

Mapping the Scientific Landscape of Academic Entrepreneurship in ASEAN Plus Three Countries: A Scientometric Exploration

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ABSTRACT

This study aims to facilitate a comprehensive investigation into the scientific activities of the ASEAN Plus Three countries in the field of academic entrepreneurship. Through careful selection of the relevant literature using multidisciplinary database, Web of Science and R packages for bibliometric analysis, this study present insights into the thematic and conceptual structure of the domain. The findings highlight the growth of publications in 2022, attributed to research in the field of academic entrepreneurship in developing economies. The findings highlight underdeveloped themes such as academic capitalism, entrepreneurial intentions and entrepreneurial education, which have the potential to advance future research and boost economic growth in these Southeast Asian developing economies. To encapsulate the country and institutional dimensions, the VOSviewer software was used. China, South Korea and Malaysia are among the top contributing nations, whereas Tsinghua University, Jilin University and University of Tokyo are the top institutions contributing to the domain literature, indicating the popularity of the concept in these regions. Considering the crucial nature of academic entrepreneurship, this study attempts to provide an effective source of reference for stakeholders, such as researchers, decision-making authorities and organizations involved in nurturing the National Innovation System through entrepreneurship in higher educational setting.

Keywords: Academic entrepreneurship, Academic spin-offs, Bibliometrics, University spin-offs, University-Industry collaboration.

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INTRODUCTION

The surging knowledge-based economy compels businesses to partner with other stakeholders to stretch their chords of perspective and obtain the necessary knowledge for innovation.^[1] These collaborative endeavours have resulted in technological advancements.^[2] Enterprises that acknowledge collaboration and publicly share information from universities tend to boost their innovative performance.^[3] Amalgamating the academic expertise of universities with professional knowledge present within private organizations can help foster emerging economies by leveraging the technical knowledge and talent pool. The impact of university-industry collaboration on economic development is being studied in abundance by the authors stating its significance in the national innovation system.^[4-6] The ever-changing landscape of innovation and entrepreneurship compels organizations and universities to adopt and practice different roles^[7] in innovation

and commercialization. Recognizing the role of universities in the innovation ecosystem,^[8] Etzkowitz (1983)^[9] introduced the term “entrepreneurial university” to describe changes indicating a university’s active participation in facilitating the transfer of academic knowledge/outcomes. As a part of third mission, universities collaborate with industries to improve research and lead to the formation of new company. This creates reinforcing loop that promotes the growth of both the stakeholders.^[10] Universities contribute to National Innovation System (NIS) by transferring knowledge through commercialization, fostering entrepreneurial ecosystem,^[11] driving regional development and develop relevant human capital. Furthermore, universities can shape innovation policy through research and engagement, ultimately driving economic growth and addressing societal challenges. Research on academic entrepreneurship, like that on technopreneurship,^[12] can inform policy decisions and support the development of effective NIS strategies. With this shifting role of universities, government as well has started to mobilize universities as the part of their strategic policies to stimulate economic development.^[13] As an outcome, the role of modern universities has become multidimensional, convening both



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innovation and entrepreneurship that contributes in fostering the innovation ecosystem.^[14,15]

In advanced economies, higher education institutions' involvement in the creation and dissemination of technological knowledge and in enhancing innovation capabilities is widely recognized.^[16,17] However, emerging markets face challenges in establishing networks due to monetary constraints, interpersonal factors and proper policy implications.^[18,19] There has been a rapid increase in the commercialization of academic research after the enactment of Bayh-Dole act in 1980 and is widely studied whereas, the investigation for the same in developing nations is quite marginal despite the fact that developing nations are most dynamic and entrepreneurial regions.^{a1} The reason for lower interaction in developing nations could be attributed to nature of R&D collaboration, firm's absorptive capability, lack of intermediary role, diversified interests and intellectual regulations.^[20]

Recently, Southeast Asia is experiencing rapid economic expansion demonstrating strength amid worldwide uncertainty. The countries in the region, including ASEAN Plus Three countries have successfully faced the challenges posed by the COVID-19 pandemic. These emerging nations have increased connection and importance in the global value chain owing to the export-led industrialization and dependence of Foreign Direct Investment.^[21] Science and Technology is gaining importance in the policy planning with the increased R&D spending signifying the importance of innovation in boosting the economy. Generally, the R&D intensity in the region is linked to income levels, the countries of this region have diversity in R&D process.^[22] For example, Singapore, Malaysia and Philippines lead in business-driven R&D, while Indonesia mostly relies on government to conduct research.^[23] However, public sector dominates research and Public Private Partnerships (PPPs) are found to be weak in the region owing to the fact that focus of these enterprises is more towards low-cost R&D which persuades the researchers to adopt the entrepreneurial role. The ASEAN plan of Action on Science, Technology and Innovation is mapped around open and inclusive innovation endeavours with a purpose to enhance the STI (Science, Technology and Innovation) potential, boost PPPs and leverage the talent pool/academic expertise to diversify their economies and address the societal challenges.^{a2} Many of these STI policies developed in different countries and economic growth are closely aligned with higher education plans, including national education plan, quality improvement and financial incentive plans. In conclusion, the place of ASEAN plus three countries on the global value chain will depend on their capabilities to innovate and upgrade.

Academic Entrepreneurship in ASEAN plus three countries become necessary for several reasons. First, it supports the economic transition of nations like the Philippines and Indonesia from efficiency-based to innovation-based economies, helping

foster innovation and entrepreneurial ventures. In countries such as Singapore and Malaysia, academic entrepreneurship has played an important role in commercializing research and facilitating knowledge transfer, contributing to technological advancement and economic growth. Countries like Indonesia, recognized as part of the Next-11 emerging markets, have the potential to become major global economies. Strengthening entrepreneurial capacity through academic channels is essential to shift production frontiers and remain competitive in the global market.

Southeast Asia and ASEAN Plus three countries are crucial regions for analysis due to their rapid economic growth, driven by a young, tech-savvy population and increasing investment in innovation. Moreover, ASEAN's projected GDP growth of 4.6% in 2023^{a3} highlights its emergence as an economic hub, with a focus on digital transformation and bridging regional disparities. The region's commitment to sustainable development, climate action and healthcare innovation further underscores its importance. With growing global integration through trade and investment frameworks, Southeast Asia and ASEAN are becoming key players in shaping future economic trends and global sustainability efforts.

Therefore, considering the emerging importance of the developing economies especially ASEAN plus three on the global value chain, this study is an attempt to identify from this bibliographic dataset, the thematic and conceptual structure of the academic entrepreneurial culture over time, comprehending how they are engaging in the research activities and which areas are noticeable from the literature. This theoretical contribution through thematic analysis tries to identify gaps and indicate new course of actions for future researches.

RELATED WORKS

Subsequent studies conducted in this domain have been published in the past few years and have gained much velocity. Based on recent indulgence of government initiatives, introduction of third mission the academic institutions are forced to perform innovation apart from the traditional research and teaching culture and further integrating commercial aspects into the technology transfer activities.^[24,25] With this shift in the objectives of academic institutions another thread of literature leads to academic entrepreneurship, which dealt with the determinants and impact of entrepreneurial capacities of students involved in commercialization activities.^[26-28]

^{a1}<https://www.routledge.com/Driving-Entrepreneurship-in-Southeast-Asia/Ratten/p/book/9781032197722>

^{a2}<https://asean.org/our-communities/economic-community/asean-science-technology-and-innovation/>

^{a3} <https://www.weforum.org/agenda/2023/08/asean-economic-growth/>

Academic Entrepreneurship (AE) consists of monetizing the intellectual creations as an outcome of R&D collaboration.^[29,30] It often includes interaction between academic institutions and industries, spin-off activities and transfer of technological knowledge. The motives involved in AE could be commercial and non-commercial depending on the region's economic development and level of innovation capabilities.^[31] For instance, developing nations are mostly involved in academic entrepreneurial activities for monetary benefits owing to the fact that these nations have higher resources required for innovative endeavours.^[32] Whereas, the developing nations mostly end up adopting non-commercial AE to address social issues owing to the lack of resources to market^[33] and transfer the intellectual property created.^[34,35] Contingent to developing nations, academic institutions do not have necessary resources to perform commercialization through innovation.^[36] Further, the author suggests to develop the entrepreneurial dexterity and the ability to apprehend the importance of commercial ecosystem in developing technological innovations.

Creation of the ASEAN Economic Community in 2015 introduced a unified regional market offering opportunities to the budding entrepreneurs to provide services across the region. And this development comes with challenges and to overcome them, construction of strong entrepreneurial ecosystem is advocated. Pawitan *et al.*^[37] studied the influences of such entrepreneurial activities in enhancing national innovation and found it pivotal. The level of entrepreneurial activities mediates this relationship, with advanced infrastructure and knowledge transfer. The disparity in national competitiveness is influenced by differences in societal and financial resources.^[38]

Wimpertiwi^[39] discusses on entrepreneurial education in ASEAN Economic community regions and addressed their potential in gaining place in global value chain. The author advocates educating students with entrepreneurial skill to be more competing in doing business. Whereas, Vuong *et al.*^[40] presents a critical perspective on the status of entrepreneurial research in Vietnam and indicating the nascent research on the domain. Additionally, the way Vietnamese scholars frame their research is indicative of the cultural influences on entrepreneurial activities.

The study by Maheshwari, Greeni^[41] recognizes the role of universities in boosting self-efficacy to overcome societal perceptions and developing entrepreneurial intentions in the students. Entrepreneurial intention is influenced by personality traits, attitudes and psychological factors. The case of National University of Singapore highlights the university's efforts to support Singapore's transformation into a regional knowledge-based economic hub through technology commercialization, serving as a guide for the other east Asian universities aiming to adopt this model. The study by Wong *et al.*^[42] suggests that competing for global talent is a key feature of entrepreneurial university model for newly industrialized countries.

The entrepreneurial landscape in developing countries within universities, faces substantial obstacles. While the 'entrepreneurial university' model has gained traction in developed nations, its implementation in developing regions remains challenging. Academic institutions struggle to foster AE, often attempting to replicate strategies from ore advanced economies without access to comparable resources or environment. Eun *et al.*^[43] examined the university led enterprises in China by proposing a new framework for the university-industry collaboration, tailored to the context of developing countries. The author attributes the internal resources of university, absorptive capability of industries and presence of intermediary institution for the launch of university run enterprises in China.

Malaysia's economic growth is mostly driven by manufacturing and assembling, with limited research and development and technology transfer to local firms.^[44] And to resolve the issues of stagnant productivity, Malaysia's Tenth Plan has prioritized human capital development, innovation and stronger ties between universities, research institutes and businesses.

Research on Academic Entrepreneurship (AE) in ASEAN and other developing countries is relatively scarce. Most existing studies concentrate on qualitative aspects, such as motivation, challenges, psychological factors and perspectives. However, the breadth of awareness and research activities in this field has not been thoroughly explored in these regions. Consequently, this study seeks to address this gap by quantitatively analysing the scope of research conducted, along with its various dimensions, to provide a comprehensive overview of academic entrepreneurship in the ASEAN and Southeast Asian regions.

METHODOLOGY

Data collection

To unravel the concealed themes and other potential facets within the expanding literature of the study topic, quantitative analysis using bibliometric approach was considered. This approach offers a data-driven approach to understanding and evaluating the dynamics of researched field, making them crucial for both academic and practical insights. Bibliometric analysis involves analysing large and objective datasets, conducting thematic evaluations which helps explore the intellectual framework of a field, provides a comprehensive overview and further facilitates the development of innovation and impactful scholarly contribution.

To conduct this systematic assessment using bibliometric methods, multidisciplinary database Web of Science was considered to retrieve the required dataset because of its exhaustive coverage and content that ensures the quality of the records used.^[45] Figure 1 summarizes the protocol used for conducting the search and collecting the data for this analysis. Initially, the task of selection of appropriate term for obtaining the dedicated results was done.

For this purpose, Significant work by Igers Skute^[46] was referred to base the selection of key terms. After that, the decided key terms were keyed into the search bar by selecting the criteria topic which retrieves documents within the author keywords, title and abstract details of each indexed records. The query string for search was “Academic entrepreneurship” OR “academic entre*” OR “academic spin-offs” OR “university spin-off” OR “academic commercialization.” Moreover, the differently spelled key terms (stemmed key terms) that are suggested by the Web of Science interface upon search were also selected to include the potential key terms that might have been jilted. Total 873 records were retrieved for all years and were further restricted to document type to articles and review articles resulting in 832 records. After collecting all relevant titles, a final country filter was applied to retrieve the dataset that would reflect upon the contribution made by the ASEAN Plus Three (APT) countries in the arena of Academic Entrepreneurship and its allied fields. The contribution from Brunei, Cambodia, Vietnam, Thailand, Singapore, Malaysia and Indonesia were retrieved except for Laos, Myanmar and Philippines for which the data was not available. Additionally, the contribution from ASEAN plus three countries, namely: China, Japan and South Korea were selected as well leading us to final of 278 records for analysis.

Data analysis

Using the bibliographic content present within the records, the analysis is conducted under two categories viz. Performance analysis and Science mapping.^[47] Through analysis in the former category, potential authors, journals and publications were identified whereas, determining the conceptual structure of

the field by establishing the relationship among various units of analysis was done under later category (science mapping) using VOSviewer version 1.6.17.^[48] Additionally, to identify and thematically map different dimensions/themes of the academic entrepreneurial domain, Biblioshiny version 4.1.3 of the R programming was utilized. Thematic mapping is usually performed to understand the conceptual structure of the domain by clustering similar concepts using bibliographic coupling.^[49] Conceptual structure of the domain is determined using co-occurrences of the words provided in the dataset and analysed using correspondence and multiple correspondence analysis techniques.

Utilizing these 2 networks mapping tools and following the systematic assessment protocol, attempt was made to,

1. Identify the most influential documents, authors, publication outlets and how the field has evolved in the last two decades. Moreover, determined the extent of the scientific activities through the identification of the top countries and institutions using co-authorship analysis.^[48]
2. Understand the thematic and conceptual structure of the domain by using co-word analysis that provides insights for trending topics,^[50] flow of the interaction of key concept over time and clustering the similar concepts providing more context to the dataset.^[51]
3. Determine the underdeveloped and untapped potential areas and suggest future directions to the domain of present study.

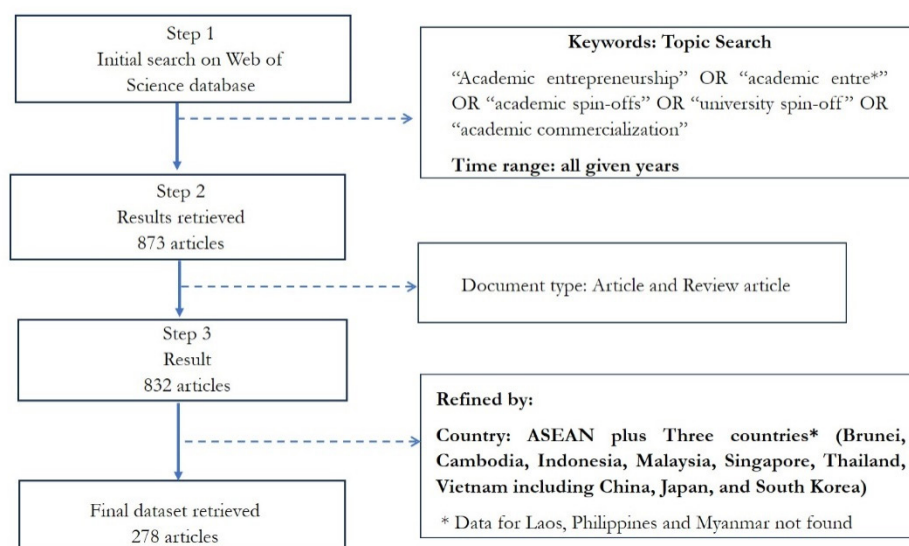


Figure 1: Systematic assessment protocol.

Table 1: Inclusion and exclusion criteria for systematic assessment of publications.

Inclusion Criteria	Exclusion Criteria
Publication including all given years.	Document type: proceeding papers, editorial materials, early access, meeting abstract etc., were excluded.
Included in academic entrepreneurship topic and differently spelled key terms.	Article written in other languages except English.
Publication exclusively from ASEAN plus Three countries.	

Table 2: Primary information and overview of the retrieved dataset.

Description	Results
Timespan	2007:2023
Records (Journals, Books, etc.,)	127
Documents	278
Document Types	
Article	254
Article; proceedings paper	1
Review	23
Yearly Growth Rate %	28.01
Average Age of documents	4.03
Average citations received/doc	11.77
References	15501
Keyword Plus (ID)	775
Author Keywords (DE)	945
Authors	
Authors	797
Single authored of docs	29
Co-Authors per Doc	3.23
International co-authorships %	43.53

Table 3: Publication outlets with local citation impact.

Journals	h-index	g-index	m-index	TC	NP	IF (2023)
Sustainability	10	15	1.25	236	29	3.9
Frontiers in psychology	4	7	0.667	66	20	3.8
Journal of technology transfer	11	13	0.846	325	13	4.8
International entrepreneurship and management journal	5	8	0.333	158	8	5.6
Science technology and society	4	7	0.25	62	7	2.1
Technological forecasting and social change	5	6	0.417	159	6	12
Technovation	5	6	0.833	82	6	12.5
Education and training	5	5	0.714	110	5	3.6
Asian journal of technology innovation	4	5	0.4	49	5	2.5
Management decision	4	5	0.5	121	5	4.6

TC=Total Citations received, NP=Number of Publications, IF=Impact Factor.

RESULTS

Performance analysis

Beginning with the development of the literature in the domain of academic entrepreneurship, Following the inclusion and exclusion criteria as presented in Table 1, the literature in the domain of Academic entrepreneurship was analyzed. Here, Table 2 presents the characteristics of the dataset that is to be consulted for further analysis. Figure 2 displays the number of documents contributed every year since 2007 till 2023 to the domain alongside citations received. It was observed that publications were fewer and almost stagnant through 2017, indicating the popularity of the domain somewhat limited. However, since 2018, the literature has kept a gradual pace with a slight decline in 2023. Past 5 years (since 2019) have seen a boom in the interest of researchers in the subject area and peaked in 2022 with almost double publications as the preceding year. Average citation per year of 4.2 and 4.52 in the years 2016 and 2019 respectively are the highest recorded average citations within the taken timespan confirming the increasing interest in the domain and its allied arenas.^[23,25] Another insight into the dataset indicates the preference of collaborative publications over single authored publications.

Top influential documents and publication outlets

Table 3 displays top ten leading publication outlets according to the number of records published on the subject area are Sustainability (29 publications) contributing around 10.43% of the total publication by APT countries, followed by Frontiers in Psychology (20 publications) and Journal of Technology Transfer (13 publications). Moreover, Journal of Technology Transfer journal received in total 325 citations (for 4.67% of the total publications) which are highest among the other journals, indicating the preference of this journal by the researchers of the academic entrepreneurial domain. H-index is used to measure the quality of research contribution of a journal apart

from Impact Factor which only considers 2-year window for citation measure.^[52] In simple terms, h-index is used to evaluate the impact of journal comprehensively and appropriately across the given discipline. Additionally, g -index and m-index are the

variants of h-index that consider the quantity of publications for evaluation as well and are displayed in the Table 3.

Table 4 reveals top 10 most cited publications. It could be found that three out of top ten publications are published in Journal of

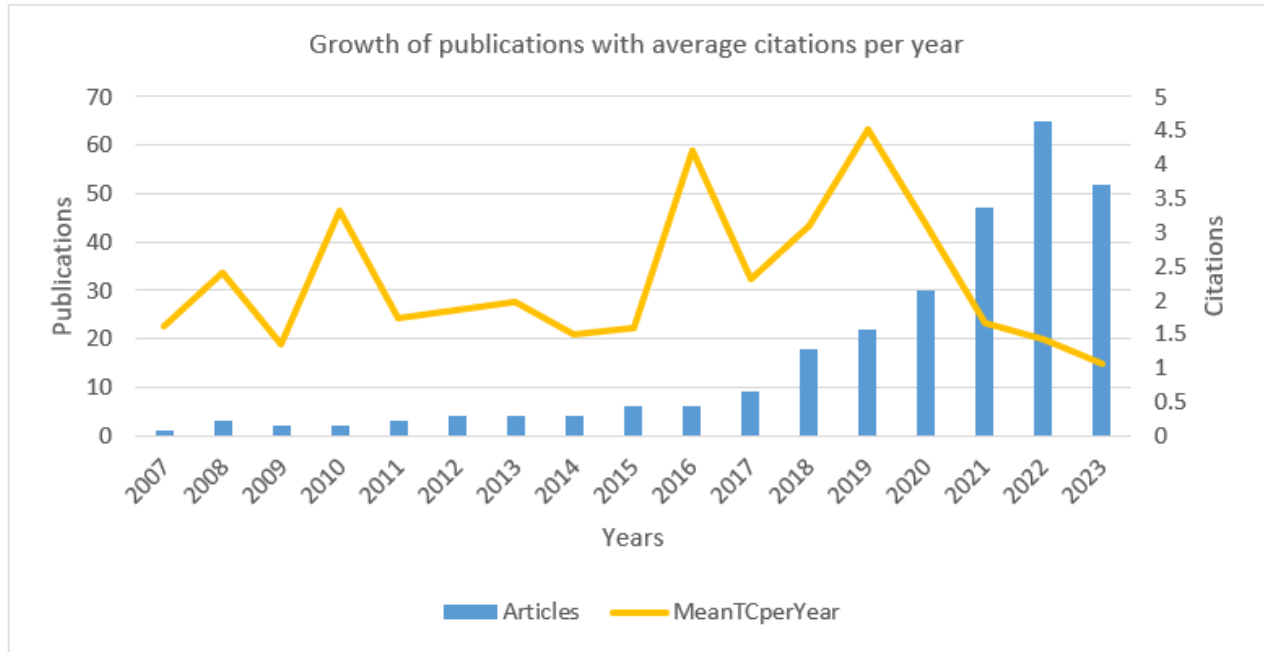


Figure 2: Growth and evolution of publication in ASEAN Plus Three Countries.

Table 4: Top 10 articles with local and global impact in terms of citations.

Titles	Authors (Year)	Local Citations	Global Citations
Entrepreneurship as a solution to extreme poverty: A review and future research directions.	Sutter <i>et al.</i> (2019)	4	249
University technology transfer through entrepreneurship: faculty and students in spinoffs.	Boh <i>et al.</i> (2016)	3	113
The development of entrepreneurship in China.	Yang & Li (2008)	4	98
Categories of university-level entrepreneurship: a literature survey.	Yusof & Jain (2010)	2	58
Impact of support from social network on entrepreneurial intention of fresh business graduates: A structural equation modelling approach.	Farooq <i>et al.</i> (2018)	2	52
Skilled unemployment and the creation of academic spin-offs: a recession-push hypothesis.	Horta <i>et al.</i> (2016)	3	41
Academic Entrepreneurship and Exchange of Scientific Resources: Material Transfer in Life and Materials Sciences in Japanese Universities.	Shibayama <i>et al.</i> (2012)	2	40
Industry-to-university knowledge transfer in ecosystem-based academic entrepreneurship: Case study of automotive dynamics and control group in Tsinghua University.	Meng <i>et al.</i> (2019)	2	36
The Individual Environment Nexus: Impact of Promotion Focus and the Environment on Academic Scientists' Entrepreneurial Intentions.	Foo <i>et al.</i> (2016)	4	30
Promoting academic engagement: university context and individual characteristics.	Zhao <i>et al.</i> (2020)	3	23

Technology Transfer presenting it to be the influential source for the AE domain. The authors of ASEAN Plus Three countries have preferred a variety of publication outlet for the publication of their works. For example- Journal of Business Venturing, Asia Pacific Journal of Management, International Entrepreneurship and Management Journal, Education+Training etc. These actions indicate that the coverage of the domain is vast. These publications are displayed in the descending order of the citations received globally. Whereas, local citations enumerate the citations received locally for the publications within the given dataset by the authors present within the database as well.^[51] The work by Sutter *et al.*^[53] is the most cited work globally with 249 citations and 4 local citations. This review paper reviewed articles of the 77 journals of the concerned field and suggested how entrepreneurship could be a solution to decrease poverty through remediation and reform in the current entrepreneurial culture where opportunity exploitation could be done to serve the needs of the poor. The influence of this work (citations received) somehow persuades us to realise and leverage the potential of entrepreneurship towards societal upliftment. Another work by Boh *et al.*^[54] discussed about

the importance of students in the initial phase of the technology commercialization and its transfer in form of spin-offs. Further, the authors discuss the importance and impact of university's environment and their guidelines regarding the development and transfer of the technology. In summary, the articles discuss about the importance of academic ecosystem, human resources and the policies in fostering the academic entrepreneurial culture.

Top contributing authors, institutions and collaborating country

Top contributing authors and productivity over time

As is evident from the beam plot in Figure 3, Guo F has the highest number of articles (6) and has started around 2019 and has 79 citations to his credit. Whereas, Zou B (started around 2019) has received 62 citations and Wang M (started around 2017) has 53 citations for 6 publications. Moreover, upon evaluating the fractional contribution of the authors it was found that Shibayama S has 2.83 articles fractionalized to his credits followed by Wang M with 1.67 articles. Cai JF started from 2020 onwards and have

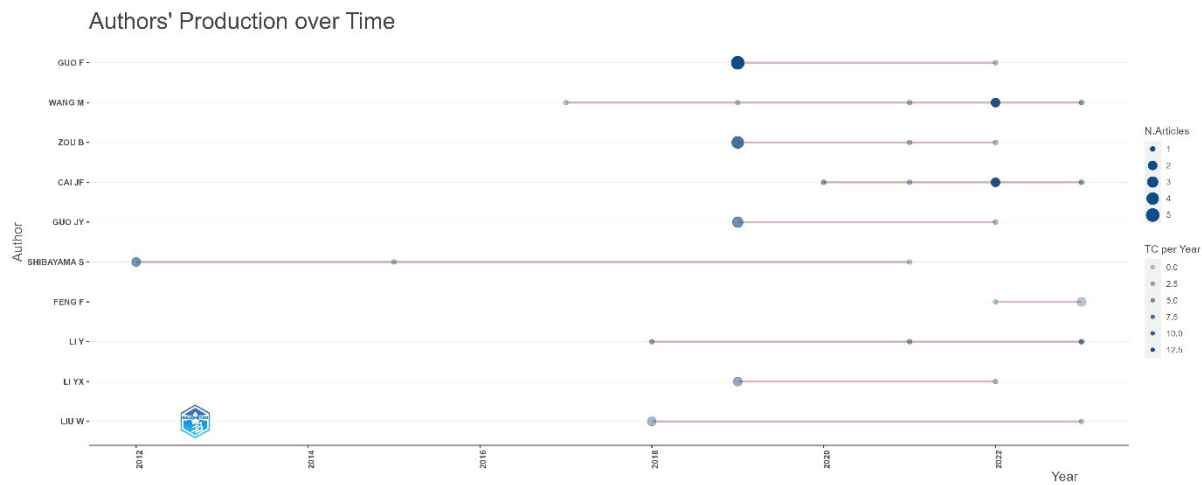


Figure 3: Top authors and their productivity over time. Source: Author's own elaboration using Biblioshiny.

Table 5: Top contributing countries in the domain of Academic Entrepreneurship.

Country	Articles	SCP	MCP	Freq
China	139	104	35	0.5
South Korea	29	22	7	0.104
Malaysia	16	10	6	0.058
Japan	14	10	4	0.05
USA	13	0	13	0.047
Pakistan	7	0	7	0.025
United Kingdom	7	0	7	0.025
Australia	6	1	5	0.022
Vietnam	6	3	3	0.022
Singapore	5	3	2	0.018

SCP=Single Country Publications, MCP=Multiple Country Publications, Freq=frequency.

5 publications with 72 citations. Guo JY has 4 publications since 2019 and Feng F, Li Y, Li YX and Liu W have 3 publications to their credit ranging from 2018-2022.

Table 5 reveals that China is the top contributing country in terms of publication (139) and has 35 publications in collaboration with

other countries. China alone contributes half of the publications (50%) followed by South Korea and Malaysia who contribute 29 and 16 publications respectively. USA, Pakistan, UK and Australia are the countries that have collaborated with ASEAN Plus Three countries contributing in total 33 articles. Moreover, Malaysia contributes 16 publications, Singapore contributes 5,

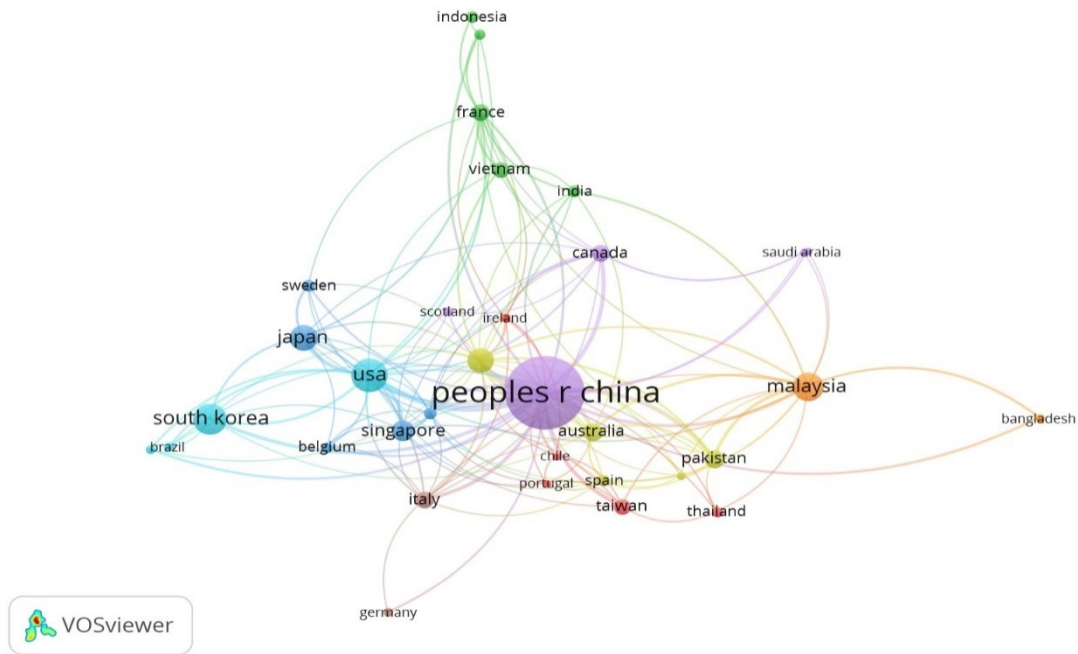


Figure 4: Country Map using own elaboration.



Figure 5: Knowledge Map of top contributing institutions.

Vietnam contributes 5 and Japan contributes 14 publications. Furthermore, Figure 4 presents the network map of the countries that have collaborated with ASEAN Plus Three countries and the level of their interconnectedness is represented through colour and width of the nodes.

Proceeding over to institutional contribution, it is found (Figure 5) that Tsinghua University alongside Jilin University and University of Tokyo are among the top contributing institutions in the domain. Apart from these institutions Sun Yat-Sen University, Zhejiang University, Nanyang University, National University of Singapore, Seoul National University and Capital University of

Economics and Business are among the important affiliations contributing to the literature of this domain.

Reference Spectroscopy

Evaluation of research using bibliometric techniques has been popular in the scholarly communication. One such sub-facet within this evaluation is RPYS (Reference Publication year Spectroscopy) that deals with the identification of the prior works that influence the present work of the researchers. To gain historical insights of the concerned literature through their cited references, that might not be directly investigated to study the

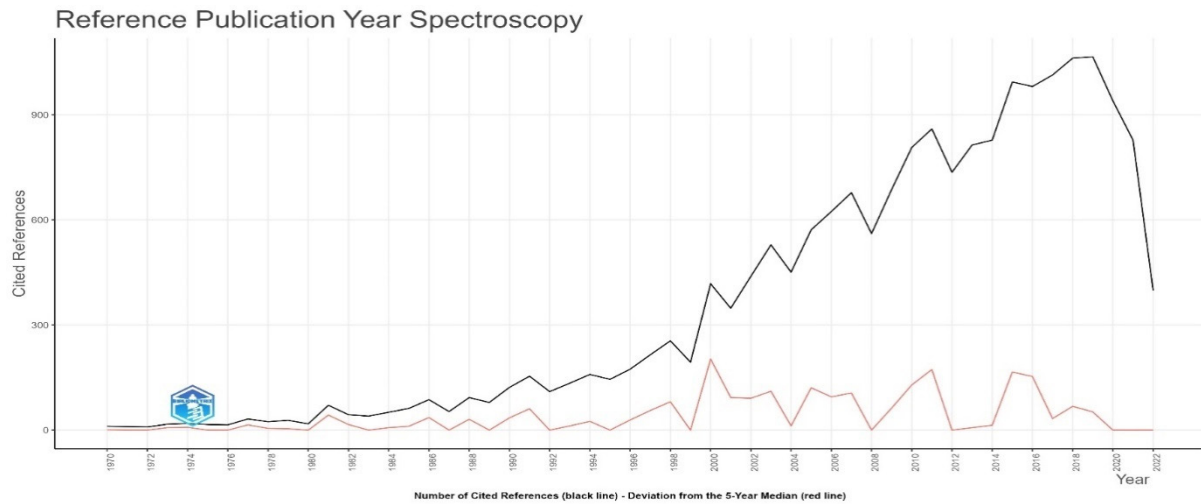


Figure 6: Reference Publication Year Spectroscopy.

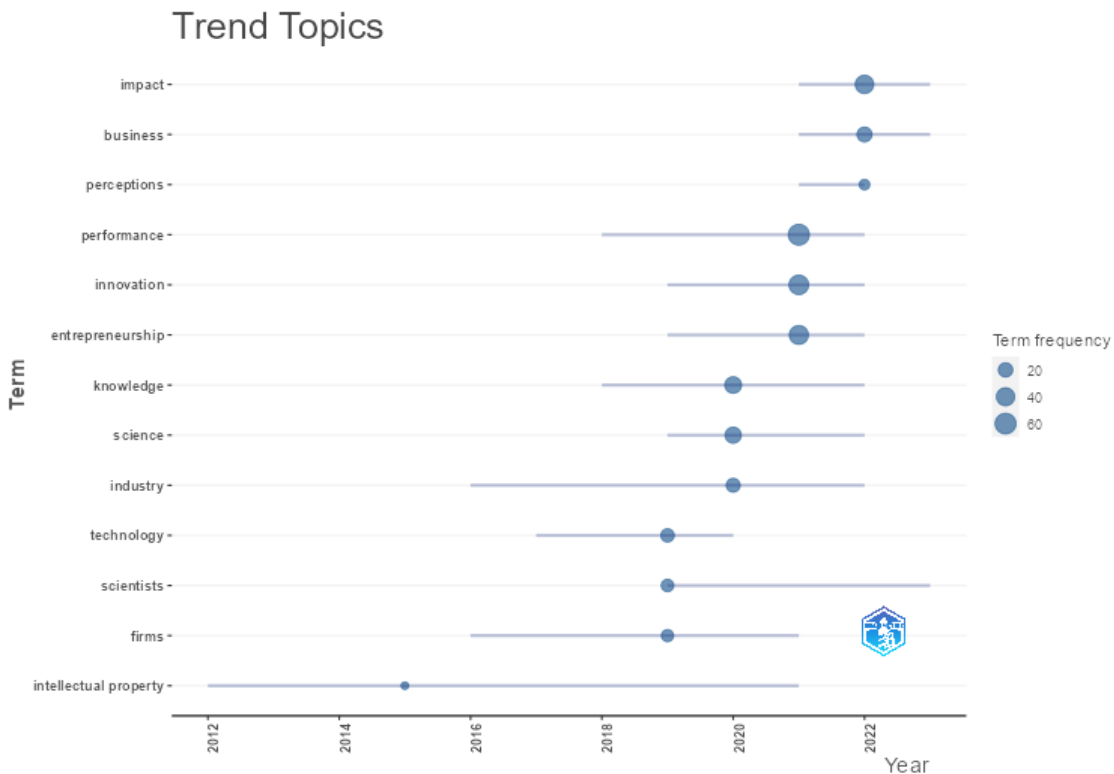


Figure 7: Trending topics over the time.

field but are considered essential for the later studies.^[55] Here, RPYS grounded on 278 documents is presented in the Figure 6. where red line indicates the deviation of cited references (black line) from its 5-year median. Considering the elevated peaks as an example, reference published in 2015, 2017, 2018, 2019 received 994, 1014, 1062 and 1066 citations respectively. The 5-year median was 173 in 2011 and received 860 citations. This shows the currentness of the domain and popularity over the past decade.

Science Mapping

Topic trend

Figure 7 depicts the trending topics that are identified and have evolved over the period. keyword Plus was selected as the field (word minimum freq.=5) to have a more descriptive/broader overview of the preferred topics.^[56] The size of the bubble indicates the frequency of the term occurring within the dataset. Year 2015 introduces the intellectual property in the entrepreneurial activities in developing-countries as per the taken dataset. Through this beam plot it is visible that since 2019 the importance

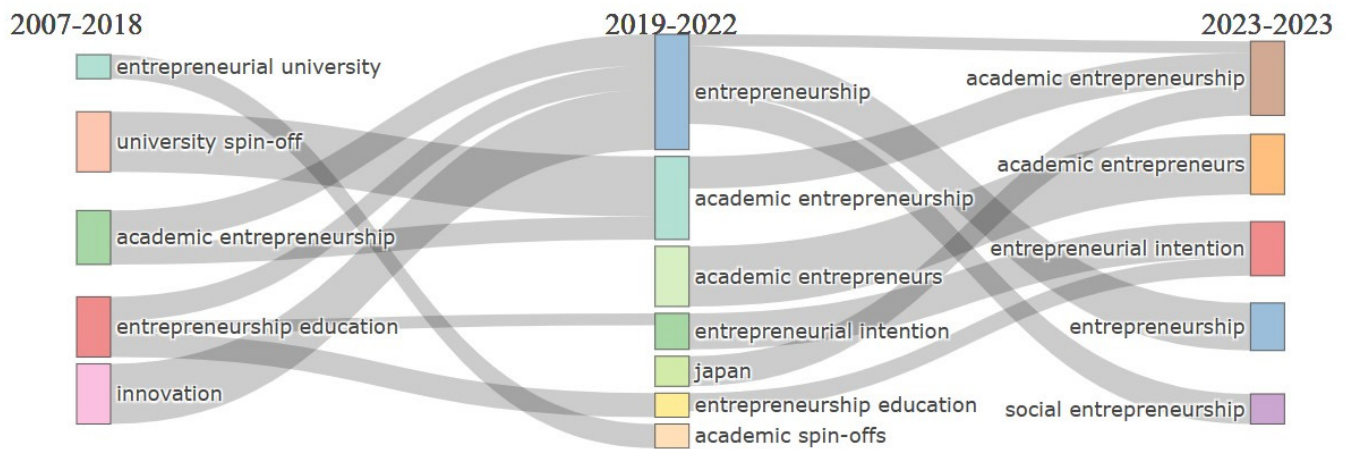


Figure 8: Sankey diagram of top key terms.

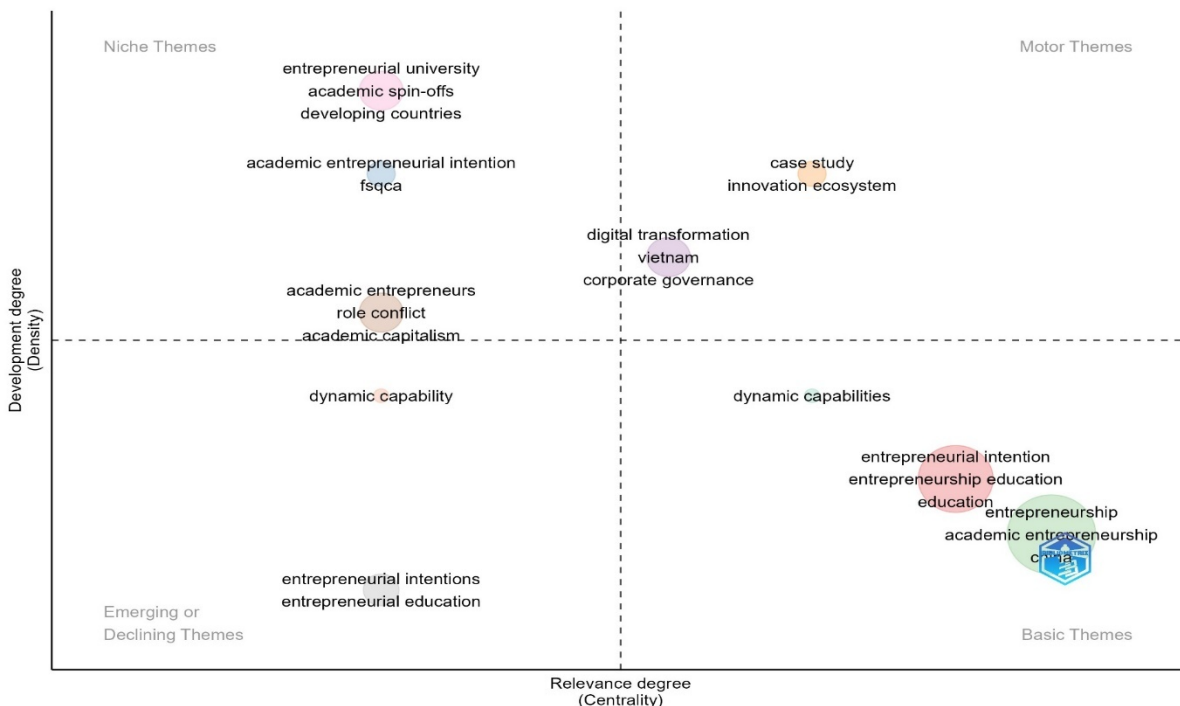


Figure 9: Thematic Map.

has shifted from mere collaboration and academic research to creating innovations and increasing productivity of the firms realising the potential of the scientists. Boosting performance through increased innovative activities has been talked about during the 2021 and following that the perception regarding commercialization of the academic research collaborations was frequently mentioned around 2022. The year 2022 focused more on the quality and the impact of these collaborative activities. In summary, most frequent key terms are performance (61 times), impact (42), innovation (50), knowledge (31), entrepreneurship (46) and intellectual property (5). Overall, the top key terms indicate innovation through entrepreneurial activities, its performance and how does it impact the society in general.

Moreover, to have a comprehensive understanding of the flow of interaction among key terms i.e., weighted connection going from one node to another and their transition over time a Sankey diagram was created using author keywords in the bibliometrix software. In Figure 8. the rectangular nodes indicate the key terms and their width along with links represent the higher frequency of their occurrence. The key terms in 2007 have gradually moved from academic entrepreneurship and its education to the entrepreneurial intentions between 2019 to 2022 and social entrepreneurship in 2023 indicating the inclusion of societal perspective in the academic technology commercialization culture.

Thematic Evolution and Mapping

Exploiting the key terms, different research themes are identified. Thereafter, each theme is further categorized using Callon's

centrality and density measures.^[57] Callon's centrality relates to the relatedness of the themes with other themes within the network^[58] and Callon's density relates to the potency of the research theme within the network. In Figure 9, themes are placed on a 2D-strategic diagram having x-y axis categorizing themes into four quadrants:

Motor Themes

Research themes of this quadrant have high density and high centrality indicating that case studies regarding innovation ecosystem, digital transformation, corporate governance in developing countries are the most developed and driving themes and are highly connected to other themes present within the network of the taken dataset. II) *Niche Themes*: The themes within this quadrant have low density and high centrality depicting that they are specialized and have peripheral importance within the network. In Figure 8, Academic Entrepreneurial intentions, Academic Spin-offs, Fs/QCA (Fuzzy-set Qualitative Comparative Analysis), Academic capitalism has well-developed internal connections with less explicit connections which indicates that these themes have been given attention but lack rigorous research. III) *Emerging/Declining Themes*: The research themes in this quadrant have low centrality and low density indicating that dynamic capabilities, entrepreneurial education and intentions in general are weakly developed or declining themes of the given network. IV) *Basic Themes*: The themes of this quadrant have low density and high centrality indicating the focus on common problems that are vital across different fields of the given subject

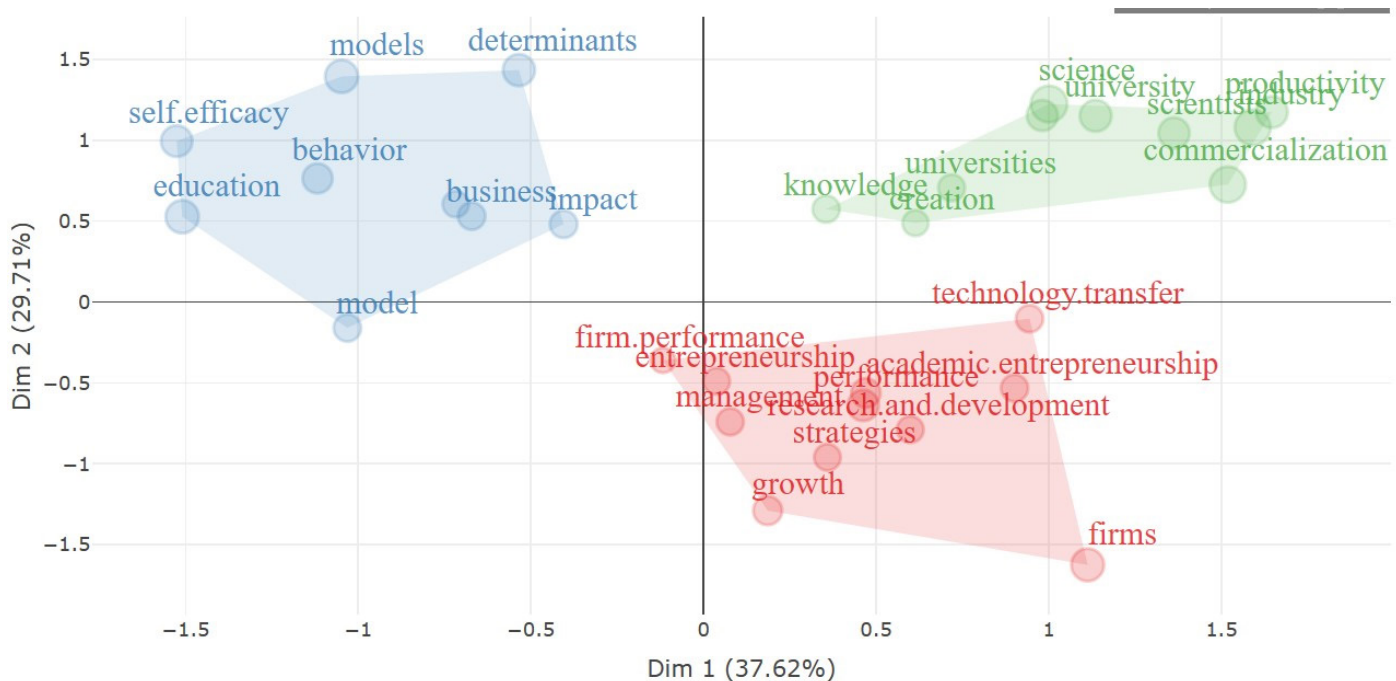


Figure 10: Conceptual Structure Map of the Academic Entrepreneurship domain (co-word analysis through correspondence analysis).

network. In summary, this theme clusters underlying areas important for the development of this domain.

Conceptual Structure

Biblioshiny provides with a function to map the conceptual structure of the domain applying multiple correspondence analysis to identify and cluster (K-mean) the related concepts that express the common interest.^[42] In simple terms, during co-word analysis likewise terms present within the dataset are placed closer while distribution. In Figure 10, terms are placed on 2D plot indicating that education, self-efficacy, behaviour are important determinants and have impact on business. Here, model and models are taken as separate element because the stemming was set to false by default. Likewise, other two clusters (green and red) present the cluster of terms related contextually.

DISCUSSION AND FURTHER SUGGESTIONS

This systematic review using bibliometric analysis clearly shows the subalternate contribution in the academic entrepreneurial domain as is visible from Table 2. The number of publications by the ASEAN Plus Three Nations collectively records to 278. The possible reasons could be the practice of informal collaborative activities that does not necessarily lead to publication and as a consequence are untapped by the databases. Another reason could be the emerging status of entrepreneurial culture in the developing economies and the gap between intentions and actual performance. Though the concept of academic entrepreneurship initiated with the introduction of Bayh-Dole act in 1980 where universities were encouraged to commercialize their research outcomes,^[59] the popularity of the concept in ASEAN Plus Three countries was approached much later in time as is evident from the Figure 2. Around 2007, the concept appeared initially and with gradual growth since 2018 reached its peak in 2022 attributing to the rapid economic growth witnessed in post-COVID period by these emerging economies.^{a4} However, ASEAN countries consider “entrepreneurship as a good career option and perceived opportunities” alongside societal attitude is the reason for their increased entrepreneurial capabilities.^[60] Like the fear of failure, interpersonal factors play an important factor in perceiving the entrepreneurial capabilities which is further influenced by the cultural and sociological environment of that region. This is evident from the analysis of the top globally cited publication where, the most influential work discusses the importance of entrepreneurship in reducing extreme poverty and elevating the economic growth of a nation using three perspectives: viewing entrepreneurship as a remedy for immediate resource issue, as a catalyst for institutional changes and a force challenging the fundamental capitalist assumptions in business.^[53] The determinants like students, organisational ecosystem, social

network, interpersonal characteristics and intellectual property transfer are also being discussed by the authors of these ASEAN Plus Three nations. The preference of the sources for publication indicates the multifaced dimensions of the domain where authors publish. In terms of contribution by the countries China has been the top contributor followed by South Korea and Malaysia. China alone contributes to the 50% of the total contribution suggesting the other ASEAN Plus Three nations to indulge and contribute more to the AE domain.

For as much as thematic evolution of the domain is concerned, Figures 8 and 9 indicate the flow of concepts over time and their relatedness. The shift from academic entrepreneurship and its education to entrepreneurial intentions and currently the social entrepreneurship shows the inculcation of social responsibility into the commercial perspective of academic entrepreneurship. It might sound like a paradox, but to serve the society and attain sustainability through entrepreneurship is the need of the hour. From Figure 9, it seems that the concepts like entrepreneurial intentions and the role conflicts during academic commercialization are developed internally but are not given explicit attention. The suggestion for the future researchers would be to consider the potential of these implicit concepts and advance the research in this direction. As the ASEAN Plus Three nations are the emerging economies, they have the unseen potential to perform better at the global market and work towards achieving sustainability. Taking a glance at the results it could be said that the countries in Southeast Asia are performing entrepreneurial activities with an aim to tackle the societal issues rather than the commercialization or marketing the Intellectual Property. Therefore, it could be suggested that these emerging economies should inculcate commercial perspective in the entrepreneurial activities through implementation of rigorous intellectual property policies.

In this regard, policymakers in emerging economies must take proactive measures to implement policies that foster collaborative efforts, stimulate the establishment of innovation hubs and encourage strategic investments in research and development infrastructure. Such interventions would not only promote the creation of spin-offs by universities but also enhance their attractiveness to investors, thereby driving economic growth, technological innovation and regional development. Lastly, taking lessons from the rising and high/upper middle-income economies like Japan (East Asian Model), China and South Korea, lower-income economies should increase R&D spending to encourage them to collaborate and perform better in scientific research activities and contribute to the economic development of that region as the outcome. By learning from East Asian model and prioritizing R&D investment, lower-income economies can create a virtuous cycle of innovation, economic growth and improved living standards.

^{a4}<https://www.mckinsey.com/featured-insights/future-of-asia/southeast-asias-economies-softening-but-still-strong>

CONCLUSION

Present day academic entrepreneurship, university spinoffs, entrepreneurial universities are considered as the latent sources contributing to the economic development of countries through advanced innovative capabilities. Substantially, considered as the commercialization of academic research/technologies (using Intellectual property and academic expertise) to generate economic value; the evaluation of the thematic evolution and conceptual structure of academic entrepreneurship culture is crucial for the stakeholders (i.e., researchers, decision-making authorities and other intellectuals) involved in nurturing the National Innovation System. The findings of this study could be referred by the future researchers, policy makers and social and academic entrepreneurs to gain insights of the potential and peripheral themes that need attention and could advance accordingly to enhance the economy through research and innovation. Even after the difference in their income level, the countries of the Southeast Asian region have the potential to perform well in the global market attributing to the labour resources, entrepreneurial capabilities and entrepreneurial mindset. Moreover, AE could be used as a source to innovate sustainably. As one man's trash could be another man's treasure, the limitations of this study could be a potential thread for future researchers. First, the selection of only one database might have restricted the potential records not tapped by the database. Second, the restriction to only articles and review articles only and selection of the key terms resulted in fewer records. Also, the publications for Laos, Philippines and Myanmar were not available in the database. Though the author has tried to include all the terms that might retrieve the desired results, allied concepts and differently spelled key terms are excluded.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

ASEAN: Association of Southeast Asian Nations; **NIS:** National Innovation System; **GDP:** Gross Domestic Product, **PPP:** Public Private Partnerships, **STI:** Science, Technology, and Innovation; **APT:** ASEAN Plus Three countries.

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