

FACTORS INFLUENCING THE OUTCOMES OF COMMERCIALY-ORIENTED ACADEMIC-INDUSTRY ENTREPRENEURIAL COLLABORATIONS

Kizito Emmanuel Nyeko¹, Ngui Kwang Sing² and Voon Mung Ling*³

^{1,2,3}School of Business, Faculty of Business, Design and Arts,
Swinburne University of Technology Sarawak Campus,

No 1. Jalan Simpang Tiga, 93350 Kuching, Sarawak, Malaysia

*Corresponding author: *³mvoon@swinburne.edu.my

Date Received: 20 October 2023 | Date Revised: 1 November 2023

Date Accepted: 15 December 2023 | Date Published: 31 December 2023

DOI: <https://10.51200/mjbe.v10i2.4816>

ABSTRACT

This study seeks to analyse the experience of academicians from foreign branch campuses and private universities in Malaysia and point out the multi-level factors that influence the outcomes of commercially-oriented academic-industry entrepreneurial collaborations. This study is cross-sectional and follows an explanatory factor analysis research design. Data was collected from 510 academics from 36 foreign branch campus universities and private universities using a simple random probability sampling method. First, only two multi-level factors, 'age' and 'readiness to collaborate,' are significant when testing the relationship between cross-functional engagement and the performance factor 'effective knowledge transfer'. Second, only two multi-level factors, 'age' and 'readiness to collaborate', are significant when testing the relationship between cross-functional engagement and the performance factor 'effective knowledge transfer'. It categorises the various types of commercially-oriented academic-industry collaboration activities. Secondly, it illustrates the consequences of each kind of commercially-oriented academic-industry collaboration. Lastly, it measures the performance of commercially-oriented academic-industry collaboration against the performance variables in developing nations like Malaysia.

Keywords: academicians, academic-industry entrepreneurial collaborations, private university, entrepreneurial engagement

INTRODUCTION

This paper reports the findings on the factors influencing the outcomes of commercially oriented academic-industry entrepreneurial collaborations using theoretical approaches, specifically, the socio-psychological, the behavioural, and the resource-based view and the organisational learning. All over the world, universities are critical participating stakeholders in nations via participation in academic entrepreneurial undertakings whilst performing their traditional duties of knowledge dissemination (teaching), knowledge generation (research) as well as carrying out administrative and management functions (Laukkanen, 2003; Venkataraman, MacMillan & McGrath, 1992). At the topmost level, governments have been instituting policies geared toward commercialisation of knowledge as a pathway to achieving national competitiveness and innovation successes via academic-industry entrepreneurial collaborations across academic disciplines (Bianchini et al., 2016; Bikard et al., 2019).

Furthermore, engagement in commercialising Academic Intellectual Property (AIP) is now regarded as another avenue to stimulate economic growth and development (Huges et al., 2016). Inadvertently, university academicians and management teams are under some degree of pressure to seek out academic-industry entrepreneurial collaborations while keeping in mind the need for project viability and a decent Return on Investment (ROI) (Czarnitzki et al., 2015; Czarnitzki et al., 2015) to justify the various entrepreneurial academic-industry collaborative activities (Hottenrott & Lawson, 2017). Globally, previous studies on academic-industry entrepreneurial collaborations have illustrated consistent challenges in establishing and operating these engagements (Barbieri et al., 2018).

One possible reason could be that the participating universities or the industries are themselves not monolithic, with differences existing between the academic disciplines and various industrial entities (Peças & Henriques, 2006; Rosli et al., 2018; Wirsich et al., 2016). The participants in academic-industry entrepreneurial collaborations have each a plethora of diverse goals, motivations, cultures, and timelines, as well as divergent expectations for outcomes (Bern, 2018; Fraser & Mancl, 2017; Garousi et al., 2019).

This study aims to analyze the experiences of academicians from foreign branch campuses and private universities in Malaysia, with a specific focus on commercially-oriented academic-industry entrepreneurial collaborations. The objective is to identify and examine the multi-level factors that influence the outcomes of these collaborations. Malaysia has been chosen as the location of this study because globally, this country is a top-tier destination for higher education. In it also has various types of tertiary institutions, namely, government, private and foreign branch campuses. Furthermore, the universities involved in the aforementioned academic-industry entrepreneurial collaborations receive numerous benefits: knowledge sharing, access to financial resources, intellectual property protection, and technical know-how support (Schaeffer, Öcalan-Özel, Pénin, 2020).

In this study we advance new understanding on commercially-oriented academic-industry entrepreneurial collaborative initiatives by exploring various schools of thought on factors affecting it, namely, individual level factors (Azjen, 1988; Bolton & Lane, 2012; Covin & Slevin, 1989), organisational level factors (Chiva et al., 2007; Gomez et al., 2004) and inter-organisational level factors (Garstka et al., 2012) that influence academicians' involvement, performance and outcomes (Calvert & Patel, 2003; D'Este & Patel, 2007; Glassman et al., 2003). All this is done with a sample of 510 academicians from private universities in Malaysia using the aforementioned theoretical approaches to entrepreneurship in the context of commercially-oriented academic-industry entrepreneurial collaborations. The rationale for our argument being: First, the development and utilisation of appropriate frameworks will enable academicians involved to overcome challenges to get best possible outcomes for long-term project sustainability. Second, each sanctioned university-industry entrepreneurial collaboration is unique thus need different forms for safety value mechanisms to work out.

Thus, the following study aims:

- to establish the various forms of commercial-oriented academic-industry entrepreneurial collaborations
- to find out the multi-level factors that influence academicians' engagement in these collaborations

This paper presents several notable contributions. Firstly, it enhances the methodological approach used in prior studies by expanding the sample size to encompass all

private universities within Malaysia, thereby providing a more comprehensive analysis. Second, it identifies the various antecedents and consequences of commercially oriented academic-industry entrepreneurial collaborations. Third, this study utilised primary data as opposed to secondary panel data. Fourth, it identifies how multi-level factors influence the outcomes of commercial-oriented academic-industry entrepreneurial collaborations in developing nations like Malaysia. The results revealed that enhanced reputation and resources and effective knowledge transfer significantly affect academicians' engagement in commercial-oriented academic-industry entrepreneurial partnerships in developing countries.

This section provides an overview of the paper's structure. The following section reviews the theories employed in the study and explains how hypotheses were developed. It also discusses the methodology, including data collection and analysis processes. Lastly, the final section elaborates on the theoretical and managerial implications derived from the conclusions.

THEORETICAL REVIEW AND HYPOTHESES DEVELOPMENT

Social-psychological approach to entrepreneurship

Derived from the realm of psychology, an associated concept suggests that individuals and the broader community are interrelated. This implies that individuals are driven to fulfill the needs of the community as a means to achieve their own objectives. Two academic branches emerged, namely, psychologists focused on sociology (Bolton & Lane, 2012; Covin & Slevin, 1989; Rauch et al., 2009) and psychologists focused on psychology (Ajzen, 1985; Ajzen & Fishbein, 2005; Sheppard et al, 1988) combine to become Socio-psychology.

Behavioural approach to entrepreneurship

This approach focuses on the environmental situation and stimulates entrepreneurs' responses that enable them in activities geared towards new venture creation (Byrgave & Hofer, 1991). Previous studies illustrate how behaviours of the entrepreneurs (their actions instead of who they are and determine the various conditions impact their participation in entrepreneurial undertakings (Gartner, 1988).

Resource-based view approach to entrepreneurship

Supporters of this theory argue some firms perform better than others in their business ecosystem, a phenomenon called competitive advantage due to their unique tangible and intangible capabilities and resources (Barney, 1991; Amit & Shoemaker, 1993).

Organisational learning approach to entrepreneurship

This approach looks at how individuals and organisations utilise knowledge in their possession. It's of the notion that your performance is based on how they utilise their situations by creating, exploiting, retaining and transferring knowledge (Crossan et al., 1999). The key takeaway from here is that effective organisational learning must be management-driven and goal-oriented.

Commercially-oriented academic-industry entrepreneurial collaborations

This study utilised survey instruments to measure the academicians' involvement in seventeen activities, as shown in Table 1.

Table 1 Commercially-oriented academic-industry entrepreneurial collaborations activities

Form of collaboration	Activities
Teaching-related	<ol style="list-style-type: none"> 1. External teaching for financial reward 2. Initiating the development of new degree programs with advice from industry 3. Placing students as trainees in the industry 4. Conducting seminars and training sessions for industry 5. Teaching a subject that involves significant interactions with industry (for example, capstone/ final year projects, guest lectures) 6. Sitting on the committee of industry/ trade bodies.
Research-related	<ol style="list-style-type: none"> 7. Research-based consultancy for industry through the university 8. Research-based consultancy privately (but without forming a company) 9. Joint-research projects with industry 10. Developing products/services with the potential for commercialisation 11. Providing research-related assistance to small business owners 12. Working in the industry while being attached to the university 13. Acquiring funding from government, non-governmental or international bodies, through collaborations with industry partners
Company-creation related	<ol style="list-style-type: none"> 14. Contributing to the formation of university centres designed to carry out commercialisation activities 15. Contributing to the formation of spin-off company/(s) (university is the owner) 16. Contributing to the establishment of university incubators and/or science parks 17. Forming joint-venture/(s) privately through collaboration with industry 18. Forming own company/(s)

We seek to point out the key determinants of academicians involvement and performance in commercially-oriented academic-industry entrepreneurial collaborations activities analysed against specific multi-level factors against the hypothesized constructs below. Therefore, we hypothesize:

H₁: The engagement of academics in commercially oriented entrepreneurial collaborations mediates the relationship between multi-level factors and the performance variable of enhanced reputations and resources.

H₂: The engagement of academics in commercially oriented entrepreneurial collaboration mediates the relations between the multi-level factors and the performance variable of influential knowledge transfer.

METHODOLOGY

Study design and population sample

In this study, the researchers utilised a cross-sectional survey design based on a sample of 510 full-time academicians from private universities foreign branch campus universities and private universities form part of a statistical population of 13,737 from the Malaysian Ministry

of Higher Education data bank (MoHE, 2012). A criteria was developed for the selection of target respondents in the present study, namely, Respondent must be a full-time employee of the eligible academic institution in Malaysia; Must holds a standard academic rank and Must give consent to be a participant in the proposed study. All participants were given 90 days to complete the self-completing survey questionnaire. After the elapse of this time period we sent out reminder emails in which we requested them to return copies of completed questionnaires.

Measurements and questionnaire

The research employs a survey questionnaire as its primary data collection tool based on pilot studies indicating its effectiveness and efficiency. The survey aims to measure the perceptions of academicians regarding commercially-oriented academic-industry collaboration activities, with a focus on several key variables. These variables include academics' readiness to collaborate with industry, their individual entrepreneurial orientation, the capability of their organizations to learn, the entrepreneurial orientation at the organizational level, the strength of inter-organizational ties, and the performance of the collaborations. The survey consists of items that assess these theoretical constructs, encompassing demographic characteristics, social-psychological factors, organizational-level factors, inter-organizational factors, commercially-oriented academic-industry collaboration activities, and the performance of such collaborations.

The measurement scales used in the study were adapted from validated data collection tools employed in previous research. To capture responses related to multi-level factors, a five-point Likert rating scale was utilized. The scale ranged from (1) Strongly disagree to (2) Disagree, (3) Neither agree nor disagree, (4) Agree, and (5) Strongly agree. Regarding the scales measuring academicians' engagement in commercially-oriented academic-industry collaboration activities, a four-point level of participation Likert rating was used. The rating options included (1) No, never, (2) Yes, engaged in the last 12 months, (3) Yes, engaged in the last 3 years, and (4) Yes, engaged in both the last 12 months and 3 years.

Data management and analysis

After the 90-day period, 5000 questionnaires were distributed, and out of those, a total of 538 questionnaires were returned. The collected questionnaires underwent screening for missing values and multivariate outliers using the Statistical Package for Social Sciences (SPSS) 19.0 software. As a result, only 510 questionnaires were deemed usable. This indicates a final response rate of 10.2 per cent. To investigate the hypothesized relationships among the variables being studied, the data from the questionnaire was subjected to factor analysis, reliability testing, analysis of variance, and multiple regression analysis.

RESULTS

H₁: The engagement of academics in commercially oriented entrepreneurial collaborations mediates the relationship between multi-level factors and the performance variable of enhanced reputations and resources.

Sobel test results revealed that all the three multi-level factors and the performance variable ‘enhanced reputation and resources’ had cross-functional engagement as a significant indicator. These factors are academic attainment’, ‘readiness to collaborate’, and ‘collaborative environment’. See Table 2.

Table 2 The results summary of mediated regression testing of cross-functional engagement as a mediator between multi-Level factors and enhanced reputation and resources.

	Model 1 Reputation & Resources (Without Mediator)	Model 2 Cross- functional	Model 3 Reputation & Resources (With Mediator)	Sobel Test of Significance
(Constant)				
Gender	.055	-.013	.021	
Age	.037***	.012/.042	.220***	
Academic	.048***	.453***/.054	-.237***	2.626***
Position	.039	-.114**/.045	.080	
Innovative & Risk- taking	.043	.035	-.059	
Readiness to Collaborate	.044***	.146***/.050	.206***	2.008**
Proactive	.046	.021	-.027	
Learning Orientation	.052***	.038	-.257***	
Collaborative Purpose	.048***	.048	.321***	
Collaborative Environment	.055**	.217*/.062	-.143***	2.170**
Breadth of cross- functional			.174***	

*Note: *** represents significant level at 0.01 or below; ** represents significant level at 0.05 or below; * represents significant level at 0.1 or below*

H₂: The engagement of academics in commercially oriented entrepreneurial collaboration mediates the relations between the multi-level factors and the performance variable of influential knowledge transfer.

The Sobel test results revealed that only two multi-level factors, ‘age’ and ‘readiness to collaborate,’ are significant when testing the relationship between cross-functional engagement and the performance factor effective knowledge transfer. See Table 3.

Table 3 The results summary of mediated regression testing of cross-functional engagement as a mediator between multi-level factors and effective knowledge transfer.

	Model 1 Knowledge Transfer (Without Mediator)	Model 2 Cross-functional	Model 3 Knowledge Transfer (With Mediator)	Sobel Test of Significance
(Constant)				
Gender	-.021	-.013	-.020	
Age	.110**	.012/.042	.109**	
Academic	.010	.453***/.054	-.039	
Position	.021	-.114**/.045	.033	
Innovative & Risk-taking	.035	.035	.031	
Readiness to Collaborate	.140***	.146***/.050	.145***	2.529***
Proactive	.020	.021	.017	
Learning Orientation	-.073	.038	-.077	
Collaborative Purpose	.289***	.048	.284***	
Collaborative Environment	.042	.217*/.062	.031	
Breadth of cross-functional			.107**	

*Note: *** represents significant level at 0.01 or below; ** represents significant level at 0.05 or below; * represents significant level at 0.1 or below*

DISCUSSION

In this study, hypothesis H₁ was subjected to a test of multiple regression analysis. The results revealed that the only activities with a positively significant relationship with the performance variable under study are research-related.

This finding aligns with other studies that attributed successful academic-industry entrepreneurial collaborations accruing benefits for the parties involved. Well documented benefits include; access to cutting edge technology and facilities, access to knowledge and technical specialists, access to intellectual property, enhanced institutional reputation and asset acquisition, mentoring of skilled human resources and driving sustainable economic growth and development (D’Este et al, 2019; Schaeffer et al., 2020; Thursby et al., 2010; Tijssen et al., 2016).

In this study, hypothesis H₂ was subjected to a test of multiple regression analysis. The results revealed only two activities, teaching-related and research-related, have a significant positive relationship with the performance variable. This phenomenon is attributed to organisational learning attained through organisational systems and management team practices (lorio et al., 2017).

The positive relationship provides empirical evidence that commercially-oriented academic-industry research-related collaboration activities are pathways for effective transfer of knowledge between partners. This is due to the free flow of tangible and intangible resources in an enabling environment that enables acquisition, operationalisation in multiple formats and archiving (Callaert et al., 2015; Blind, Pohlisch & Zi, 2018). A study on academic-industry collaboration innovation in the United Kingdom conducted at the turn of the century revealed that 10 per cent of new products and services went from concept to final product minus

significant delays due to university-driven research and development (R&D) (Mansfield, 1998). Furthermore, previous studies found that in addition to the expected financial benefits for commercially-oriented academic-industry collaborations, they also gain unexpected non-financial benefits from engaging in activities co-currently (Bianchini et al., 2016; Bilkard et al. 2019).

The positive relationship provides empirical evidence that commercially-oriented academic-industry teaching-related collaboration activities are consistent with findings in previous studies (Dolan et al, 2019; Steyn, 2004). These scholars attributed this to the primary academic function of teaching being a medium for knowledge transfer by skilling schemes at all learning levels and across disciplines. This is because teaching-related activities open the learners to critical thinking skills, dynamic thought processes and an entrepreneurial mindset necessary to encounter the challenges of an increasingly globalised economy with dynamic market forces (Arza & Carattoli, 2017).

CONCLUSION

This study provides empirical evidence that brought to light key emerging trends with respect to age, gender, seniority, nationality and institutional systems in commercially-oriented academic-industry entrepreneurial collaborations activities. 1) academics engagement in these activities is conducted co-currently with their traditional academic roles of teaching, research and administrative; 2) senior-ranked academicians are more likely to engage in various entrepreneurial activities due to their years of experience and networks built; 3) academicians from institutions with robust learning systems, access to financial resources and collaboration networks are more likely to engage in them compared to their peers; 4) individual characteristics and motivations (financial and non-financial) are key drivers of academic engagement.

RESEARCH IMPLICATIONS

The findings highlight issues of concern for researchers, practitioner audiences and policymakers theoretically and policy-managerial implications.

Theoretical implications

The theoretical implications fill essential gaps. First, it categorises the various types of commercially-oriented academic-industry collaboration activities. Second, it illustrates the consequences of each kind of commercially-oriented academic-industry collaboration. Lastly, it measures the performance of commercially-oriented academic-industry collaboration against the performance variables in developing nations like Malaysia.

Policy and Managerial implications

This study has policy and managerial implications based on the empirical evidence collected to highlight the outcomes of commercially-oriented academic-industry collaborations, related policy formulation, necessary support structures and trust-building process commercially-oriented academic-industry collaborations.

According to the findings of Lawson et al. (2019), researchers who hold senior positions and possess PhD qualifications tend to exhibit a greater cultural affinity with industrial partners. As a result, they encounter fewer barriers in terms of their orientation towards commercial activities, making them more inclined to engage in academic-industry collaborations with a commercial focus compared to their counterparts who do not hold PhD qualifications.

As a result of their extensive experience and established networks, senior-ranked academicians are more inclined to participate in a diverse range of entrepreneurial activities. Yet, young researchers have to build up their reputations by publishing papers and networks before engaging in various entrepreneurial activities.

Firstly, policy makers take time to proactively understand how commercially-oriented academic-industry collaborations work in order to develop robust Human Resource Management (HRM) policies that take into account the unique demographic characteristics of the end users. Lawson et al. (2019) found that academicians with senior academic qualifications with PhD are culturally closer to industrial partners thus experience lower orientation barriers thus more readily engage in collaborations with third parties than those starting out their academic careers.

Secondly, policymakers must proactively understand the different categories of commercially-oriented academic-industry collaborations and be able to meet the specific issues addressed in Memorandums of Understanding (MoU) (Manning, 2018). For example, their partnerships must be able to handle the 17 goals of Sustainable Development Goals (SDGs) societal impact while maintaining set academic-industry standards (Arruti & Panos-Castro, 2020).

Thirdly, previous studies (Perkmann et al., 2019; Tennent et al., 2016) highlight the utmost need of the establishment of vibrant and functioning support structures to support academicians involving commercially-oriented academic-industry collaborations. These include; financial resources, non-financial resources, data and access to networks.

Lastly, universities involved in commercially-oriented academic-industry collaborations need to develop mentoring programmes to train their staff involved in these collaborations. During the collaboration life cycle, the participants create social networks, better insights into the needs of involved stakeholders and access to better financial and non-financial resources. This will ultimately result in better optimization of the bottom-line and overall performance.

Limitations

The study has certain limitations. Firstly, data collection relied on a self-administered survey questionnaire. However, no follow-up interviews were undertaken yet this would have helped us probe the academicians further to understand why they hold particular views. Secondly, the study utilised a limited data sample from all foreign branch campuses and private universities in Malaysia, which makes the findings nation-specific, limiting generalisation of findings to other types of institutions from other countries.

Future research

Firstly, this paper has a single country focus yet the phenomenon of private universities is commonplace in both developed and developing nations. This places limitations on possibilities for theory development.

Therefore, future research into this area might be conducted in a multi-nation context for greater insights. Secondly, the use of quantitative methods of data collection places limits on information gathered from respondents. We recommend that future studies utilise more robust qualitative data collection methods such as one on one interviews in order for respondents to express their views on constructs under study better. Thirdly, this study acknowledges the distinctions between public and private universities, recognizing that entrepreneurship is heavily influenced by contextual factors. Differences can be observed in various aspects of these institutions, including their mission or purpose, ownership, sources of revenue, government controls, and management norms (Lawson et al., 2019). We recommend more studies in this area in the context of private universities. This is because entrepreneurial practices by these institutions have been largely ignored. Lastly, this study is cross-sectional yet it is common knowledge that opinions held by people usually evolve. To this end, we recommend that future studies utilise a longitudinal approach.

REFERENCES

- Ajzen, I. (1985). *From intentions to actions: A theory of planned behaviour*. Springer.
- Ajzen, I. (1988). *Attitudes, personality and behaviour*. Dorsey Press.
- Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*, Englewood Cliffs: Prentice Hall.
- Arruti, A., & Paños-Castro, J. (2020). International entrepreneurship education for pre-service teachers: A longitudinal study. *Education + Training*, 62(7-8), 825-841.
- Arza, V., & Carattoli, M. (2017). Personal ties in university-industry linkages: A case-study from Argentina. *J. Tech. Transf*, 42, 814–840.
- Baker, D.B. (2012). *The Oxford Handbook of the History of Psychology*. University Press. Oxford Library of Psychology.
- Barbieri, E., Rubini, L., Pollio, C. & Micozzi, A. (2018). What are the trade-offs of academic entrepreneurship? An investigation on the Italian case. *J. Tech Transf*, 43, 198–221.
- Barney, J. (1991). Firm Resource and Sustained Competitive Advantage. *Journal of Management*, 17(1), 99–120.
- Bikard, M., Vakili, K., & Teodoridis, F. (2019). When collaboration bridges institutions: The impact of university–industry collaboration on academic productivity. *Org. Sci*, 30, 426–445.

- Bolton, D., & Lane, M. (2012). Individual entrepreneurial orientation: Development of a measurement instrument. *Education + Training*, 5 (2), 219–233.
- Bygrave, D.W., & Hofer, W.C. (1991). Theorising about entrepreneurship. *Entrepreneurship Theory & Practice*, 16 (2), 13–22.
- Blind, K., Pohlisch, J., & Zi, A. (2018). Publishing, patenting, and standardization: Motives and barriers of scientists. *Res. Policy*, 47, 1185–1197.
- Calvert, J., & Patel, P. (2003). University–industry research collaborations in the UK: Bibliometric trends. *Science and Public Policy*, 30, 85–96.
- Chiva, R., Alegre, J., & Lapiedra, R. (2007). Measuring organisational learning capability among the workforce. *Emerald Group Publishing*, 28 (1), 224–242.
- Covin, J., & Slevin, D. (1989). Strategic management of small firms in hostile and benign environments. *Strategic Management Journal*, 10, 75–87.
- Crossan, M.M., Lane, H.W., White, R.E., & Djurfeldt, L. (1995). Organisational learning: Dimensions for a theory. *The International Journal of Organisational Analysis*, 3(4), 337–360.
- D'Este, P., Llopis, O., Rentocchini, F., & Yegros, A. (2019). The relationship between inter-disciplinarity and distinct modes of university-industry interaction. *Res. Policy*, 48, 103–799.
- D'Este, P., & Patel, P. (2007). University–industry linkages in the UK: What are the factors underlying the variety of interactions with industry? *Research Policy*, 36, 1295–1313.
- Dolan, B., Cunningham, J.A., Menter, M., & McGregor, C. (2019). The role and function of cooperative research centers in entrepreneurial universities. *Manag. Deci.*, 57, 3406–3425.
- Callaert, J., Landoni, P., Van Looy, B., & Verganti, R. (2015). Scientific yield from collaboration with industry: The relevance of researchers' strategic approaches. *Res. Policy*, 44, 990–998.
- Garstka, T.A., Collin-Camargo, C., Hall, J. Neal, M., & Ensign, K. (2012). Implementing Performance-Based Contracts and Quality Assurance Systems in Child Welfare Services: Results from a National Cross-Site Evaluation. *Journal of Public Child Welfare*, 6 (1), 12–41.
- Garousi, V., Pfahl, D., Fernandes, J.M., Felderer, M., M'antyl'a, M.V., Shepherd, D., Arcuri, A., Coşkunçay, A., & Erdogan, B.T. (2019). Characterizing industry-academia collaborations in software engineering: Evidence from 101 projects. *Empirical Software Engineering*, 24, 2540–2602.
- Gartner, W.B. (1988). Who is an entrepreneur? Is the wrong question. *Entrepreneurship Theory and Practice*, 12 (2), 47–68.

- Glassman, A.M., Moore, R.W., & Rossy, G.L. (2003). Academic Entrepreneurship: Views on Balancing the Acropolis and the Agora. *Journal of Management Inquiry*, 12, 353–374.
- Gomez, P.J., Lorente, J.J.C., & Cabrera, R.V. (2004). Training practices and organisational learning capability: Relationship and implications. *Journal of European Industrial Training*, 28 (2-3), 234–256.
- Czarnitzki, D., Grimpe, C., & Pellens, M. (2015). Access to research inputs: open science versus the entrepreneurial university. *J. Tech' Transf*, 40, 1050–1063.
- Czarnitzki, D., Grimpe, C., & Toole, A.A. (2015). Delay and secrecy: Does industry sponsorship jeopardize disclosure of academic research? *Indust. Corp. Change*, 24, 251–279.
- Hottenrott, H., & Lawson, C. (2017). Fishing for complementarities: Research grants and research productivity. *Int. J. Indust. Org*, 51, 1–38.
- Hughes, A., Lawson, C., Salter, A., Kitson, M., Bullock, A. & Hughes, R. (2016) The Changing State of Knowledge Exchange: UK Academic Interactions with External Organizations 2005-2015. NCUB, London, Retrieved from <https://eprints.lancs.ac.uk/id/eprint/145906> on 14 March 2018.
- Jones-Evans, D. (1997). *Universities, Technology Transfer and Spin-off Activities: Academic Entrepreneurship in Different European Regions*. Targeted Socio-Economic Research Project. University of Glamorgan.
- Kizito Emmanuel, N. (2016). *Entrepreneurial Pursuit in Academic-Industry Collaboration: An Exploratory Study of Factors Influencing Financial Success in Private Universities in Malaysia*. Thesis research project (Unpublished). Swinburne University of Technology, Melbourne, Australia.
- Laukkanen, M. (2003). Exploring academic entrepreneurship: Drivers and tensions of university based business. *Journal of Small Business and Enterprise Development*, 10, 372–382.
- Lawson, C, Salter, A, Hughes, A., & Kitson, M. (2019). Citizens of somewhere: Examining the geography of foreign and native-born academics' engagement with external actors, *Res. Policy*, 48, 759–774.
- Iorio, R., Labory, S., & Rentocchini, F. (2017). The importance of pro-social behaviour for the breadth and depth of knowledge transfer activities: An analysis of Italian academic scientists. *Res. Policy*, 46, 497–509.
- Louis, K.S., Blumenthal, D., Gluck, M.E., & Stoto, M.A. (1989). Entrepreneurs in academe: An exploration of behaviours among life scientists, *Administrative Science Quarterly*, 34, 110–131.
- Manning, L. (2018). Enabling entrepreneurial behaviour in a land-based university. *Education + Training*, 60 (7/8), 735-748.

- Mansfield, E. (1995). Academic research underlying industrial innovations: Sources, characteristics, and financing. *The Review of Economics and Statistics*, 77 (1), 55-65.
- Ministry of Higher Education (MOHE). (2012). *Buku informasi IPTS: Bertaraf Universiti, Kolej Universiti dan Kampus/ Kementerian Pengajian Tinggi*. Visual Print Sdn. Bhd.
- Peças, P., & Henriques, E. (2006). Best practices of collaboration between university and industrial SMEs. *Benchmarking: An International Journal*, 13 (1/2), 54-67.
- Perkmann, M., McKelvey, M., & Phillips, N. (2019). Protecting scientists from Gordon Gekko: How organizations use hybrid spaces to engage with multiple institutional logics. *Org. Sci.*, 30, 235–445.
- Rauch, A., Wiklund, J., Lumpkin, G.T., & Frese, M. (2009). Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future. *Entrepreneurship: Theory & Practice*, 33(3), 761-787.
- Rosli, A., De Silva, M., Rossi, F., & Yip, N. (2018). The long-term impact of engaged scholarship: How do SMEs capitalise on their engagement with academics to explore new opportunities? *International Small Business Journal: Researching Entrepreneurship*, 36(4), 400-428.
- Schaeffer, V., Öcalan-Özel, S., & Pénin, J. (2020). The complementarities between formal and informal channels of university–industry knowledge transfer: A longitudinal approach. *Journal of Tech. Transf*, 45, 31–55.
- Siegel, D.S., Thursby J.C., Thursby, M.G., & Ziedonis, A.A. (2001). Organisational Issues in University-Industry Technology Transfer: An Overview of the Symposium Issue. *Journal of Technology Transfer*, 26, 5-11.
- Tennant, J.P., Waldner, F., Jacques, D.C., Masuzzo, P., Collister, L.B., & Hartgerink, C. (2016) The academic, economic and societal impacts of Open Access: An evidence-based review. *F1000Res*, 5, 632. Available at: <https://f1000research.com/articles/5-632/v2#article-reports> (accessed 14 July 2016).
- Thursby, M., Fuller, A., & Thursby J. (2010) An Integrated Approach to Educating Professionals for Careers in Innovation. *Academy of Management Learning and Education*, 8, 389-405.
- Tijssen, R.J., Yegros-Yegros, A. & Winnink, J.J. (2016) University–industry R&D linkage metrics: Validity and applicability in world university rankings, *Scientometrics*, 109, 677–696.
- Venkataraman, S., MacMillan, I., & McGrath, R. (1992). Progress in research on corporate venturing, in Sexton. DL & Kasarda, J. (eds.), *The State of the Art of Entrepreneurship*. PWS-Kent, pp. 487-519.
- Wirsih, A., Kock, A., Strumann, C., & Schultz, C. (2016). Effects of university-industry collaboration on technological newness of firms. *Journal of Product Innovation Management*, 33(6), 708-72.