

RESEARCH ON DIGITAL ENTREPRENEURSHIP IN THE ERA OF DIGITAL TRANSFORMATION: TRENDS AND OPPORTUNITIES

Huynh Thi My Dieu^{1*}, Huynh The Nguyen¹, Tran Nguyen Khanh Hai¹

¹ University of Finance - Marketing, Vietnam

*Corresponding author: Email: mydieu@ufm.edu.vn

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Appendix 1. Summarize the research on DEI

Authors	Year	Purpose	Methodology	Results	Implications/Limitation
Al-Mamary et al.	2025	Examine how Information Technology Culture (ITC) and Technology Orientation (TO) influence Digital Entrepreneurship Intention (DEI) among youth in Saudi Arabia	372 participants, PLS-SEM	ITC) and TO did not have a significant direct impact on DEI. Both ITC and TO showed significant indirect effects on DEI through Entrepreneurial Self-Efficacy (ESE). ESE was found to have a strong and direct positive influence on DEI. Social Support (SS) did not significantly moderate the relationship between ESE and DEI.	Current models must integrate psychological readiness alongside technology and culture to accurately predict behavioral outcomes. The findings are rooted in the specific socio-economic reality of Saudi Arabia; therefore, they may need local modifications before being applied to other developing nations
Zulfiqar et al.	2025	AI-powered education: Fostering entrepreneurship among university students: Investigating the impact of artificial intelligence (AI) tools on entrepreneurial intentions and attitudes.	students in Pakistan, SPSS, Smartpls TPB, TAM	The integration of AI tools has significantly improved students' attitudes and learning abilities regarding entrepreneurship by providing useful and automated solutions. The perceived value of using AI technology correlates positively and strongly with the usefulness and ease of use of AI and attitudes towards entrepreneurship	The study employed a self-reporting methodology, involving data collection based on surveys rather than measuring students' actual entrepreneurial desires and intentions after AI implementation in the classroom. The cultural and geographic scope of the study was limited to young university students, primarily from major cities
Aloulou et al.	2024	Examining the role of digital entrepreneurial	487 Saudi students,	Attitudes towards DE and PBC are significantly related	The TPB antecedents can play a mediating role between DEK and the

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		knowledge (DEK) and entrepreneurial role models (ERM) in shaping DEI among Saudi Youth	TPB; SEM	to DEI DEK indirect effects on intentions; ERM exert a negative and significant moderating effect on the relationship between PBC and DEI	intentions Did not possible to generalize the findings
Alzamel	2024	Explore the motivations, challenges, and strategies employed by Saudi women entrepreneurs in the e-commerce sector and analyze the impact of their entrepreneurial activities on the future economy	Quantitative and post-positivist approach, 388 women working in different start-ups in the big cities of KSA	E-entrepreneurial significantly impacts women entrepreneurial and economic growth. Entrepreneurial self-efficiency significantly mediates the relationship between women entrepreneurial and economic growth	Addressing cultural barriers, fostering an enabling environment for their entrepreneurial endeavors. Saudi women entrepreneurs should receive financial and technical support to initiate their ventures.
Bowen & Morris	2024	To investigate entrepreneurial opportunities through digital technology among agrifood businesses.	Resource bricolage theory 22 semi-structured interviews with representatives of small agrifood businesses	A continuum of different attitudes among respondents towards the adoption of digital technology (ADT), ranging from passive to proactive attitudes. Efficiency and productivity marketing and connectivity as issues in the ADT by agrifood businesses. These businesses were less likely to engage in cutting-edge technology activities	Existing debates relating to the passive nature of agrifood businesses towards growth opportunities. The development of a ADT continuum provides with a deeper understanding of how DE opportunities can be harnessed.
Calandra et al.	2024	How the metaverse can impact DE and how the revival of this new technology can bring entrepreneurial development.	Qualitative study metaverse 533 practitioner sources from the Nexis Uni database	Three relevant macro-topics for metaverse and DE (technology, immersive and design) Eight concepts (private solutions, digital twins, gamification, public solutions, new business worlds, co-design,	The conceptual difference between innovation or greater transformation of business models through the metaverse. Identifying a model for applying emerging technology to digital entrepreneurs.

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				collaborative spaces and stakeholders' participation).	
Lungu et al.	2024	Map the topic of DE, based on the existent research published in the Web of Science database for providing a systematic and integrative review of the literature	A bibliometric study, 3366 publications indexed in the Web of Science	Digital instruments (digital platforms, social media, Internet) and the need for dynamic capabilities are seen as promoters of adopting new business models and strategies for increasing firms' performance. The emergence of a digital entrepreneurial ecosystem (smart city, big data, and artificial intelligence)	Expand the analysis to other databases for achieving a more comprehensive bibliometric approach and will include another period, for comparing the results. Up-to-date literature on DE analyzed using quantitative and qualitative methods
Sitaridis & Kitsios	2024	Examine the role of IT knowledge and skills, on DEI of students, compared to the impact of entrepreneurial knowledge obtained from entrepreneurship courses	A cross-sectional survey, university IT and business students, Human capital approach	IT knowledge is connected to DEI of students providing a link between human capital theory and intentionality theories. Course design continuously adapts to the requirements of digital business, whereas theorists rush to understand the impact of emerging digital technologies in business processes.	Combine IT knowledge with entrepreneurial knowledge to promote DE. The core IT knowledge, should also examine the effect of emerging digital technologies on students DEIs.
Wibowo et al.	2024	Investigates the influence of DE education-DEE, perceived usefulness-PU, and perceived ease of use-PEU on DEI.	309 university students in Indonesia PLS-SEM, TAM	DEE significantly affects digital entrepreneurial self-efficacy (DES) and intention. The mediating role of DES in explaining the association between DEE, PEU, and EIs	The variables of the TAM can promote DES and intention.
Yáñez-Valdés & Guerrero	2024	Determinants and impacts of DE pre- and post-COVID-19 pandemic.	Reviewed 208 articles	The relationship between external and internal factors that enable the exploration of available digital	Proposes a multidimensional framework and discusses challenges and opportunities.

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				technologies for emerging business models, and the value digital entrepreneurs create for social, economic, and technological developments.	
Abaddi	2023	Explored GPT impact on the DEI of students and tech-savvy generations.	TAM & TPB Quantitative quest, 400 Business administration students	The mediating power of GPT usefulness and GPT ease of use part of the TAM emerges, TPB constructs also affect the EI of students.	The powerful combination of TAM and TPB, the exploration of GPT models mediating role
Agarwal et al.	2023	Define, evaluate and clarify the factors associated with the growth of women own enterprises in the sense of technological innovation.	A systematic and comprehensive analysis of literature	Technical information, such as the occupation of parents, financial support from banks and government and non-profit organizations	The relevance of regulatory policies and policy to the growth of women-owned digital enterprises
Al Halbusi et al.	2023	Examines the impact of attitude towards entrepreneurship-ATE, subjective norms-SN, and perceived behavioural control-PBC on e-EI in a single integrative model, the role of social media use-SMU and perceived social support (PSS) as moderators on the relationships between TPB components and e-EI.	TPB, PLS-SEM 510 entrepreneurs from five public universities in Iraq.	ATE, SN, and PBC have a positive impact on e-EI. SMU significantly strengthens the relationship between TPB components and e-EI.	When PSS is higher, it positively moderates the relationship between ATE and e-EI, PBC and e-EI. Can be valuable to entrepreneurs who wish to explore or capitalize on opportunities in the digital economy.
Alkhalaileh et al.	2023	Investigated the factors influencing DEI	399 undergraduate students in Jordan. Smart-PLS	DEI is directly influenced by ATE and PBC and indirectly by personality traits.SN, digital literacy, and perceived university support	Contribute to the growing body of knowledge on the role of digital literacy and socio-psychological factors in driving digital EIs, offering valuable insight for future policy

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				did not significantly impact it.	initiatives and educational strategies
Chakraborty & Biswal	2023	The impact of social media participation-SMP on female entrepreneurs towards DEI and their psychological empowerment.	Cross-sectional study integrates the Stimulus Organism Response Framework uses, Gratification theory	The significant effect of SMP on female entrepreneurs towards their DEI which further affects their psychological empowerment	The importance of female entrepreneurship which is essential for attaining self-reliance by reducing the socio-economic barriers. Female entrepreneurs' participation in social media communities enhances the levels of empowerment.
Elnadi & Gheith	2023	Providing insight into DE at the individual level by developing a model that explores the individual characteristics influencing business administration undergraduate students' intention toward DE in Saudi Arabia.	219 participants PLS-SEM	Entrepreneurial alertness and entrepreneurial digital innovativeness positively affect DEI. Entrepreneurial passion, entrepreneurial curiosity, and digital competence are positively associated with entrepreneurial alertness and digital innovativeness.	The five constructs of digital innovativeness, entrepreneurial alertness, entrepreneurial passion, entrepreneurial curiosity, and digital competence
Mir et al.	2023	Identifying major antecedents of DEIs, by exploring the association of four antecedents: digital entrepreneurial competence-DEC, innovative cognition-IC, social media adroitness-SMA and DE role models on the goal intentions, the association between goal intention and implementation intention to start a digital venture	287 respondents, Smart-PLS, Capital theory	The significant impact of the identified antecedents on the DE volition of potential entrepreneurs. Innovativeness has the greatest impact on the goal intentions to create new digital ventures followed by the presence of role models. DEC is a significant contributor in enhancing the propensity to start digital ventures while being digitally adroit has the least impact on such inclination.	The role of skill-based education programs to enhance the information technology related knowledge of students and incubation support for hands-on-training on the various dimensions of digital ventures. Entrepreneurial education can design special tasks and learning activities that acquainting students with design thinking perspectives and lean start-up approaches.
Mohammed. et al.	2023	E-commerce education (e-CE),	TPB,	e-CE levels influenced attitudes related components	People's desire to launch an internet company was substantially connected

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		gender disparity, and DEI: The moderating role of attitude components; a competitive advantage of the Ha'il region	338 young Saudi students	of people's views about e-EI, which influenced their intention to start an e-commerce firm. e-EC and attitude components are predictors of e-EI, men and women are not connected to this intention	with its behavioral, cognitive, and emotional components.
Mohammed et al.	2023	Explore the influence of attitude-related variables on the relationship between personality traits and the inclination to participate in DE, within the context of Ha'il's endeavors for competitive advantage in Saudi Arabia.	241 undergraduate students, Smart-PLS	Personality traits significantly shape the interplay between attitudes and EIs.	Future research could delve into the drivers of digital EI in Ha'il, as a strategic means to gain a competitive edge
Paliwal et al.	2023	The growth of the available literature in the academic world and to highlight the trends regarded as key in the realm of DE by means of the conduct of bibliometric analysis concerning the conceptual background	Bibliometric and systematic literature, 122 articles from the Scopus database, from 1970 to 2022.	Three clusters revealed several closely associated key words. The synthesis of topics of recent date which were of interest to scholars have led about the evolution of many topical clusters along with the identification of a change in interest over the days gone past	The development of digital entrepreneurial platforms the assumptions that lie under, the designs of the research along with an analysis of what was contributed to the field and the direction road map pointing out topic areas for further research
Sahrah et al.	2023	Determinants that could impact the desire to engage in DE, with a specific focus on personal traits, resilience, and the level of educational services.	517 sample data (212 Malaysian, 305 Indonesian), Smart-PLS	The intention to pursue DE is affected by both an individual's openness to experience and their resilience. SQ is a factor that affects both DEI and resilience	Provides new understanding of DEI antecedents and implies that improvement on education SQ can foster student intention to DE and their resilience.
Sakhteh et al.	2023	Identify the factors affecting open innovation in DE.	The content analysis method, Ten experts in	The most important factor in the world is the adoption of strategies based on	Each of the two groups was prioritized using the Shannon entropy, compared as factors

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			the field of open innovation and DE in Iran, 25h of semi-structured interviews	innovation and knowledge and entrepreneurial characteristics in individuals, while the most important factor in Iran is having a vision and a suitable program for business and entrepreneurial characteristics in individuals.	affecting open innovation in Iran and worldwide
Singh et al.	2023	Investigates the impact of digital entrepreneurial education and training-DEET and its impact on the DEI through the mediating character of entrepreneurial competence-EC.	391 survey responses, convenient and snowball sampling methods.	DEET showed a positive influence on EC and EI, with EC mediating the relationship between DEET practices and EI.	Assist the development of digital entrepreneurs. Useful for governments, entrepreneurs, venture capitalists, angel investors and various international development institutions.
Wibowo et al.	2023	Examine how DEK affects the DEI of students. The role of digital entrepreneurial alertness-DEA in mediating this relationship	cross-sectional survey, self-administrated survey, Indonesia, PLS-SEM	Digital entrepreneurial education-DEE and DEK can promote students DEI. DEA as a moderating variable DEE, DEK and student DEI.	Provides insights linked to psychological dimensions in the form of DEK and DEA as one of the predictor variables, as well as mediators for enhancing students DEI
Wibowo et al.	2023	Examines the association between DEE and DEI among Indonesian students by considering the mediating roles of entrepreneurial intuition and social media usage-SMU.	A self-administered survey of 270 universities students, Indonesia, PLS-SEM	DEE positively affects DEI and SMU. A significant correlation is found between SMU, EI, and DEI. The mediating role of SM in the relationship between DEE and DEI, SM can mediate the relationship between entrepreneurial intuition and DEI.	The importance of digitalization and SM in stimulating digital EI. The need for entrepreneurship to involve digitalization for students EI and behavior
Xin & Ma	2023	The effect of gamifying online entrepreneurship education-EE on students' intention to be digital entrepreneurs.	TPB, SCT. Smart-PLS	Digital policy cognition and digital entrepreneurial self-efficacy-DES are two key elements. Gamifying online	Promote further and improve DEE

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				EE can influence DEI directly. Digital policy cognition and DES play mediating roles between gamifying online EE and DEI.	
Xu et al.	2023	The intentions and behaviours of these entrepreneurs in relation to their digital start-ups and the impact caused by exogenous changes require deeper investigation.	Intention-based social cognitive perspective	A holistic framework regarding the changing entrepreneurial behaviour	Policy implications for the development of digital start-ups
Yáñez-Valdés et al.	2023	Theorizes the micro-foundations of digital-social value-creation and explores the flourishing of the DSE phenomenon during/after the global lockdowns.	Integrative literature review and a thematic case study	Extending the DSE definition and identifying the fostering (micro, meso, and macro) conditions involved in the digital-social value-creation process.	Several implications emerged from the DSE learning, adaptation, and co-creation strategies/practices
Akhter et al.	2022	Identify the determining factors of DEI among university graduate students in Bangladesh.	358 university students, Bangladesh Quantitative, SPSS	Digital entrepreneurial self-efficacy-DES, digital literacy, entrepreneurship education-EE, innovativeness, and creativity positively and significantly impact university students becoming digital entrepreneurs.	Students' innovativeness and EE have more impact on their DEI, implying that policymakers and universities should design their academic policy to promote innovative and entrepreneurship activities in the academic pedagogy
Al-Mamary & Alraja	2022	To test the most famous theory in the field of intention, namely TPB model	TPB, 248 students, Amos.	The model is applicable in Saudi Arabia, in the field of EI to help develop the field of entrepreneurship amongst Saudi youth in general and support the DEI of young people at the university level.	The contribution of young entrepreneurs to the economic and social development of the country
Dicuonzo et al.	2022	The role of transformational	case study methodology,	DP supported the entrepreneur in	Extension of the existing literature that deepens

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		entrepreneurship in managing a digital platform-DP	semi-structured, open-ended interview with the entrepreneur and founder of Yamamay, a company operating in the retail sector	formulating strategic choices that allowed the company to continue offering its services despite the store closures imposed by the pandemic. The whole concept of traditional retail has been and continues to be revised, rationalizing it and integrating it with a more omnichannel logic in which DP play a fundamental role.	the understanding of the relationship between DP and TE in a particular scenario, such as the COVID-19 pandemic. The effect of business decisions on the adoption of DP to meet increasing and changing customer needs.
Ferreira et al.	2022	The impact of national entrepreneurship systems (NESs) on what is known as the twin transition evaluate the effect of the entrepreneurial attitudes, abilities and aspirations, and components of NESs, on the twin transition (digital and environmental).	Through recourse to dynamic panel econometric techniques applied to various databases (Eurostat, FAO, GEM, UN, and World Bank)	The positive interactions established by entrepreneurial attitudes, abilities and aspirations, as pillars of NESs, with the digital and environmental transitions.	The level of national economic development returns a positive moderating effect on the relationship between the NES components and the twin transitions.
Gillani et al.	2022	This mapping visualization study is to thoroughly discover and create clusters of EE to convey a taxonomic structure that can oblige as a basis for upcoming research.	Google Scholar through Publish or Perish tool, 1000 documents (2007- 2022) Bibliometric analysis	Generating stronger bonds with DEE research; it should stand in international research association to boost both interdisciplinary DEE and its influence on a universal basis.	Strengthens students understanding of current DEE research by classifying and decontaminating the most powerful knowledgeable relationship among its contributions and contributors.
Sobaih & Elshaer	2022	Examines to what extent the big five personal traits-BFPT (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism)	A pre-examined questionnaire, Kingdom of Saudi Arabia (KSA). SmartPLS	A direct positive and significant impact of the BFPT on PA. The impact of the BFPT (except agreeableness) on DEI were positive but insignificant. A	Contributing to the research gap in relation to PT and its impact on PA and ultimately on DEI, especially among digital natives

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		and digital natives' impact on their DEI, the indirect impact through personal attitude-PA.		mediating effect of PT in the link between PA and DEI among senior students in KSA higher education.	
Tandon et al.	2020	Study the impact of digitization on the entrepreneurial ecosystem in India, coupled with the rise of digital entrepreneurs especially, in context of start-ups.	Divided into different sections that focus on understanding entrepreneurial and digital ecosystems and the emergence of the intersecting field of DE.	The later sections discuss in detail about India's entrepreneurial ecosystem	Government support and attempt to draw implications for Indian entrepreneurs who are hoping to build successful technology-based start-ups.
Younis et al.	2020	Exploring the relationship between personality characteristics and contextual factors with their association to the attitudes, the PBC, and SN, which determine DEI of students at Qatar University.	TPB, 203 students	Students' attitudes towards DE are not associated with their propensity towards risk-taking and locus of control. Social and cultural views not related to the students' DEI. Perceived support and perceived barriers have a strong relationship with Qatar University students PBC.	Identifying the critical motivational factors associated with DE among university students and it provides information that could be useful for policy- and decision-makers.
Ladeira et al.	2019	Developing a fuzzy cognitive map (FCM) to identify and analyze the determinants of DE's success	Two group sessions were held with a panel of decision makers who deal with the DE phenomenon every day.	Understanding of the cause-and-effect relationships between the determinants of DE, resulting in a well-informed framework that was validated by the panel members. Based on their shared experience and knowledge, an FCM was developed and validated.	This methodological procedure enabled an objective analysis of the dynamics behind DE.
Le Dinh et al.,	2018	Developing a framework for a specific type of Living Labs for	-	This Living Lab serves as a foundation for activities and their	To foster university-entrepreneur partnerships, the PDEP-LL provide services for

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		promoting the DE process, that begins with the idea generation and continues with different business management stages.		digital artefacts involved of each entrepreneurial stage, for different associated digital platforms and for professional support services.	several types of academic and industrial stakeholders in the digital business ecosystem for supporting entrepreneurs and start-up businesses
Yaghoubi Farani et al.	2017	Relationship between entrepreneurial knowledge-EK and DEI and asserts that this relation is mediated by motivational factors.	150 computer sciences students, Iranian, TPB	The two motivational factors (ADE and PBC) significantly relate to DEI. EK indicates indirect effects on intentions via these two motivational factors.	Understanding the role of EK in shaping DEI through developing an integrated intention model based on the TPB. The TPB fully accounts for the indirect effects of EK.
Dutot & Van Horne	2015	Fill the gap in the literature about entrepreneurship and digital, a conceptual model of DEI.	10 semi-structured interviews of both French and Emirati digital entrepreneurs	Agility, entrepreneurial alertness and entrepreneurial characteristics influence intention.	Professionals can identify items that will help them launching their firm when academics will find new areas of research regarding DE.

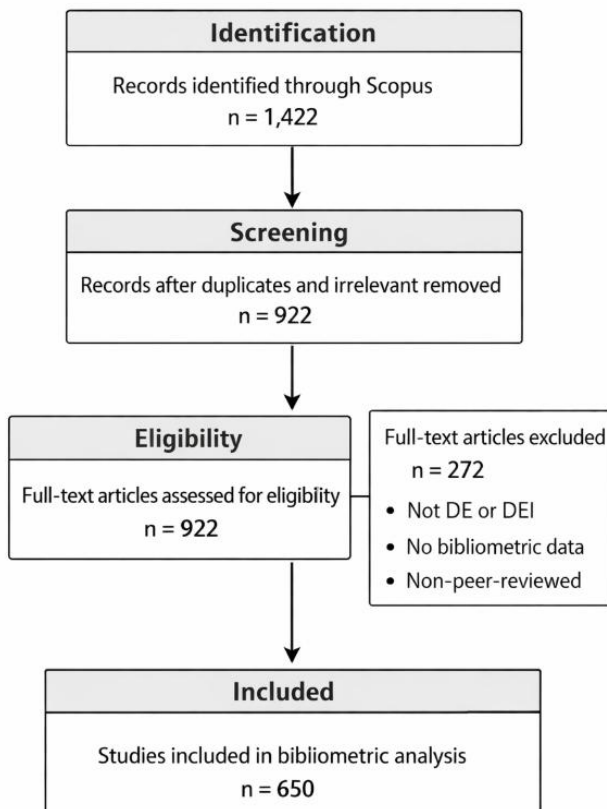
Appendix 2. Summary of theories used in research on entrepreneurship

Theory	Contents	Application in research on entrepreneurship	Authors	Years
The Theory of Planned Behavior Model - TPB	Explain that people's planned behavior is the result of their intention to perform the behavior and their ability to control it, influenced by three factors: (1) Attitude towards behaviour; (2) Subjective norms; (3) Perceived behavioral control.	The three antecedents of intention are largely shaped by exogenous factors such as personality traits, sociocultural environment, and institutions. When intentions are predicted from attitudes and subjective norms, or from attitudes, subjective norms, and perceived behavioural control, on average about 40% - 50% of the variance is explained.	Ajzen	1991
Social Cognitive Theory (SCT)	An individual's decision to exhibit a certain behavior is based on a combined consideration of personal, social and environmental factors.	Explain how an individual decides to start and grow their own business. An individual's belief to achieve a particular task effectively will strongly influence his or her intentions and behavior. SCT emphasizes that the social environment can create opportunities and challenges for individual behavior. Research on EIs focuses on how the social environment, corporate culture, and social support influence EIs and decisions.	Bandura	1986

Theory	Contents	Application in research on entrepreneurship	Authors	Years
Expectancy Theory (ET)	Propose three antecedents that motivate individuals to strive to achieve results. (1) Expectancy, (2) Instrumentality, (3) Value.	It is predicted that an individual will be motivated to invest all the effort necessary to start a business if they believe that a high initial effort will help them achieve their desired goals through business ownership.	Vroom	1964
Theory of Reasoned Action - TRA	Claims that a person's behavior is determined by their intention to perform the behavior, and that this intention in turn is a function of attitudes toward the behavior and subjective norms.	If people evaluate the proposed behavior as positive (attitude) and if they think that others want them to perform that behavior (subjective norm), this leads to higher intentions (motivation) and they are more likely to perform the behavior.	Fishbein & Ajzen	1975
Technology Acceptance Model - TAM	Predict the acceptability of a tool and identify modifications that must be included in the system for users to accept it, including 02 variables: (1) Perceived usefulness (PU); (2) Perceived ease of use (PEU) impact on Attitude toward using.	The most studied model for investigating technology acceptance in corporate environments.	Davis	1986
The Entrepreneurship Intention Model - EIM	EIs are formed by a combination of a person's rational and intuitive thinking about creating a new business, each intention being first influenced by a variety of personal and environmental contextual factors.	Personal factors and social context interact with rational thinking and contextual thinking throughout the process of forming EI.	Bird	1988
The Entrepreneurial Event Model - EEM	An individual's decision to choose to establish a new business depends on important changes in their life and attitude towards entrepreneurship expressed in two aspects: Individuals' Perception of feasibility and desire of the business.	Emphasize that the "entrepreneurial event" acts as a trigger to determine an individual's entrepreneurial behavior, which can help them make the best decision among the options.	Shapero & Sokol	1982
The Theory of Planned Behavior Entrepreneurial Model - TPBEM	Starting a new business is a deliberate process and can be influenced by three key antecedents of TPB	The antecedents are attitudes toward starting a new business, which develop from a perceived desire; perceived social norms for engaging in new business creation; and perceived control over entrepreneurial behavior.	Krueger & Carsrud	1993
The Entrepreneurship Intention Model - EIM (extention)	Factors such as the political or economic environment as well as an individual's abilities and personality can influence a person's thinking	Entrepreneurial self-efficacy is the most important construct and is theorized to play a mediating	Boyd & Vozikis	1994

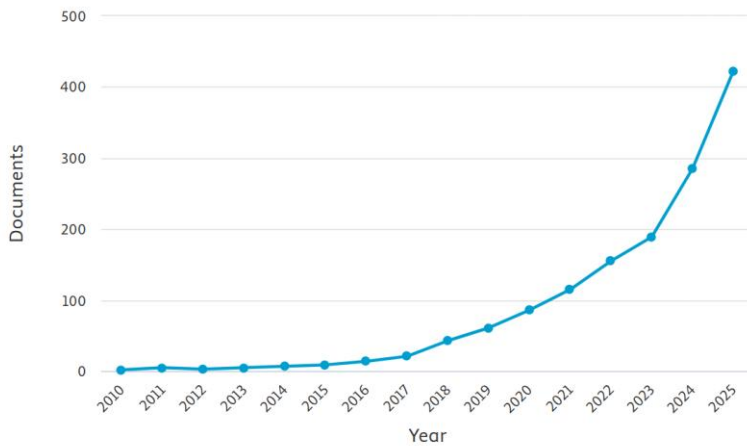
Theory	Contents	Application in research on entrepreneurship	Authors	Years
	about starting a business, thereby creating entrepreneurial intent. Adding the concept of self-efficacy to Bird's (1988) original EIM Model	role between thoughts related to new venture creation and EIs.		
Structural model of Entrepreneurship Intention - SMEI,	Points out the crucial importance of personality traits in explaining self-employment attitudes and entrepreneurial behavior alongside personal attitudes, social norms, contextual and economic determinants	Components of personality traits, including risk-taking tendency and internal locus of control, have a significant influence on attitudes toward entrepreneurship, thereby indirectly influencing EI of young people who intend to establish new businesses	Lüthje & Franke	2003

Appendix 3. Article Selection Process



Appendix 4. Number of articles by year

Documents by year



Year	No. of Articles
2025	422
2024	285
2023	189
2022	155
2021	115
2020	86
2019	61
2018	43
2017	21
2016	14
2015	9
2014	7
2013	5
2012	3
2011	5
2010	2

Appendix 5. The top 10 studies with the highest co-citation index

References (Author, Year, Publication)	Links	Total link strength	Citations
Nambisan, S. (2017)., Entrepreneurship theory and practice, 41(6)	29	326	114
Nambisan, S., Wright, M., & Feldman, M. (2019), Research policy, 48(8)	30	154	42
Elia, G., Margherita, A., & Passiante, G. (2020), Technological forecasting and social change, 150	30	143	41
Sussan, F., & Acs, Z. J. (2017), Small Business Economics, 49	28	148	40
von Arnim, L., & Mrozewski, M. (2020), Sustainability, 12(19)	28	122	34
Giones, F., & Brem, A. (2017), Technology innovation management review, 7(5)	28	111	33
Zaheer, H., Breyer, Y., & Dumay, J. (2019), Technological Forecasting and Social Change, 148	27	124	29
Shane, S. (2000), Academy of Management Review	24	44	26
Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017), MIS quarterly, 41(1)	27	88	25
Eisenhardt, K. M. (1989), Academy of management review, 14(4)	19	43	22

Appendix 6. Five key themes co-citation

Theme Label	Contents	Representative Citation
1. The concepts of DE and related issues	web of opportunity, definition and research agenda, digital technology perspective, innovation management research, academic entrepreneurship, new venture creation	Braun & Clarke (2006); Dy et al. (2017); Giones & Brem (2017); Nambisan, S. (2017); Nambisan et al. (2017); Pergelova et al. (2019); Rippa & Secundo (2019); von Arnim & Mrozewski (2020); Barliana et al. (2025)
2. Review, agenda research on DE	DE process, business model innovation in DE, the digital transformation of innovation and progress, challenges and key themes, innovative business models, systematic literature review, future research avenues	Elia et al. (2020); Ghezzi & Cavallo (2020); Nambisan, et al. (2019); Richter et al. (2017).; Satalkina & Steiner (2020); Steininger (2019); Zaheer et al. (2019), Van Greunen & Silibaziso (2025), Hathrobi et al. (2025)
3. DE: Theory and practice	DE from startup to scaleup, case study research, opportunities and challenges, inductive research, DE theory and practice	Cavallo et al. (2019); Eisenhardt (1989); Eisenhardt & Graebner (2007); Gioia et al. (2013); Nambisan (2017); Ries (2011); Shane (2000), Zhang & Li (2025); Mouloudj et al. (2024)
4. DE ecosystem	digital affordances, entrepreneurship in digital platforms, the digital entrepreneurial ecosystem	Autio et al. (2018); Nambisan et al. (2018).; Srinivasan & Venkatraman (2018); Stam (2015); Sussan (2017); Qasim et al. (2024)
5. New business models in DE	digital artifacts, new business models, organizing for innovation in the digitized world	Kallinikos et al. (2013); Kraus et al. (2019); Yoo et al. (2012), Wan & Fang (2025)