection between person's creativity and entrepreneurship (Shane & Venkataraman, 2000). Observing that many founding teams employ brainstorming to boost the amount of fresh ideas, entrepreneurs' creative role in innovation is widely recognised. This strengthens creativity as a crucial basis for innovation.

Baron and Tang (2011) found that creativity of an entrepreneur is positively related to the individual's innovativeness. Creative individuals are more likely to spot business opportunities (Shane & Nicolaou, 2015). Entrepreneurs with higher levels of creativity are more likely to come up with novel ideas for their businesses (Gielnik et al., 2015). Entrepreneur's creativity was also found to have a significant positive influence on process innovation as well (Heunks, 1998). Creative problem solving may serve as a major catalyst for entrepreneurship as well as increasing individual creativity and innovation (Horng et al., 2021).

People can build creative imaginativeness by devising for novelty and thinking laterally (McMullen & Kier, 2017). Individuals with enhanced creative imaginativeness will better contribute qualitatively as they will have the ability to defer judgment, and think laterally and out of the box. This is in accordance with de Noble et al. (1999) dimension of developing new products and market opportunities and building an innovative environment in the firm showing increased levels of entrepreneurial self-efficacy. Hence, we propose the following hypothesis:

H1: creative imaginativeness positively influences entrepreneurial self-efficacy.

2.5. Social imaginativeness

Existing literature states social imaginativeness impacts both idea generation and selection in new firms by allowing individuals to cognize the requirements of others (Kier & McMullen, 2018). Developing social competencies facilitates an individual to antedate the actions and responses of others (Davis, 1983). It is found abundant information is provided through facial expressions, stance, voice modulation, speeches, gestures, *etc.* (McMullen, 2010). Entrepreneurs are more likely to identify an issue that they are best suited to fix when they begin to see things from the viewpoint of others (McMullen, 2010). Social imaginativeness can aid in idea collection by assisting in selecting and generating the most promising idea by considering the proposals from the perspectives of others. This is congruent to de Noble, Dong Jung, and Ehrlich's fourth dimension of entrepreneurial self-efficacy. Hence, we propose the following hypothesis:

H2: social imaginativeness positively influences entrepreneurial self-efficacy.

2.6. Practical imaginativeness

Practical imaginativeness enables individuals, by virtue of their problem-solving skills, to focus on bottleneck problems in projects, with a belief that once those were resolved, the remainder of the project would be relatively uncomplicated (Kier & McMullen, 2020). People who see ahead of a new-found situation and visualize the issues that they may possibly face and plan appropriately are said to exhibit higher practical imaginativeness (Kier & McMullen, 2018). They have a good sense of planning, and budgeting and they can manage projects and key resources in the most judicious way possible (McMullen & Kier, 2017). This substantiates that an individual with developed practical imaginativeness has a tremendous potential to be able to deal with vagueness and uncertainty in the new venture and can identify potential sources of funding for investment thereby raising their entrepreneurial self-efficacy. Hence, we put forth the following hypothesis.

H3: practical imaginativeness positively influences entrepreneurial self-efficacy.

Entrepreneurship necessitates perseverance and passion in addition to taking chances, coping with uncertainty, being inventive, guiding others, and being constructive. Higher levels of self-efficacy among entrepreneurs will enable them to enhance the performance of their organisations, particularly in emerging economies, effective human agency is a vital factor for the success of institutions functioning in the face of obstacles (Herath & Mahmood, 2014). Attitudes toward entrepreneurship and perceived self-efficacy ideas will subsequently impact the formation of entrepreneurial intention (Ajzen, 1985). Among college students, regardless of gender, self-efficacy is highly associated with declared vocational interests and occupational choice (Betz & Hackett, 1986). As a result, self-efficacy may be a critical factor in deciding whether a person's entrepreneurial intention is moulded early in their career. Hence, we present our final hypothesis as below.

H4: Entrepreneurial self-efficacy positively influences entrepreneurial intention.

Figure 1 depicts the conceptual framework with all the five constructs and the hypotheses.

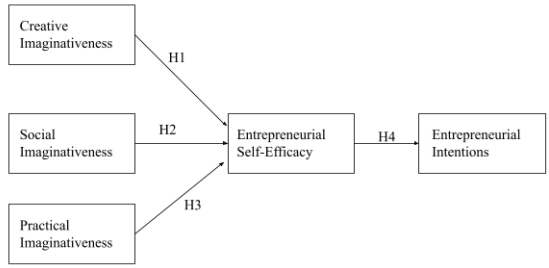

Figure 1. Conceptual model (source: created by authors)

3. Methodology

3.1. Research instrument

The research design used a quantitative, cross-sectional approach. Data was collected using online questionnaire-based survey on a five-point Likert scale over a period of 2 months. Due to unavailability of a usable sampling frame, convenience sampling was employed and the population in the study included students from 17 different engineering and technical institutes across India. The online survey was disseminated via electronic mails and social media sites including *Facebook*, *WhatsApp* groups, *Instagram*, *etc*. However, bias brought on by the convenience sample was carefully avoided. Care has been taken to ensure representativeness and reduction of bias by keeping an audit trail during the data collection stage and by making conscious efforts to select samples with homogeneous attributes. Structural equation modeling (SEM) technique, partial least squares path modeling (PLS-PM), was used to validate the measurement model and evaluate the hypotheses. Items of constructs creative imaginativeness, social imaginativeness, and practical imaginativeness were adapted from Kier and McMullen (2017), entrepreneurial self-efficacy was borrowed from de Noble et al. (1999), and finally, questions related to the entrepreneurial intention were taken from Liñán and Chen (2009). The questionnaire was presented to experts in the area of student entrepreneurship for content validation and was further subjected to pilot analysis to validate the instrument. The refined questionnaire used for the main consisted of 4 items for creative imaginativeness, 6 items for social imaginativeness, 5 items for practical imaginativeness, 19 items for entrepreneurial self-efficacy, and 4 items for entrepreneurial intention. The final questionnaire used for main study is as shown in Table 1.

Table 1. Research instrument (source: created by authors)

Creative imaginativeness (CI)[a]	
CI_1	I consider myself to be innovative.
CI_2	I consider myself to be inventive.
CI_3	I like to create original work.
CI_4	Being creative is a large part of who I am.

End of Table 1

Social imaginativeness (SI)[a]	
SI_1	It is easy for me to see things from the other person's point of view.
SI_2	I am good at reading people.
SI_3	I can read people's emotions just from their facial expressions.
SI_4	I always make an effort to see the world through other people's eyes.
SI_5	It is easy for me to understand why people feel the way they do.
SI_6	I have a good sense for what other people are feeling.
Practical imaginativeness (PI)[a]	
PI_1	Before I face a new situation, I picture the issues I may encounter and plan accordingly.
PI_2	Forming mental images helps me solve problems.
PI_3	I can understand existing methods to solve new problems.
PI_4	I can picture what the limitations and problems of a system will be.
PI_5	I see connections between seemingly unrelated pieces of information.
Entrepreneurial self-efficacy (ESE)[b]	
ESE_1	I can see new market opportunities for new products and services.
ESE_2	I can discover new ways to improve existing products.
ESE_3	I can identify new areas for potential growth.
ESE_4	I can design products that solve current problems.
ESE_5	I can create products that fulfil customers' unmet needs.
ESE_6	I can determine what the business will look like.
ESE_7	I can develop a work environment that allows people to be more self-directed.
ESE_8	I can develop a working environment that encourages people to try out something new.
ESE_9	I can encourage people to take initiatives and responsibilities for their ideas and decisions, regardless of outcome.
ESE_10	I can form partner or alliance relationships with others.
ESE_11	I can develop and maintain favourable relationships with potential investors.
ESE_12	I can develop relationships with key people who are connected to capital sources.
ESE_13	I can identify potential sources of funding for investment.
ESE_14	I can understand vision and values of the organization.
ESE_15	I can inspire others to accept the vision and values of the company.
ESE_16	I can formulate a set of actions in pursuit of opportunities.
ESE_17	I can work productively under continuous stress, pressure and conflict.
ESE_18	I can tolerate unexpected changes in business conditions.
ESE_19	I can persist in case I face any problem.
Entrepreneurial intention (EI)[c]	
EI_1	I will make every effort to start and run my own firm.
EI_2	I am determined to create a firm in the future.
EI_3	I have very seriously thought of starting a firm.
EI_4	I have the firm intention to start a startup some day.

Note: Items adopted from three sources ([a] Kier & McMullen, 2017; [b] de Noble et al., 1999; [c] Liñán & Chen, 2009).

3.2. Data collection

Convenience sampling method was employed due to the unavailability of a usable sampling frame. Data were collected over the course of three months from different regions of India using an online questionnaire. The *Google* form link of the questionnaire was circulated online through various student body networking platforms, student groups, and through social media such as *LinkedIn*, *Facebook*, *Twitter*, *etc.* 216 responses were collected from undergraduate engineering students belonging to various streams of specialization from 17 different engineering colleges across India. Care has been taken to ensure representativeness and reduction of bias by keeping an audit trail during the data collection stage and by making conscious efforts to select samples with homogeneous attributes. Responses sought to make sure that every region of the nation was fairly represented, and they included both government and private engineering universities with National Institutional Ranking Framework rankings of 75 or lower because of the higher likelihood of student entrepreneurship development programs in such institutes. The questionnaire used a five-point Likert scale where strongly disagree (1) to strongly agree (5) was used for measurement. The demographic details of the respondents are recorded in Table 2.

Table 2. Demographic information of respondents (source: created by authors)

Gender	Number of responses
Male	118
Female	98
Age	Number of responses
17–20	65
21–24	151
Domicile region	Number of responses
North India	63
South India	72
East India	58
West India	23
Year of study	Number of responses
2nd year	38
3rd year	86
4th year	92
Specialization	Number of responses
Aeronautical engineering	06
Automobile engineering	08
Civil engineering	25
Computer science/information technology	37
Electrical engineering	41
Electronics engineering	49
Mechanical and manufacturing	38
Biotechnology/biomedical engineering	12

3.3. Statistical analysis

This study used SEM for statistical analysis using the PLS method. *SmartPLS3* was the software tool used to create the structural model. In PLS-SEM, analysis is carried out in two stages: 1) measurement model evaluation (to assess the reliability and validity of the research instrument), then 2) structural model evaluation (for hypothesis testing).

3.3.1. Common method bias and multicollinearity test

Checking for common method bias (CMB) is essential to rule out any bias that might have occurred due to measuring independent and dependent variables using the same instrument. Harman's single factor analysis was performed on the data set to assess CMB. This test revealed that a single factor accounted for only 46.8% of the total variance. This value is less than 50% (Lee et al., 2014), indicating no single dominant factor in the collected data. Hence, it was proved that CMB was not an issue with the data set.

Multicollinearity issues in the model can result in biased results. Therefore, it had to be ensured that the research model was devoid of multicollinearity. Variance inflation factor (VIF) is a measure that provides an understanding of the collinearity between constructs in the regression analysis. The VIF values were found to be in the range of 1 and 1.848, significantly lower than the cut-off value of 5 (Venkatesh et al., 2012), proving that multicollinearity issues were not existing in the model.

3.3.2. Measurement model analysis

The validity (convergent and discriminant) and reliability of the survey tool must be established prior to evaluating inferential statistics. The degree of agreement between two or more items measuring the same variable is known as convergent validity (Thong, 2001). Outer loadings are the standardised path weights that connect the components to the indicator variables. Convergent validity is gauged using the average variance extracted (AVE) and outer loading values. Each dimension's AVE value should be greater than 0.5, signifying that the latent variable accounts for at least 50% of the variance in its indicators (Fornell & Larcker, 1981). Each construct item's outside loadings should be bigger than 0.60. (Lee et al., 2014). The analysis of the measurement model revealed that the AVE values for all samples fell between 0.54 and 0.86. Furthermore, all of the construct items' outer loading values fell between 0.65 and 0.94. As a result, the model's convergent validity was established. Table 3 displays the measurement model values.

The definition of discriminant validity is the ability of items to distinguish between variables (Thong, 2001). Heterotrait-monotrait (HTMT) ratio and Fornell–Larcker criterion (FLC) are two methods for assessing discriminant validity (Hair Jr. et al., 2017). The FLC states that discriminant validity is demonstrated if the AVE's square root values are higher than the correlations of latent variables (Hair Jr. et al., 2017). Results show that all of the constructs used in this study satisfied the FLC since the square root of their AVE values was greater than their inter-construct correlations. The HTMT ratio, a key measure for assessing discriminant validity, showed that all HTMT ratios were below the threshold of 0.85, supporting the model's discriminant validity (Hair Jr. et al., 2017). Tables 4–5 present the discriminant validity and HTMT ratio values, respectively.

Table 3. Measurement model analysis (source: created by authors)

Items	Loadings	Cronbach's alpha	Congeneric reliability	Average variance extracted
CI_1	0.912	0.901	0.931	0.771
CI_2	0.858			
CI_3	0.894			
CI_4	0.847			
SI_1	0.796	0.905	0.927	0.678
SI_2	0.805			
SI_3	0.838			
SI_4	0.806			
SI_5	0.842			
SI_6	0.854			
PI_1	0.783	0.879	0.911	0.673
PI_2	0.809			
PI_3	0.855			
PI_4	0.832			
PI_5	0.822			
ESE_1	0.709	0.953	0.958	0.544
ESE_2	0.782			
ESE_3	0.766			
ESE_4	0.754			
ESE_5	0.776			
ESE_6	0.752			
ESE_7	0.695			
ESE_8	0.798			
ESE_9	0.677			
ESE_10	0.691			
ESE_11	0.785			
ESE_12	0.798			
ESE_13	0.721			
ESE_14	0.783			
ESE_15	0.754			
ESE_16	0.699			
ESE_17	0.708			
ESE_18	0.651			
ESE_19	0.693			
EI_1	0.909	0.945	0.960	0.859
EI_2	0.933			
EI_3	0.919			
EI_4	0.944			

Note: CI – creative imaginativeness; SI – social imaginativeness; PI – practical imaginativeness; ESE – entrepreneurial self-efficacy; EI – entrepreneurial intention.

Table 4. Discriminant validity (Fornell–Larcker criterion) (source: created by authors)

	CI	EI	ESE	PI	SI
CI	0.878				
EI	0.582	0.927			
ESE	0.724	0.722	0.738		
PI	0.615	0.547	0.699	0.821	
SI	0.401	0.419	0.552	0.506	0.824

Note: CI – creative imaginativeness; SI – social imaginativeness; PI – practical imaginativeness; ESE – entrepreneurial self-efficacy; EI – entrepreneurial intention.

Table 5. Heterotrait-monotrait ratio (source: created by authors)

	CI	EI	ESE	PI	SI
CI					
EI	0.629				
ESE	0.829	0.760			
PI	0.682	0.599	0.760		
SI	0.436	0.452	0.593	0.565	

Note: CI – creative imaginativeness; SI – social imaginativeness; PI – practical imaginativeness; ESE – entrepreneurial self-efficacy; EI – entrepreneurial intention.

4. Results

The next stage is to assess the structural model results after validating that the construct measures are reliable and valid. The proposed research model has five constructs and four hypothesized relationships to be tested. The R^2 value or coefficient of determination values for entrepreneurial self-efficacy was 0.521, and entrepreneurial intention was 0.720, indicating moderate to substantial predictive accuracy levels. Hypothesis testing results revealed that all the postulated hypotheses were supported (Table 6, Figure 2).

Table 6. Hypotheses testing results (source: created by authors)

Hypothesized relationship		Path coefficients (β)	*t*-statistics	*p*-values	Hypothesis result
H1	CI→ESE	0.540	11.356	<0.001	Supported
H2	SI→ESE	0.202	4.080	<0.001	Supported
H3	PI→ESE	0.265	4.341	<0.001	Supported
H4	ESE→EI	0.722	16.092	<0.001	Supported

Note: CI – creative imaginativeness; SI – social imaginativeness; PI – practical imaginativeness; ESE – entrepreneurial self-efficacy; EI – entrepreneurial intention.

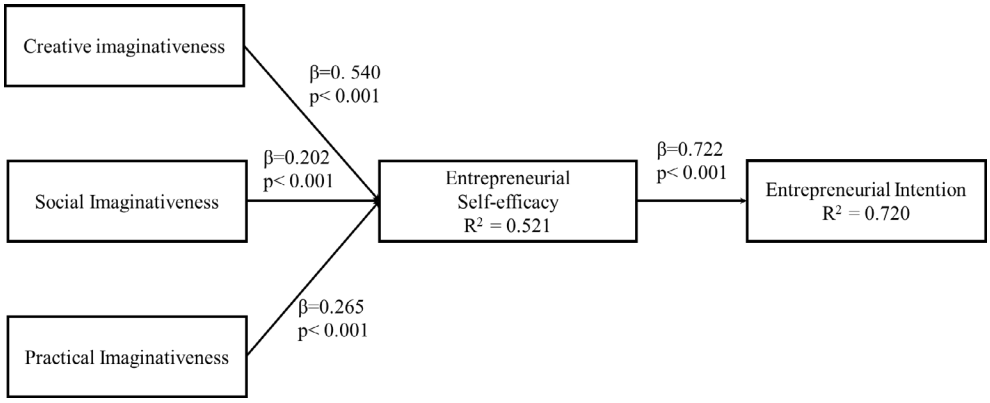

Figure 2. Partial least squares results (source: created by authors)

Creative imaginativeness (β = 0.540, $p < 0.001$), social imaginativeness (β = 0.202, $p < 0.001$), and practical imaginativeness (β = 0.265, $p < 0.001$) had a significant influence on entrepreneurial self-efficacy. Also, entrepreneurial self-efficacy developed as a consequence of imaginativeness influenced one's entrepreneurial intention (β = 0.722, $p < 0.001$). The hypothesis that proves the influence of entrepreneurial self-efficacy on entrepreneurial intention showcases that an individual who has enhanced their self-efficacy by engaging themselves in analytical, creative, and social activities are more likely to have an intent toward entrepreneurship.

5. Discussion

Though there are not many studies corroborating the relationship between creative imaginativeness and entrepreneurial self-efficacy, past studies have recognized the influence of creative disposition on self-efficacy. In agreement with studies conducted by Bellò et al. (2018), Kumar and Shukla (2022), Horng et al. (2021), and Kier and McMullen (2020), creative imagination emerged as a significant antecedent influencing entrepreneurial self-efficacy by enhancing the innovative abilities of the entrepreneur. Similarly, our results are also in agreement with research conducted by Tamannaeifar and Motaghedifard (2014), who found that creativity had a significant positive impact on children's self-efficacy. Social imaginativeness was found to have a significant relationship with entrepreneurial self-efficacy. Though research associated with social aspects of imaginativeness is rare, our findings are in consensus with similar studies conducted by Erozkan (2013) where social skills namely, communication and interpersonal problem-solving skills were found to be significantly correlated to self-efficacy. The outcomes support the finding that students' perceptions of their self-efficacy varied depending on their social skills and emotional intelligence (Salavera et al., 2017). Similarly, there are no studies to our knowledge that examines the empirical evidence of practical imaginativeness on entrepreneurial self-efficacy. However, our results agree with prior studies conducted on the positive association between planning activities and entrepreneurial self-efficacy (McCann & Vroom, 2015) and the pro-activeness of an individual to entrepreneurial self-efficacy (Otto et al., 2009; Prabhu et al., 2012). Additionally, our results are similar to the positive significant relationship between problem-solving skills that are shown to enhance self-efficacy beliefs in the context of nursing students (Ancel, 2016; Fitriani et al., 2020).

Numerous studies have espoused the positive significant influence of entrepreneurial self-efficacy on entrepreneurial intention. Entrepreneurial intention being the most widely researched outcome of entrepreneurial self-efficacy, our findings are in line with innumerable studies in the past that were conducted in the context of undergraduate students (BarNir et al., 2011; Engle et al., 2010; Hockerts, 2017; Horvath, 2016; Krueger Jr. et al., 2000; Piperopoulos & Dimov, 2015; Prabhu et al., 2012; Saeed et al., 2015; Sánchez, 2011; Sesen, 2013).

6. Conclusions and implications

Much of the literary evidence supports the role of entrepreneurial self-efficacy in developing entrepreneurial intent. Higher levels of self-efficacy among students would not only encourage

them to start up, but will also assist them improve the performance of their entities since the success of the entities operating in the presence of difficulties in a rising economy depends heavily on the efficacious human agency. All three forms of imaginativeness namely, creative, social, and practical, show a significant positive influence on entrepreneurial self-efficacy. While creative imaginativeness enables individuals to develop and design new products and innovate the existing ones, social imaginativeness empowers them to gain others' perspectives and accordingly formulate visions and objectives of their firm. Practical imaginativeness helps in idea selection, problem-solving and qualifies one to manage critical resources, and makes one confident to sustain in an uncertain situation. All three forms of imaginativeness bolster confidence as a cognitive estimate of performing tasks, being socially conscious and innovation-driven, and this is what motivates individuals towards new venture ideation.

6.1. Theoretical implications

The use of imaginativeness as an antecedent to examine entrepreneurial self-efficacy is novel, and we opine that it adds to future research on the development of entrepreneurial self-efficacy and entrepreneurial intention. Furthermore, because all the forms of imaginativeness were found to have a significant positive impact on entrepreneurial self-efficacy, this study may help us better understand the function of creative, practical, and social imaginativeness in entrepreneurial initiatives among engineering students, which no previous research has looked into. In the context of technical entrepreneurship, our findings support the role of imaginativeness and entrepreneurial self-efficacy as precursors to entrepreneurial intention. Though not generalizable, this finding could help researchers better understand the formation of entrepreneurial intention among students in developing countries, where technical entrepreneurship could be a viable solution for countries grappling with social, environmental, and economic issues.

6.2. Practical implications

India has emerged as the 3rd largest ecosystem for start-ups globally. However, due to a lack of a clear policy framework, insufficient funding, licenses, and necessary authorizations are frequently challenges for such student-run organizations. Virtual incubation centres are built to provide support to start-ups and early-stage businesses by providing them with the necessary guidance and network of like-minded people. However, there is often a lack of qualified technical workforce. This issue needs to be researched as to why people are not exploring a career to work in deep-tech start-ups despite having an impeccable technical background. It is also observed that even when a team of young graduates develops a high quality product or a service, they are not able to successfully take their ventures to fruition.

7. Limitation and future scope of work

Since the study collected responses from only a few engineering colleges in India, the results are not generalizable. However, the chosen institutes have a comprehensive national representation of students. Despite our efforts to collect as many responses as possible from

institutes around the country, we believe that a larger sample size with a more diverse representation of the student population will further reinforce the results obtained. The inherent drawbacks of convenience sampling restrict the generalizability of the findings.

The Government of India has launched strong and innovative initiatives for adult education to enable students to explore their sensory, cognitive, and social abilities. The National Education Policy 2020 (Government of India, Ministry of Human Resource Development, 2020) aims on including programs such as critical life and vocational skills. We encourage scholars to explore more closely how such educational and training initiatives help individuals develop their imagination and entrepreneurial self-efficacy. Additionally, research might be done to ascertain how intentions are affected by legal and regulatory frameworks (Engle et al., 2011).

Since the three categories of imaginativeness each function separately, teams may need to make up for individual members' deficiencies. Our study is focused on individuals pursuing engineering but imaginativeness can be studied in a scenario in which more than one individual works on a collective goal. Such a study would be a huge contribution to the literature and would help young graduates choose their start-up teams astutely. It was found that it is not necessary for all team members to have similar imaginative profiles; that is, individual team members' thinking does not have to be homogeneous. Studies in this area may provide new insights into entrepreneurial team formation in technology incubation centres. Additionally, the interrelationship between the three forms of imaginativeness may be researched. It is rather possible that individuals exhibit creative, practical, and social imaginativeness in varying degrees. Research on this area may shed light on the workings and unique strategies adopted by lone entrepreneurs who work independently and in very small entrepreneurial teams. Also, the influence of gender could be studied from the perspective of imaginativeness in the context of entrepreneurship.

There is a need to explore the antecedents of imaginativeness in detail so as to better understand at what level individuals can start developing it for engaging in entrepreneurship in the future. For instance, previous entrepreneurial experience may have a positive influence on imaginativeness. The effect of different content on cognitions deserves more consideration. Research on entrepreneurial self-efficacy has mainly concentrated on its benefits, with little emphasis given to any potential drawbacks. Additionally, since our study only focusses on engineering students, future research can be further extended to students from other disciplines for deeper insights into the role of creative, social, and practical imaginativeness on entrepreneurial self-efficacy and entrepreneurial intention.

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