



SYSTEMATIC REVIEW

REVISED Academic entrepreneurial engagement for frugal innovation in higher education institutions: a systematic literature review [version 3; peer review: 1 approved, 2 approved with reservations]

Oluwayomi Toyin Ojo¹, Magiswary Dorasamy^{id}¹, Melissa W. Migin¹, Jayamalathi Jayabalan^{id}^{1,2}, Rajeswari R³, Soon Seng Tung^{1,4}

¹Faculty of Management, Multimedia University, Cyberjaya, Selangor, 63100, Malaysia

²Faculty of Accountancy and Management, Universiti Tunku Abdul Rahman, Kajang, Selangor, 43000, Malaysia

³Jai Bharath School of Management Studies, Perumbavoor, Kerala, 683562, India

⁴Alibaba Group Malaysia Sdn Bhd, Kuala Lumpur, Wilayah Persekutuan, 52900, Malaysia

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Abstract

Higher education institutions (HEI) are faced with increasing challenges related to shrinking resources, high operation costs, the COVID-19 pandemic, decreasing student enrolment rates, and pressure to contribute to regional development and economic growth. To overcome such challenges, academics must move beyond their traditional functions of research and teaching and engage in entrepreneurial activities. Through engagement in entrepreneurial activities, academics can contribute to frugal innovation (FI) in private HEI (PHEI). The literature in this context emphasizes that academic entrepreneurial engagement (AEE) will lead to innovation, the identification of opportunities for new business ventures, financial rewards for institutions and academics, an impact on the economy, and the enhancement of social welfare. This study presents a systematic review of the literature and adopts the Transfield five-phase strategy to review the literature on AEE from the past two decades (2000–2020). A total of 1,067 papers on FI are obtained, only five of which focus on AEE. Moreover, papers related to AEE for FI are few. The study presents the research gaps, challenges, and potential factors for further research in this context. We conclude that FI for AEE in PHEI can be a game-changer for future sustainability. Moreover, we believe that the outcome of this review warrants further research.

Open Peer Review

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- Murali Sambasivan** ^{id}, Thiagarajar School of Management, Madurai, India
- Hasniyati Hamzah** ^{id}, Universiti Malaya, Kuala Lumpur, Malaysia
- Alessandro Muscio**, University of Foggia, Foggia, Italy

Any reports and responses or comments on the article can be found at the end of the article.

Keywords

Academic entrepreneurial engagement, higher education institutions, Frugal innovation, Malaysia, Private university, Sustainability, Game changer, Systematic literature review



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Corresponding authors: Oluwayomi Toyin Ojo (1211400075@student.mmu.edu.my), Magiswary Dorasamy (magiswary.dorasamy@mmu.edu.my)

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REVISED Amendments from Version 2

Major difference is :

- Provided justification for the selection of only peer-review papers in this study.

Any further responses from the reviewers can be found at the end of the article

Introduction

Private higher education institutions (PHEI) play an important role in a nation's economic development and prosperity by supplying skilled workforce and generating basic knowledge for solving societal problems. Notwithstanding their strategic contributions, PHEI are challenged by dwindling resources and the need to contribute to the economy and social development.¹ For instance, in Malaysia, PHEI are faced with rising operating costs, pressure to increase their global ranking, drop in student enrolment, problems in balancing teaching and research task allocation, decreasing government funding and shrinking budget allocations for staff development and empowerment programmes.²

Many PHEI in Malaysia incurred losses for years and are unable to access adequate capital.³ A recent report revealed that 55% of Malaysia's PHEI incurred losses, and approximately 44% were financially insolvent. As a result, more than 5,800 academics are faced with an uncertain career outlook, and approximately 121,000 students are at risk of receiving poor-quality education.⁴ Besides, PHEI depend mainly on student fees to offset their operating costs. However, funding sources continue to decline. The annual budget of the National Higher Education Fund Corporation, which is a major provider of educational loans in Malaysia, was severely reduced owing to the high default and low repayment rates of existing loans.⁴ Thus, to survive, PHEI management must devise effective strategies to attain financial stability amidst dwindling resources.

Furthermore, the COVID-19 pandemic created additional challenges and heightened the impact of existing problems encountered by PHEI. The Movement Control Order (MCO) and border closure policy to curtail the spread of COVID-19 resulted in a drop in student enrolment. Specifically, international student enrolment declined drastically owing to students' inability to gain entry into the country.⁵ Prospective students also deferred or delayed their studies, whereas others were unable to pay tuition fees owing to loss of jobs and the economic recession. Inevitably, this situation will further put a strain on the cash flow of institutions⁵ and the economy. These challenges indicate the urgent need for PHEI management to re-strategise to enhance their output and quality amidst dwindling resources.

In coping with the challenges associated with resource constraints and adversities, academics are expected to venture beyond their traditional responsibilities of conducting research, accomplishing administrative tasks and performing teaching activities and engage in entrepreneurial activities.⁶ By fostering entrepreneurial practices among academics, PHEI can stimulate innovative outcomes to improve economic growth, create jobs and research opportunities for graduates and support the educational ecosystem.⁷ PHEI establish initiatives to promote educational ecosystems that are conducive to entrepreneurial activity for academics.⁸⁻¹⁰ The literature ascertains the role of individual academics¹¹ through their effective transfer of knowledge to form new ideas and inventions that can help universities achieve their entrepreneurial mission and promote sustainable development. Hence, researchers have started paying attention to factors influencing university faculty members' entrepreneurial intention and behaviour.¹²

Academic entrepreneurial engagement (AEE) entails the commercialisation of scientific knowledge, including the transformation of knowledge into products and processes that may inevitably contribute to economic growth and innovation. AEE refers to academic engagement in activities beyond the traditional functions of research, administration and teaching, including formal and informal activities, such as collaborations with businesses and industries, new-firm creation, research output patenting, invention disclosures by academics to technology transfer offices, academic knowledge transfer, research output licensing, contract research, consulting, research collaborations, knowledge transfer mechanisms, student placements, training and continued professional development, leading to financial rewards for individual academics and institutions.¹³ Academic engagement in entrepreneurial activities supports knowledge transfer and technology commercialisation and can contribute significantly to entrepreneurial ecosystem development.

AEE is underscored by capability factors such as entrepreneurial-related abilities, education, human capital and industrial experience.¹⁴ Hence, previous studies have explored the individual, organisational and institutional determinants of academic entrepreneurial intention.^{15,16} Moreover, studies have examined the various forms of AEE, such as spinoffs, firm creation, licenses and joint ventures and so on.^{15,16} Other studies have investigated the factors motivating individual academics to start a business, such as their work routine, need for independence and desire to become wealthy.

Researchers have also examined the determinants and outcomes of academic entrepreneurial intention.¹⁴ Nevertheless, insights into the antecedents and outcomes of academic entrepreneurial engagement (AEE) have received limited attentions.

Previous studies indicated that AEE is essential for creating an entrepreneurial university.¹⁷⁻¹⁹ Kodithuwakku et al. (2012)²⁰ argued that in a resource constrained environments entrepreneurial skills are key to discovering opportunities. Earlier studies²¹ identified limited resources as a push factor that motivates academics to be entrepreneurial to overcome resource barriers. Findings from²² reveals that academic entrepreneurs operating in resource constrained environments sees every opportunities to engage in entrepreneurial activities. De Silva et al. (2012)²² reveals that limited resources do not limit academic engagement in entrepreneurial endeavour but help academics consider being entrepreneurial as a means to be resource-rich. It is also revealed that academics gradually diversify their engagements, and due to limited opportunities, they tend to engage in unrelated diversification. Thus, academic engagement in entrepreneurial activities can help enhance university global performance through frugal innovation (FI).

FI is also known as jugaad innovation, which demands rapid and rational adaptability to changing conditions.^{23,24} FI changed the nature of innovation as the 'ability to accomplish more with less', resulting in increased economic and societal value whilst reducing resource consumption.²⁴ The main characteristics of FI are based on cost dimensions, such as reducing costs or purchase prices and the overhead on nonessential activities, increasing 'value proposition', decreasing unnecessary functions and features that are non-value adding and minimising the use of resources.^{25,26} Therefore, FI could enable significant reduction in resource consumption whilst achieving superior-quality standards and considering the goal of creating a frugal environment. The concept of FI requires further in-depth research using conceptual and empirical techniques.

In higher learning institutions (HLIs), some academicians and management personnel emphasise teaching and learning, student services and community participation, whereas others are concerned with achieving national goals by developing industry-oriented technical innovation, interacting with businesses and engaging in technology transfer. Clearly, HLIs contribute by engaging in R&D collaboration, skills development training, commercialisation through spinoffs and the co-creation of knowledge and ideas and entrepreneurial and technical expertise to overcome community challenges and attain national goals. Hence, emphasis is placed on exploring FI principles as a game changer for the sustainability of PHEI.

Overall, this paper contributes theoretically in terms of gaps exists in frugal innovation for AEE pertaining to motivation, opportunity and ability of academics in PHEI. Further research will help to grow the body of knowledge and enhance theory related to motivation, opportunity and ability to support AEE in PHEI. In terms of practical contribution, this research warrants attention of PHEI to further adopt frugal innovation to create sustainable practices through AEE. Our further research are focusing on how this can be implemented to turbocharge the formation of IR4.0 education eco-systems.

Against this background, this study will provide academic researchers with insights into what has been done with regard to FI for AEE and PHEI to prioritise the factors that can influence AEE for FI in PHEI. In particular, we aim to achieve and provide answers to the following questions;

1. Does a research gap exist in AEE studies to support FI pertaining to motivation, opportunity and the ability of academics in PHEI?
2. What are the challenges encountered by academics and the key factors influencing the pursuit of entrepreneurial initiatives in PHEI?
3. Can AEE for FI be a game changer for supporting constraints in PHEI?

In addressing these questions, we examined 1,067 papers on FI for AEE in PHEI and identify four major gaps in the literature. We believe that our findings warrant the attention of the research community. In particular, we make significant contributions to theoretical understanding by providing researchers with insights into what has been done with regard to FI for AEE. Findings from this study will offer academic entrepreneurial communities a series of research ideas to advance the field and enable PHEI to know the key factors that influences academic entrepreneurial engagement and the various challenges that hinder them in engaging in entrepreneurial activities. Therefore, PHEI will be able to prioritise the factors that can influence AEE for FI in PHEI. In summary, this study is envisaged to have practice implication for PHEI, in their attempts to leverage AEE for FI.

Methods

This paper was designed to present the identified research gaps and insights to examine FI as a game changer for AEE. Based on the literature, key factors influencing AEE to achieve FI in HLIs were explored. This literature review was based on the five stages of the systematic review as illustrated in Figure 1 proposed by Tranfield et al., 2003.²⁷

Stage 1. Planning the review

This review aims to identify the research gaps, challenges and factors supporting FI for AEE in PHEI. In addition, this review aims to offer researchers a comprehensive review of previous works related to FI to support AEE initiatives, specifically in the form of a conceptual framework. Finally, the outcome of this review process will offer academic entrepreneurial communities a series of research ideas to advance the field.

Stage 2. Identifying and evaluating studies

In this stage, papers were examined for the selected keywords. Specifically peer review papers because it focuses on current trend and have also gone through expert review. The keywords included general key terms ('AEE') regarding



Figure 1. Systematic literature review stages.

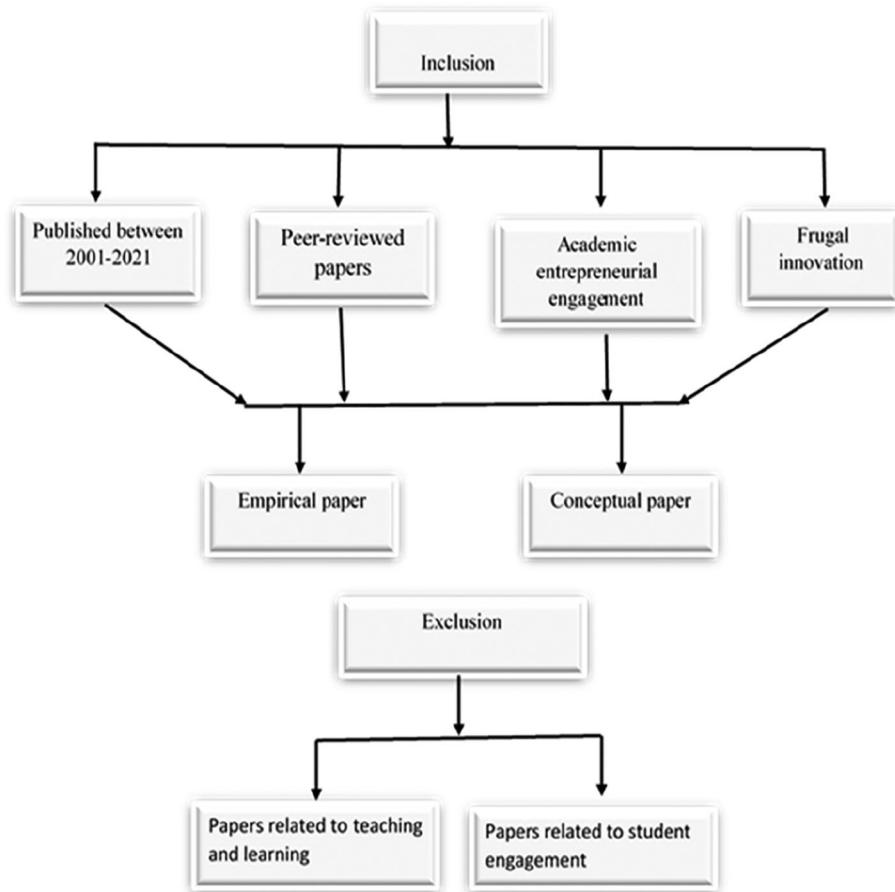


Figure 2. Inclusion and exclusion criteria.

Table 1. Keyword combinations.

Keyword combinations						
Academic Entrepreneurial Engagement	Academics Entrepreneurial Engagement AND Motivation	Academic Entrepreneurial Engagement AND Opportunity	Academic Entrepreneurial Engagement AND Ability	Frugal Innovation	Frugal Innovation AND Academic Entrepreneurial Engagement	Frugal Innovation AND Academic Entrepreneurial Engagement AND Education/University/HEI/IHL

Table 2. Summary of search results.

No	Online database	Keyword combinations						
		Academic Entrepreneurial Engagement	Academics Entrepreneurial Engagement AND Motivation	Academic Entrepreneurial Engagement AND Opportunity	Academic Entrepreneurial Engagement AND Ability	Frugal Innovation	Frugal Innovation AND Academic Entrepreneurial Engagement	Frugal Innovation AND Academic Entrepreneurial Engagement AND Education/University/HEI/IHLs
1	Emerald	1	0	0	0	199	0	0
2	ProQuest	0	2	0	0	403	0	0
3	Inderscience	0	0	0	0	49	0	0
4	Scopus	0	0	0	0	101	0	0
5	Science Direct	1	0	0	1	315	0	0
	Total:	2	2	0	1	1067	0	0

IHLs – Institution of higher learning; HEI – Higher education institutions.

specific keywords ('FI for AEE in PHEI'). The focus of this review is to analyse research on AEE in PHEI. The factors and challenges mentioned in the literature were further classified into several categories.

Inclusion and exclusion criteria

Figure 2 shows the inclusion and exclusion criteria for selecting the papers. The selected papers were those published in the past two decades, peer reviewed, related to AEE focusing on FI and of scholarly origin and either conceptual or empirical papers.

Keywords

We focused on six major research areas, namely, (1) AEE, (2) FI, (3) institutions of higher learning (IHL), (4) motivation, (5) ability and (6) opportunity. For the first area, we included terms such as 'Academic Entrepreneurial Engagement' and 'Frugal Innovation'. Each keyword set was combined with other keywords. Table 1 presents the keyword sets used for this research

Search strategy

The strategy used to collect the papers was based on five major online databases. The online databases were selected based on their wide range of social science research. Table 2 presents the results based on all the sources mentioned above and keyword sets. A total of two papers were listed when we used the keyword 'Academic Entrepreneurial Engagement'. When we searched for 'FI', 1,067 papers were retrieved. When we used the keywords 'AEE' AND 'Motivation', two papers were listed. However, no papers were retrieved when we used 'AEE' AND 'Opportunity' and 'FI' AND 'AEE Ability'. Finally, 'AEE' AND 'Ability' listed one paper. After careful selection based on the inclusion and exclusion criteria described above, we identified five papers relating to AEE and FI.

Stage 3. Extracting and synthesising data

From the sources mentioned above, we extracted the papers based on the extraction process in Figure 3.

Figure 3 summarises the paper selection criteria for the review. From the databases and other sources, only AEE papers linked to motivation/opportunity/ability/FI/IHL were chosen for further review. The relevant papers based on the selection criteria are reported in the following subsections. From the 1,067 papers, we selected five for the final review.

In Figure 4, the Prisma diagram shows the reduction of papers from 1067 to final 5 papers.

Stages 4 and 5 of the Tranfield process are discussed in the following sections.

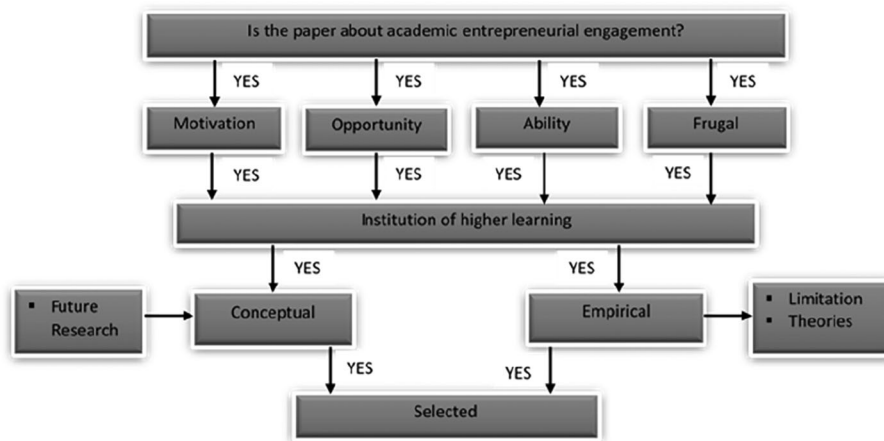


Figure 3. Extracting and synthesising process.

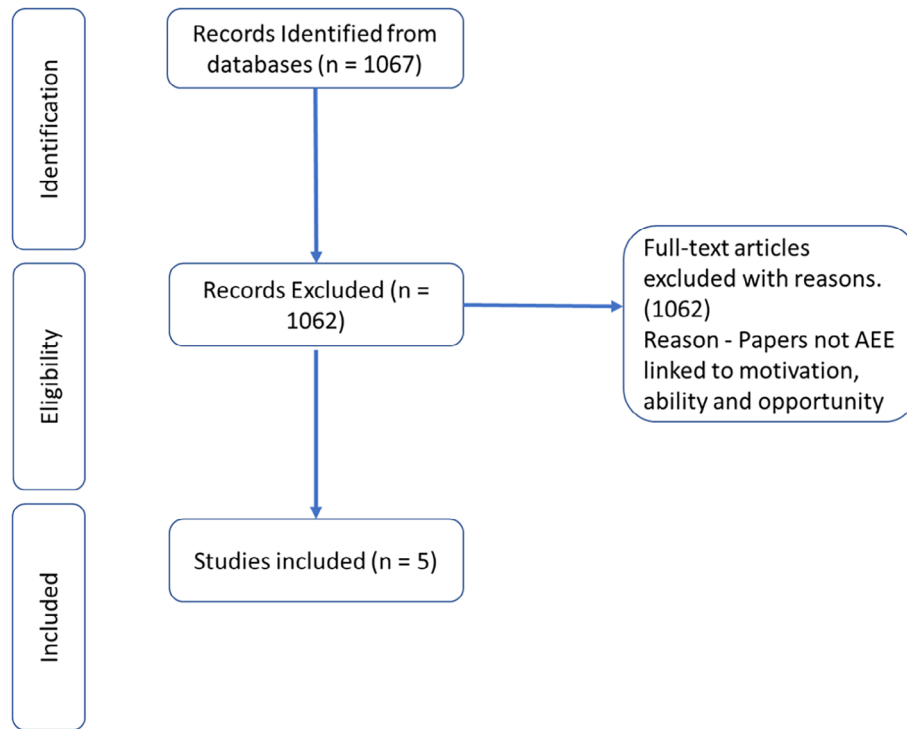


Figure 4. Prisma diagram.

Institutional Review Board Statement

Institutional Review Board Statement: Research Ethical Committee (REC) of Multimedia University (EA1392021). The study was conducted according to the guidelines and approved by the REC of Multimedia University, Cyberjaya, Malaysia.

Results

Summary of five core papers

The five papers were from public HEI and based on [Tables 3 and 4](#), our findings revealed that no research was conducted in the area of FI for AEE related to motivation, opportunity and the ability of academics in PHEI. Most of the studies focused on factors shaping academics' entrepreneurial intention, exploring individual, organisational and institutional variables.^{15,16} The studies on academic entrepreneurial intention were conceptualised from different theoretical perspectives, including theory of planned behaviour (TPB), social learning theory and motivational theories. Based on TPB, academic attitude, subjective norms and behaviour control were associated with entrepreneurial intention.^{28,29} Moreover, other factors such as perceived feasibility and desirability were determined to influence entrepreneurial intention, leading to actual behaviours.⁹ Therefore, further research is necessary to explore the role of motivation, ability and AEE opportunity for FI.

Challenges and factors

Challenges

Several challenges constrain academic engagement in entrepreneurial activities. Such challenges were categorised as individual factors, which constrained personal engagement; organisational factors, which were structural and systemic inhibitors of engagement; and process factors, which included institutional policies detrimental to academic entrepreneurial behaviour.

Based on [Table 5](#), existing studies highlighted the need for academics to assume job responsibilities beyond teaching and research as a major challenge to their engagement in entrepreneurial activities.¹⁴ Academics are expected to extend their research output to products and services suitable for the industry and society. Thus, their research outcomes should be commercialised by creating new firms without breaching current laws that govern their role within the university.³⁰

Table 3. Summary of Five Core Papers.

Author (year)	Theory	Factors	Method	Challenges	Findings	FI	Motivation	Ability	Opportunity	
³³ Gümüşay & Bohné, (2018)	Resource oriented	1. Individual	Qualitative	Development of entrepreneurial competencies	Classification of relational, structural, and cultural cognitive inhibitors			✓		
		2. Contextual								
³⁰ Halilem et al. (2017)	Multilevel approach		Quantitative	Academic entrepreneurial behavior	Copyright and income sharing schemes		✓			
³¹ Sulaimon et al. (2016)	Resource based view	Socio-economic characteristics	Quantitative	Commercializing research output process without violating extant rules	Academic responsibilities and entrepreneurial development are related					
		Dependent and independent variables								
³² Wang et al. (2020)	1. Social cognition 2. Planned behavior	1. Individual	Quantitative	Determinants of academic entrepreneurial intentions	Previous commercialization experience		✓			
		2. Organizational								
²² De Silva (2012)			Qualitative and quantitative	Entrepreneurial engagement in resource constrain environment	Lack of resources not a barrier					
										Engage in unrelated
										Diversification
										Being resource rich

Table 4. Plotting of papers on FI, motivation, ability and opportunity.

Authors (year)	Frugal Innovation	Motivation	Ability	Opportunity
³³ Gümüşay & Bohné (2018)			✓	
³⁰ Halilem et al. (2017)		✓		
³¹ Sulaimon et al. (2016)				
³² Wang et al. (2020)		✓		
²² De Silva (2012)				

Table 5. Extracting and synthesising process.

Challenges category	List of challenges (from Table 4)	Authors
Individual challenges	Academic entrepreneurial behavior	³⁰ Halilem et al. (2017)
	Determinants of academic entrepreneurial intention	³² Wang et al. (2020)
	Entrepreneurial engagement in resource constrained environments	²² De Silva (2012)
Organization challenges	Development of entrepreneurial competencies	³³ Gümüşay & Bohné (2018)
Process challenges	Commercializing research output process without violating extant rules	³¹ Sulaimon et al. (2016)

Table 6. Factors influencing AEE.

Authors	List of factors
³¹ Sulaimon et al. (2016)	socio-economic characteristics
³² Wang et al. (2020)	Individual factors
	Organizational factors
³³ Gümüşay & Bohné (2018)	Contextual factors

Academics are challenged to develop the appropriate competencies to become entrepreneurial to help create a firm. Competence refers to the academic ability to identify resources to start a business.²² In addition, understanding the dynamics shaping the development of entrepreneurial competencies can improve capabilities to maximise resource use through FI, which means ‘accomplishing more with less’, thereby resulting in increased economic and societal value whilst reducing resource consumption.²⁴

Factors

Previous studies determined the relevant factors related to AEE. Regarding socioeconomic characteristics, gender, age, income and personality (proactiveness and optimism) were associated with academic entrepreneurial behaviour.³¹ Drawing on TPB, Wang *et al.*³² investigated the role of academic output and prior experience as individual factors and university reputation and supportive climate as organisational factors influencing AEE.³³ identified cultural factors as contextual inhibitors of academic competencies for entrepreneurial engagement. These studies are further summarised in Table 6.

Discussion

The discussions are described in Table 7 to answer the research questions as shown below.

Limitation of this study is on the number of keywords selected. Keywords selections are based on research focus. However, there is possibility of obtaining more articles if the keywords are expanded to field of study that are not specific in nature such as intention. This could possibly be publication bias.

Table 7. Answering research questions.

<p>Research gaps in studies on FI for AEE pertaining to motivation, opportunity and ability of academics in PHEI</p> <p>Based on Tables 3-6, our findings revealed that little research was conducted in the area of FI for AEE related to motivation, opportunity and the ability of academics in PHEI. The mapping in Table 4 clearly indicates the scarcity of research on FI, motivation, opportunity and ability.</p>
<p>Challenges faced by academics and key factors influencing pursuit of entrepreneurial initiatives in PHEI</p> <p>Based on the literature review of the various factors and challenges faced by academics in pursuing entrepreneurial initiatives in PHEI, we emphasised that attention should be paid to factors determining AEE, as few researchers examined the challenges faced by academics in developing the appropriate entrepreneurial competencies. The adoption of an FI mindset in AEE can create an opportunity to mitigate the identified challenges. FI minimises resource consumption and costs to attain high productive outcomes.</p>
<p>FI as a game changer for PHEI to improve AEE</p> <p>AEE is a crucial factor, as PHEI must utilise their internal capabilities to promote FI through idea generation and relate them to their innovation ecosystem environment and the overall institutional structure. The scientific and technical competencies of universities will foster FI through the efficient use of resources under constrained environments and enable them to venture beyond the local market. Therefore, apart from their traditional mission and norms, PHEI that can realign their strategies to focus on sustainable societal development and address societal problems through academic research can enable FI. To develop FI in PHEI, AEE across various university community dimensions (academicians, scholars, faculty or the university) and collaboration with external stakeholders are necessary. Hence, PHEI will be able to integrate social, FI and environmental objectives through open innovation strategies via knowledge transfer and collaboration to produce patents, copyrights, intellectual property and spinoffs and startups with industries, business associations, the government, NGOs and communities rather than merely focusing on traditional financial objectives. As a result, PHEI must aim to promote teaching, research and community outreach activities that focus on achieving societal goals and contributing to FI to support AEE.</p>

Future research

We recommend future research to consider the following topics:

- AEE factors involving the COVID-19 MOC and other related aspects
- AEE for FI in PHEI focusing on adult learners
- AEE using qualitative methods that may unveil in-depth knowledge within this context based on actual academic entrepreneur case studies

Conclusion

The purpose of this study is to notify academic entrepreneurial communities of the disparity in the implementation of FI to enhance AEE in studies published in the past 20 years. Our paper is based on an extensive review of the literature and the application of a methodology that includes five stages. This methodology is used to determine the scope and nature of FI to promote AEE. Despite the sizeable search result of 1,067 papers in the AEE domain, our search record is limited to five papers investigating FI for AEE. Based on our rigorous review of the five papers, we recommend further comprehensive research to determine whether FI is related to AEE and identify the challenges and factors supporting FI for AEE in PHEI and additional empirical work.

PHEI that can achieve FI will be able to enhance their AEE and contribute to the economy and social development, thereby creating IR 4.0 educational ecosystems.

Data availability

Figshare. Excel file- Dataset.xlsx. DOI: <https://doi.org/10.6084/m9.figshare.14872554.v1>.³⁴

Figshare. Guideline Checklist

DOI: <https://doi.org/10.6084/m9.figshare.16682626.v2>.³⁵

This project contains the following data:

- This dataset is analysed for theories, type of papers, Academic entrepreneurial engagement factors and challenges, method and findings

Data are available under the terms of the [Creative Commons Attribution 4.0 International license](#) (CC-BY 4.0).

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References

- Lee MNN: **Higher education in Malaysia: National strategies and innovative practices.** *Mass Higher Education Development in East Asia: Strategy, Quality, and Challenges.* Springer International Publishing; 2015; pp. 105–118.
[Publisher Full Text](#)
- Dahlan ARA, Ibrahim J, Razi M, *et al.*: **Redesign business model options for university of the future and staying relevant in the fourth industrial revolution age.** 2018.
- Norliza MZ, Velantina A, Normazni A, *et al.*: **Challenges A and evolution of higher education in malaysia.** *Int. J. Islam. Civilisational Stud.* 2017; 4: 78–87.
[Publisher Full Text](#)
- Aziz A: **Private colleges to suffer without loans.** *The Malaysian Reserve.* 2019.
- Menhat M, Mohd Zaideen IM, Yusof Y, *et al.*: **The impact of Covid-19 pandemic: A review on maritime sectors in Malaysia.** *Ocean Coast. Manag.* Aug. 2021; vol. 209: p. 105638.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Perkmann M, *et al.*: **Academic engagement and commercialisation: A review of the literature on university-industry relations.** *Res. Policy.* Mar. 2013; 42(2): 423–442.
[Publisher Full Text](#)
- Miller K, Alexander A, Cunningham JA, *et al.*: **Entrepreneurial academics and academic entrepreneurs: A systematic literature review.** *Int. J. Technol. Manag.* 2018; 77(1–3): 9–37.
[Publisher Full Text](#)
- Davey T, Galan-muros V: **Understanding entrepreneurial academics - how they perceive their environment differently.** 2020; 39(5): 599–617.
[Publisher Full Text](#)
- Guerrero M, Rialp J, Urbano D: **The impact of desirability and feasibility on entrepreneurial intentions: A structural equation model.** *Int. Entrep. Manag. J.* 2008; 4: 35–50.
[Publisher Full Text](#)
- Van Der Zwan P, Thurik R, Verheul I, *et al.*: **Factors influencing the entrepreneurial engagement of opportunity and necessity entrepreneurs.** *Eurasian Bus. Rev.* 2016; 6: 273–295.
[Publisher Full Text](#)
- Wright M, Phan P: **The commercialization of science: From determinants to impact.** *Acad. Manag. Perspect.* Feb. 01, 2018; vol.32(no.1): pp.1–3. *Academy of Management.* 32: 1–3.
[Publisher Full Text](#)
- Siegel DS, Wright M: **Academic Entrepreneurship: Time for a Rethink?** *Br. J. Manag.* Oct. 2015; 26(4): 582–595.
[Publisher Full Text](#)
- Mirani MA, Yusof M: **Entrepreneurial Engagements of Academics in Engineering Universities of Pakistan** | Elsevier Enhanced Reader. *Procedia.* 2015; (accessed May 28, 2021).
[Reference Source](#)
- Neves S, Brito C: **Academic entrepreneurship intentions: a systematic literature review.** *J. Manag. Dev.* Jun. 01, 2020; vol. 39(no. 5): pp. 645–704. Emerald Group Holdings Ltd.
[Publisher Full Text](#)
- Bozeman B, Fay D, Slade CP: **Research collaboration in universities and academic entrepreneurship: the-state-of-the-art.** *J. Technol. Transf.* 2013; 38: 1–67.
[Publisher Full Text](#)
- Wright M: **Academic entrepreneurship, technology transfer and society: where next?.** *J. Technol. Transf.* 2014; 39: 322–334.
[Publisher Full Text](#)
- Etzkowitz E, Webster A, Gebhardt C, *et al.*: **The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm.** *Res. Policy.* 2000; 29(2): 313–330.
[Publisher Full Text](#)
- Hannon PD: **Why is the Entrepreneurial University Important?.** *J. Innov. Manag. Dec.* 2013; 1(2): 10–17.
[Publisher Full Text](#)
- Zhao Z, Broström A, Cai J: **Promoting academic engagement: university context and individual characteristics.** *J. Technol. Transf.* 2020; 45(1): 304–337.
[Publisher Full Text](#)
- Kodithuwakku SS, Rosa P: **The Entrepreneurial Process and Economic Success in a Constrained Environment.** *J. Bus. Ventur.* 2002; 17: 431–465.
[Publisher Full Text](#)
- Adesola AO: **The Nigerian university system: meeting the challenges of growth in a depressed economy.** *Higher Education.* 1991; 21: 121–133.
[Publisher Full Text](#)
- De Silva L: **Academic Entrepreneurship in a Resource Constrained Environment - ProQuest.** 2012. (accessed Jun. 15, 2021).
[Reference Source](#)
- Radjou N, Prabhu J, Ahuja S: **Jugaad Innovation: Think Frugal, Be Flexible, Generate Breakthrough Growth.** United State of America: Josse-Bass; 2012.
- Radjou N, Prabhu J: **Frugal Innovation: How to do more with less.** London: Profile bo; 2014.
- Tiwari R, Kalogerakis K, Herstatt C: **Frugal Innovations in the mirror of scholarly discourse: Tracing theoretical basis and antecedents.** 2016.
- Weyrauch T, Herstatt C: **What is frugal innovation?. Three defining criteria.** *J. Frugal Innov.* 2016; 2(1): 1–17.
[Publisher Full Text](#)
- Tranfield D, Denyer D, Palminder S: **Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review.** *Br. J. Manag.* 2003; 14(3): 207–222.
[Publisher Full Text](#)
- Kautonen T, Van Gelderen M, Tornikoski ET: **Predicting entrepreneurial behaviour: a test of the theory of planned behaviour.** *Appl. Econ.* 2013; 45(6): 697–707.
[Publisher Full Text](#)
- Trivedi R: **Does university play significant role in shaping entrepreneurial intention? A cross-country comparative analysis.** *J. Small Bus. Enterp. Dev.* 2016; 23(3): 790–811.
[Publisher Full Text](#)
- Hallilem N, Amara N, Olmos-Peñuela J, *et al.*: **'To Own, or not to Own?' A multilevel analysis of intellectual property right policies' on academic entrepreneurship.** *Res. Policy.* Oct. 2017; 46(8): 1479–1489.
[Publisher Full Text](#)

31. Sulaimon A-H, Adebiji S, Amole B: **Academic Entrepreneurship and Enterprenerial Development in Nigeria: Myth or Reality?**. *Vestn. Volgogr. Gos. Univ. Ser. 3. Ekon. Ekol.* 2016; (4): 147-154.
[Publisher Full Text](#)
32. Wang M, Cai J, Munir H: **Promoting entrepreneurial intentions for academic scientists: combining the social cognition theory and theory of planned behaviour in broadly-defined academic entrepreneurship.** *Eur. J. Innov. Manag.* 2020; **24**(2): 613-635.
[Publisher Full Text](#)
33. Gümüşay AA, Bohné TM: **Individual and organizational inhibitors to the development of entrepreneurial competencies in universities.** *Res. Policy.* Mar. 2018; **47**(2): 363-378.
[Publisher Full Text](#)
34. Ojo OT, Dorasamy M, Wigin MW, et al.: **Excel file- Dataset.xlsx.** *figshare. Dataset.* 2021.
[Publisher Full Text](#)
35. Ojo OT, Dorasamy M, Wigin MW, et al.: **PRISMA_2020_checklist- 1.docx.** *figshare. Dataset.* 2021.
[Publisher Full Text](#)

Open Peer Review

Current Peer Review Status:   

Version 3

Reviewer Report 15 August 2023

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Alessandro Muscio

University of Foggia, Foggia, Italy

The paper deals with an original and interesting topic. However, it is flawed in many respects. First of all, the introduction is much larger than the other sections, including the literature review. Secondly, the discussion of the results is superficial. Third, it lacks of focus. Therefore, I must recommend its indexing only after major revisions.

Comments:

- Since the paper is focused on FI in AEE, I would redraft the introduction accordingly. At the moment, it is largely focused on AEE. Moreover, the authors shift from AEE to FI without mentioning innovations. For me, the focus should be on academic R&I and on FI.
- Why the focus on private institutions? It might be relevant for Malaysia, but it is definitely not for the majority of other countries. At least there might be a difference in meanings. Please put this limitation into context and discuss better the generalizability of results to other countries.
- Why did the review omit students' engagement? Scholars in many countries have concluded that students represent one of the most valuable source of AEE.
- What are the keywords used in the literature review? Notwithstanding the relevance of FI for academia, searching for "frugal innovation" might underestimate considerably the magnitude of the phenomenon. The "search strategy" section is not sufficiently clear.
- The implications and discussion are too superficial.
- In some cases I found references in footnotes, in others I found traditional citations. Please harmonise the style of citations.

Are the rationale for, and objectives of, the Systematic Review clearly stated?

Partly

Are sufficient details of the methods and analysis provided to allow replication by others?

Partly

Is the statistical analysis and its interpretation appropriate?

Not applicable

Are the conclusions drawn adequately supported by the results presented in the review?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Academic engagement, academic entrepreneurship, technology transfer, innovation.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 17 May 2023

<https://doi.org/10.5256/f1000research.147668.r173879>

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Murali Sambasivan 

Thiagarajar School of Management, Madurai, Tamil Nadu, India

This version is acceptable.

Are the rationale for, and objectives of, the Systematic Review clearly stated?

No

Are sufficient details of the methods and analysis provided to allow replication by others?

No

Is the statistical analysis and its interpretation appropriate?

No

Are the conclusions drawn adequately supported by the results presented in the review?

No

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 2

Reviewer Report 03 February 2023

<https://doi.org/10.5256/f1000research.79999.r159933>

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Hasniyati Hamzah 

Department of Real Estate Faculty of Built Environment, Universiti Malaya, Kuala Lumpur, Malaysia

Summary of review

Overall, the research topic is impactful in ensuring the sustainability of Malaysian private higher education institutions (PHEIs) by exploring academic entrepreneurial engagement (AEE) to generate institutional income. The problem statement was aptly formulated as it reflects the current difficulty faced by higher education institutions in Malaysia, and perhaps worldwide. The methodology was fairly explained, with some gaps that need to be addressed to increase the validity of the findings. Table 7 was useful in illustrating how the results of the SLR answer the research questions.

Major issues

1. It was not explained how the **1,067** papers were reduced to only **five** for the final review. The keywords in Table 1 did not differentiate between private and public HEIs. It was not known if the five final papers were from **private** higher education institutions' perspective. If no, how can the five final papers be used in the present study?
2. There was no explanation on the data extraction and analysis protocol. How many researchers were involved in the process? For more complex papers, how were biases, omissions and misinterpretations minimised to ensure an accurate understanding of the papers' theories and findings?

Minor issues

1. Proofreading: There are some grammatical/syntax oversights. E.g:
 - "In particular, we aim **to achieve the provide answers** to the following questions;" . Please check the bold phrase.
 - "...various challenges that hinder **then** in engaging..." Them?
2. There was no justification of the selection of only peer-review papers in this study. Could books and postgraduate thesis also add to the literature? There could be a good reason why

only peer-review papers were considered and I'm interested to know the answer. The above issues did not seem insurmountable and I hope that the authors will be able to either respond satisfactorily or amend the paper accordingly.

Thank you.

Are the rationale for, and objectives of, the Systematic Review clearly stated?

Yes

Are sufficient details of the methods and analysis provided to allow replication by others?

Partly

Is the statistical analysis and its interpretation appropriate?

Partly

Are the conclusions drawn adequately supported by the results presented in the review?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Entrepreneurial education in real estate

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 30 Apr 2023

Magiswary Dorasamy

Dear Respected Reviewer,

Thank you for very valuable comments. We have corrected the paper based on comments as per the following feedback:

1. How can the five final papers be used in the present study?
 - The Prisma diagram shows the reduction of papers from 1067 to final five papers given in Fig.4 (which was missing in the original article).
2. There was no explanation on the data extraction and analysis protocol.
 - Data extraction process was given in stage 3 extracting and synthesising data. The analysis involves basic descriptive information.
3. How many researchers were involved in the process?
 - Two researchers was involved in keyword search of the literatures.
4. For more complex papers, how were biases, omissions and misinterpretations minimised to ensure an accurate understanding of the papers' theories and findings?
 - The papers are straight forward and was easy to categorize as it appears clearly in the paper. Hence, there was no bias or misinterpretation issue.

5. There was no justification of the selection of only peer-review papers in this study.
 - The justification is now added. See stage 2, first paragraph.
6. Could books and postgraduate thesis also add to the literature?
 - Due to accessibility issue, we have not included books and postgraduate thesis.

Competing Interests: We do not have any conflict of interest.

Reviewer Report 28 February 2022

<https://doi.org/10.5256/f1000research.79999.r122607>

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Murali Sambasivan 

Thiagarajar School of Management, Madurai, Tamil Nadu, India

Revisions are acceptable. The authors have addressed the queries.

Are the rationale for, and objectives of, the Systematic Review clearly stated?

Partly

Are sufficient details of the methods and analysis provided to allow replication by others?

Partly

Is the statistical analysis and its interpretation appropriate?

Partly

Are the conclusions drawn adequately supported by the results presented in the review?

Partly

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 23 November 2021

<https://doi.org/10.5256/f1000research.76955.r97934>

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Murali Sambasivan 

Thiagarajar School of Management, Madurai, Tamil Nadu, India

The article '**Academic entrepreneurial engagement (AEE) for frugal innovation (FI) in higher education institutions: a systematic literature review**' highlights the need for private higher educational institutions (PHEI) to move beyond teaching and research to overcome the current challenges such as COVID-19 pandemic, shrinking resources and so on. Specifically, the article deals with the systematic literature review related to engagement in entrepreneurial activities by academics through frugal innovation (FI). The article concludes that FI for AEE in PHEI can be a game-changer for future sustainability.

The theme of the research 'the idea of academic entrepreneurial engagement leading to innovation, identification of opportunities for new business ventures, financial rewards for institutions and academics, impact on the economy, and enhancement of social welfare' is interesting and requires further empirical research. This idea needs to be explored in both public and private higher learning institutions.

I am highlighting below a few points that can be addressed to enhance the quality of the paper.

Major Points:

- The introduction section must motivate the reader to read the complete article. Therefore, typically, the introduction section must address four questions: What do we know? What else do we need to know? Why do we need to know? What will be done in this research? The authors must revisit introduction based on these questions.
- Why frugal innovation? Why not just, innovation?
- Introduction must explicitly state the theoretical and practical contributions of this research.
- Research questions and objectives are same. It is sufficient to have questions or objectives, unless they are different.
- Why were motivation, opportunity, and ability used as keywords? Probably the keywords limited the number of papers selected.
- Discussion section must be elaborated with more references and examples. I hardly see, any.

Minor point:

- To reedit the manuscript.

Are the rationale for, and objectives of, the Systematic Review clearly stated?

Yes

Are sufficient details of the methods and analysis provided to allow replication by others?

Yes

Is the statistical analysis and its interpretation appropriate?

Not applicable

Are the conclusions drawn adequately supported by the results presented in the review?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Management Science, Operations and Supply Chain Management, General Management

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 30 Nov 2021

Magiswary Dorasamy

Review Comment: The introduction section must motivate the reader to read the complete article. Therefore, typically, the introduction section must address four questions: What do we know? What else do we need to know? Why do we need to know? What will be done in this research? The authors must revisit introduction based on these questions.

The introduction section must motivate the reader to read the complete article. Therefore, typically, the introduction section must address four questions: What do we know? What else do we need to know? Why do we need to know? What will be done in this research? The authors must revisit introduction based on these questions.

Response: Thank you for your comment. The introduction has been revised as suggested. Please see paragraph1, page 2-4

Reviewer Comment:

Why frugal innovation? Why not just, innovation?

Response: Thank you for your comment. The PHEI is facing resource constraints especially budget constraints. As such, frugal innovation will help PHEI to accomplish more with less. Please see paragraph 3, page 4

Reviewer Comment:

Introduction must explicitly state the theoretical and practical contributions of this research.

Response: Thank you for your comment. The theoretical and practical contributions have

been addressed in the introduction section.

Reviewer Comment:

Research questions and objectives are same. It is sufficient to have questions or objectives, unless they are different

Response: Thank you for your comment. We have retained the questions and removed the objectives.

Reviewer Comment:

Why were motivation, opportunity, and ability used as keywords? Probably the keywords limited the number of papers selected.

Response: Our emphasis is to identify how AEE by way of motivation, opportunity and ability so that PHEI can achieve its goals (please see paragraph 2, page 4)

Reviewer Comment:

Discussion section must be elaborated with more references and examples. I hardly see, any.

Response: Thank you for the comments. We did not cite the citations in this section as the discussion referred to the tables which contain the reference.

Competing Interests: No competing interests were disclosed.

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