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# EXPLORING FACTORS SHAPING THE COMMERCIALISATION OF UNIVERSITY RESEARCH IN MALAYSIA: A CONCEPTUAL PAPER

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**Abstract:**

The commercialisation of research conducted within a university has a significant role to play in supporting both the innovation and economic development of a nation as well as the transfer of knowledge. While in Malaysia the commercialisation of research is relatively ineffective despite the various initiatives of the government and the different funding schemes. The intention of this paper is to outline a research methodology which can be used to determine the factors which contribute to commercialisation of the results of university research. This framework focuses on four independent variables: knowledge and technology transfer from universities, the use and protection of intellectual property, collaboration between universities and industry, and market validation. This research proposes that a researcher expertise can be a key factor in the commercialisation process. This expertise, which reflects a researcher's ability, awareness and preparedness, can influence the way a commercialises its scientific output. At the core of the proposed mechanism is the Knowledge Spillover Theory of Entrepreneurship (KSTE). This theory suggests that universities facilitate innovation in the regions where they are located by engaging academics in business and through other knowledge spillover channels. This paper provides useful indicators for those

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universities, research teams, policymakers and governments involved in commercialising research output for them to improve their output commercialisation performance. This study aims to help identify the key areas which need improvement so as to increase the number of successful commercialisation of research findings in Malaysia. The research findings are anticipated to lead to the development of suitable strategies which can increase the impact of research in the country. The Malaysian innovation system will thus be strengthened.

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**Keyword:**

Intellectual Property (IP) Management, Knowledge Spillover Theory of Entrepreneurship, Knowledge Technology Transfer, Market Validation, Research Expertise, University Research Commercialisation, University-Industry Collaboration



## Introduction

While many people believe that research carried out by a university should be solely for academic purposes, the reality is quite different. The transfer of a university's discoveries into industry can be instrumental in speeding up technological advancement. It can also give the economy a vital boost. In Malaysia, the importance of turning academic research into commercial outcomes is accepted with policies such as the National Science, Technology and Innovation Policy (NSTIP). The aim of this policy is to establish Malaysia as an international innovation centre by stimulating commercial research from educational institutions which are driven by research (Ministry of Science Technology and Innovation, 2021).

The commercialisation output of Malaysian universities is, however, unsatisfactory in that it remains low. For instance, about 3 to 4% of the research that is done at universities is successfully turned into products that are sold, a lower rate than the global average of 5%. Research into commercialisation has shown that a significant gap continues to exist between the volume of research and development occurring and the volume actually commercialised. Researchers in various countries are still facing significant hurdles, including a lack of collaboration with industry, inadequate market testing, poor management of intellectual property and limited contact with potential customers (Abd Rahim et al., 2021; LiXi & Rahman, 2024).

In the majority of the studies on commercialisation, the institutional and structural elements of technology transfer offices (TTOs) and university policies have received significant attention. Despite increasing evidence that researchers with a particular type of entrepreneurial drive are more effective at commercialising research, it appears that individual researchers' attributes,

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which include practical ability, business awareness and entrepreneurial drive, are also essential in the management of commercialisation processes (Perkmann et al., 2013; Suhaimi et al., 2020).

In this paper explores how in countries such as Malaysia researcher's expertise can facilitate the conversion of research findings into products. This is a relatively underdeveloped area in research. To date there has been research on the dynamics of collaboration and technology transfer processes, however, none of these studies have looked at how academic competencies influence the commercialisation of research. This study integrates the latest theoretical and empirical work to advance understanding of knowledge spillovers and the commercialisation of university research, and to provide guidance for those responsible for the development of innovation systems.

## Literature Review

### *University Research Commercialisation*

Universities also play an important role in the commercialisation of technology alongside research institutes. Research undertaken at universities is vital in leading to the development of products which can then be brought onto the market and contribute to economic growth through innovation. The transfer of technology from a university to industry can occur by various means such as the company spin-offs (Szulczewska-Remi & Nowak-Mizgalska, 2023), joint research and development ventures with industry (Mensah, 2023), and the granting of licences (Miranda et al., 2021). By engaging in such research and development, universities can address the industry's need for innovation created by their researchers (Habidin et al., 2024; Perkmann et al., 2013). In recent years research institutions in several countries have started to adopt this business model. Examples can be seen in countries like South Korea (Lee & Jung, 2021), China (Zhou & Wang, 2023) and India (Singh & Kumar, 2022), where institutions have been involved in commercialisation through academic spin-offs. In Malaysia, some of the institutions of higher learning that adopted this programme are the Universiti Kebangsaan Malaysia (UKM), Universiti Putra Malaysia (UPM) and Universiti Teknologi Malaysia (UTM). Collaborative robots have been developed for the use in settings such as manufacturing of robotics and skincare products (Shamsir & Abd Jamil, 2019). While Malaysian public universities are involved in research the results of much of this research remains unused. The majority of intellectual property rights have not been commercially exploited. Programs and initiatives have been set up to encourage the area, such as Malaysian government grants from the Ministry of Science, Technology and Innovation (MOSTI) and the Malaysian Public Private Partnership. The commercialisation of intellectual properties in our public universities is relatively low. Only a small percentage of this sort of intellectual property is exploited commercially; this number is approximately eight percent (Habidin et al., 2024; Suhaimi et al., 2020). Researchers have pointed out that several factors are contributing to the commercialisation of research findings and these factors include transferring of technology, intellectual property management and the institutions' support frameworks which encourage industry collaboration, and also market viability to assess the practical of output bringing into the market (Battaglia et al., 2023; Kim & Cho, 2022; Ramli et al., 2021). This also involves educating researcher about the commercialisation process (Ismail et al., 2015; Khademi et al., 2015; Suhaimi et al., 2020). For commercialising research findings in Malaysia, factors such as institutional, government and attitudes are important (Guindalini et al., 2021). The commercialisation of research is further influenced by the attitudes of academics, government

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policies and market readiness. Despite Malaysia's difficulties in lacking sufficient frameworks and producing insufficient commercial output, fostering stronger university links and the development of academic entrepreneurial ecosystems could enable research to be translated into commercial opportunities. The commercialisation of research in the Malaysian academic sector must involve close ties between the public and private sectors so as to bring about the maximum benefits to the Malaysian economy through the exploitation of research findings.

***Knowledge Technology Transfer (KTT)***

The transfer of knowledge from research into industrial practice is vital in the process of research becoming commercial products thereby stimulating regional development and economic growth. Knowledge transfer and technology transfer occur where universities engage with the wider world, and it is at this interface that the processes of knowledge, scientific discoveries and technology are disseminated and commercialised. While focusing on the contribution of universities as producers of knowledge, it is also important to consider the role of universities as active players in regional innovation systems in order to promote economic development (Feldman, 2014). This is particularly true when technology is transferred into the marketplace. Malaysia's government is aware of the role knowledge transfer and technology (KTT) plays in an economy which is being increasingly based on knowledge, consequently, a large amount of funding has been set aside to assist in university-based research. The substantial number of financial resources have been funded by Malaysian Government's initiative into the prototype, idea including to assist the sale of intellectual property rights to industry (Shahidan et al., 2019). Of late, there has been a heightened emphasis in Malaysia on the transfer of technology. As a result, the Technology Transfer Offices (TTOs) are responsible for the transfer of technology in the universities have been increasing in prominence over the years (Sapah et al., 2022; Sutopo et al., 2022; Tweheyo et al., 2022). Universities and research centres establish an office that encourages technology transfer when there is a clear technology to transfer and industry demand. This TTO main responsibility is the management of intellectual property rights. The main duties of such offices include patent protection and licensing agreements, where a contract between the company and the developer of the patent is drawn. They can also set up spin-off companies. Commercialisation pathways not only enhance regional economic development but also contribute to national GDP and industrial output through the creation of spin-off companies or the licensing of university-owned patents to external firms (Dzakiy et al., 2023). In 2019, Shahidan et al. noted that the successful operation of technology transfer offices (TTOs) supports the argument for a collaborative approach between government, industry and universities to maximise the commercial impact of research carried out in universities (Shahidan et al., 2019). The Malaysian knowledge translation and transfer system is a rapidly developing interface between industry and academia. A dynamic interface between academia and industry, this is necessitating ongoing policy support, institutional capabilities and comprehensive frameworks to improve the conversion of knowledge into business ventures that can benefit the economy and society.

While the transfer of technology to the commercial sector appears to be needed as shown by recent reviews, active researcher participation is required for any significant commercial impact. The effectiveness of technology transfer shows to be greater in collaborative situations involving universities and external partners such as industrial, stake holders, government etc who work together to develop projects. Expertise of researchers seems to have an important influence on the commercialisation of technology, implying that research staff expertise is crucial in the successful exploitation of such technologies (Zarea et al., 2025).

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### *Intellectual Property (IP) Management*

Intellectual property rights which safeguard such intellectual creations as patents, trademarks and copyrights are an essential element in the sale of the products of academic research. This includes Abd Rahim et al. 2021; patents, copyrights and trademarks. In Malaysia the management of intellectual property is of great importance, yet academics are hindered in their tasks due to lack of knowledge regarding the laws and regulations governing the country's intellectual property. This is often due to the low rate of patent filings by Malaysian research institutions, resulting from commercialisation of research being hindered (Abd Rahim et al., 2021; Sattiraju et al., 2022). In 2021, Wekesa et al. stated that, commercialisation of research results is encouraged by comprehensive management of intellectual property and the protection of rights on this property facilitates its transfer (Bereuter et al., 2023; Wekesa et al., 2024). A study in Malaysia reveals that there is little connection between technology transfer and intellectual property management, mainly because there are unclear government policies, conflicting laws and institutional regulations and a disparity between government and institutional policies. Higher learning institutions in Malaysia are thus urged to incorporate intellectual property awareness in their courses and facilitate the registration process so as to cultivate a culture of intellectual property awareness among lecturers. In order for this country to improve its research commercialisation, it is crucial that government bodies and academic institutions work together more closely. They must develop clearer policies and guidelines with regard to commercialising research (Naqiyuddin et al., 2016; Sattiraju et al., 2022; Suominen & Deschryvere, 2024). One means by which Malaysian universities can effectively exploit their research and development activities is for them to strengthen their policies relating to intellectual property. In order to make the most of the commercial potential of research undertaken by Malaysian academics, this country can expect long-term benefits (Abd Rahim et al., 2021).

Intellectual property has to be effectively used and properly protected in order to allow research to be transformed into wealth. Researchers need to have the intellectual property skills to be able to secure patent and licensing agreements which are key to the commercialisation of their research findings. This requires researchers to be more than just good at doing research (Habidin et al., 2024).

### *University-Industry Collaboration (UIC)*

The collaboration efforts between universities and industry area can bring numerous economic and innovative benefits but, in some cases, these cooperations are limited by the differing objectives and goals of the two entities (Mascarenhas et al., 2024). Nevertheless, the outcome is that technology is transferred, and this helps in turning the results of research into products that are commercially available. Research based and practical approaches to product development by the academic and industrial communities have combined to bring new products and technologies into existence (Leitner et al., 2021). In the Malaysian context, UIC plays a pivotal role in the nation’s aspiration to transition towards a knowledge-based economy, with universities and industries actively engaging in joint research and development (R&D), knowledge sharing, and technology commercialisation activities. Research in Malaysian universities is increasingly being exploited by the creation of Technology Transfer Offices and supportive policies to facilitate the exploitation of research findings (Ramli & Senin, 2021). Significant obstacles persist mainly due to the varied corporate cultures of the partner companies, the relatively low level of industry readiness and a requirement for enhanced

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communication and mutual trust between the partners. In university-industry collaboration in several countries (Aziz; & Rajiani, 2020; Kotiranta et al., 2020; Xia & Jia, 2023) not only have made a significant impact for both the universities and the industrial section, in fact it has open a new perspective for these sectors. The benefits in these collaborations include the possibility of the exchange of information and also enable each partner to acquire skills from the other. Effective of University Industry Collaboration (UIC) are characterised by mutual understanding, shared targets and a strategic alignment of the skills and resources of the universities with the needs of industry; this often being supported by government policies and other incentives that target innovation. This approach could lead to a situation whereby Malaysian industry, particularly Small and Medium Enterprises (SMEs), would have access to cutting-edge technologies that would enhance their competitiveness in both domestic and international markets (Shaaran et al., 2021; Yoo & Jung, 2024). In conclusion, the commercialisation of research results through the UICs could bring about substantial economic and technological advancement to Malaysia, provided that industrial and academic partners can continue to overcome the challenges they face.

Despite industry-university collaboration providing access to new knowledge and resources, the effectiveness of partnerships is dependent on researchers being able to access and use intangible assets such as expertise and also to develop and maintain trust relationships, both of which are skills of researchers (Plata, 2024).

***Market Validation***

It is essential to test and verify commercial potential of research findings prior to them being taken to market. This involves checking that there is demand for the innovation and that it can be manufactured and sold. The process involves researchers and institutions identifying how the competitive environment, customer needs and market conditions influence market potential (Latif et al., 2004). In line with the Malaysian Ministry of Science, Technology and Innovation's (MOSTI) initiatives the country has been concentrating on bridging the gap between its scientific research and industry since 2015 with the Malaysia Education Plan 2015-2025 (MOHE, 2015). This is aligned with the policy in order to benefit from recent technological advancements businesses and commerce need thorough market research to spot and profit from technology transfer possibilities (Azlin et al., 2023; Ismail et al., 2015). Research and development investments in Malaysia have a low commercialisation output, with academic inventions being taken to market to a limited extent. This lack of market assessment and validation is attributed to the fact that most of the products launched were not subjected to rigorous market analysis and validation. Researchers can assess demand for their products, adjust their product to suit market requirements, reduce the risks associated with the commercialisation process and secure investment through collaboration with industry partners in bridging the gap between research and industry (Guindalini et al., 2021). Malaysian institutions of higher learning should ensure their strategies and business planning includes intellectual property management. This approach will facilitate co-operation. By helping them translate research into products and services which meet both global and local needs, the centre will be useful (Ramli et al., 2021). In order to ensure that commercial settings successfully adopt and sustain research results, it is vital that market validation is used. This is particularly relevant in Malaysia where a key aim is for academia and industry to work together to drive national development and economic growth. When researchers work closely with the market to identify needs and participate in activities to validate their research, the chances of

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commercial success increase. This is especially true when they are actively involved in stakeholder engagement and market discovery.

***Researcher Expertise***

While expertise of the researcher is essential for taking research out of laboratories and making it commercially viable, it has a vital role to play in the business and economic exploitation of research from universities. Currently in Malaysia the transfer of technology and commercialisation of academic research is in the initial stages of development; thus, a university researcher needs both technical skills and also business skills to assist with the commercialisation of research(Ramli et al., 2021). Academics with expertise in commercialisation alongside their subject can bring products from the laboratory to the market, facilitating socio-economic growth and furthering the Malaysian knowledge economy. The skills and expertise required for this position involve experience with the management of intellectual property, the knowledge of partnerships between the industry and the university, and a keen ability to engage in spin-offs, exhibition and licensing of new innovative products. In Malaysia, despite government initiatives such as the Malaysian Education Development Blueprint and efforts by the Ministry of Higher Education to promote the commercialisation of research, industry's perception of research is still unsatisfactory (Choo Ta et al., 2024; Malaysia Education Blueprint 2015-2025 (Higher Education), 2015; Suhaimi et al., 2020). Researchers with knowledge of commercialisation can strengthen university-industry collaboration (Biranvand, 2020; Dolmans et al., 2021). They bridge the gap between industry and university by improving awareness of innovations and working to translate research into commercially viable products with this collaboration. It is essential for Malaysia to strengthen its commercialisation research capabilities in order to maximise the potential of its research. In order to sustain such training programs, they are going to have to receive ongoing education and be supported by industry and governments. This support will result in a climate in which sustainable development and innovation can thrive.

***Theoretical Foundation***

The theoretical framework adopted in this research is based on the Knowledge Spillover Theory of Entrepreneurship (KSTE). According to the knowledge transfer theory, universities and research institutions produce knowledge and academics who are involved in the process of innovation. These academics transfer their knowledge to entrepreneurs who then turn this knowledge into wealth and businesses (Acs et al., 2013). Innovation is a socially embedded process and KSTE argues that knowledge transfer can be understood as a process that is full of transaction costs and uncertainty. This process is often spotted by entrepreneurs who are then able to convert them into profitable business opportunities. The outcome of this situation is the fact that knowledge is commercially exploited which could otherwise have gone unused. Key in Malaysia is the development of knowledge science and technology infrastructure. The government has taken a number of steps aimed at boosting innovation within the country through a variety of projects. The key priorities are strengthening the transfer of knowledge technology, safeguarding intellectual property and facilitating partnerships between industry and the universities. The effective use of the research undertaken at a university relies on a number of factors. These networks of universities with industry, where collaborative R&D projects are undertaken, ensure that research expertise is translated into viable products and services (Habidin et al., 2024; Suhaimi et al., 2020). In these connections, the researchers not only create knowledge but also play a role in its commercialisation and in the creation of

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businesses. The Malaysian government's national science, technology and innovation policy runs from 2021 to 2030 (Ministry of Science Technology and Innovation, 2021). The government's strategy is to use technological advancement to strengthen the country's competitiveness and to aid the economic growth. A study aimed at furthering the commercial application of research undertaken by universities, while also helping a country's overall competitiveness globally, suggests collaboration between industry and academia. The research groups would have access to marketing advice, technology, strategic intellectual property management and collaborative networks. This concept is helped by the knowledge spillover theory of entrepreneurship; this theory provides a conceptual framework for an understanding of and an improvement in innovation policy execution, in entrepreneurial efforts and in the knowledge creation processes occurring in Malaysia.

The commercialisation of scientific and technical knowledge at universities is not seen as occurring until the process of knowledge transfer has taken place and the knowledge has been utilised by individuals or firms who can successfully convert the knowledge into marketable products or services (Audretsch et al., 2025).

Research into university technology transfer has highlighted the important role of university managers in facilitating interactions between academic and industry personnel. While institutional mechanisms such as technology transfer offices (TTOs), intellectual property management and university-industry collaboration are important, they are not sufficient on their own to ensure successful technology transfer (Abid et al., 2025; Padilla et al., 2023). For knowledge spillovers to manifest in commercially viable products or services they have to trigger these processes. Research commercialisation in universities is shaped by the way that internal and external institutional factors interact with researchers. The interaction is described as a process of mediation by the skill and expertise of the researcher. This skill enables the university research to be converted into economic benefits.

**Conceptual Framework**

This paper examines the interplay between institutional and individual factors which effect the commercialisation of university research. This is viewed through the prism of the Knowledge Spillover Theory of Entrepreneurship. The process of translating scientific research into marketable products can be described as both the transfer of technology and the indirect influence of research on industries.

This study views the researcher's expertise as a key element which enables actual business results as a result of institutional support and a supportive infrastructure (Meissner & Shmatko, 2017). It is the researcher's initiative and skills in commercialising their work that will ultimately activate structures for collaboration between industry and universities, or access to resources from offices dealing with intellectual property. Research findings show that innovation can only occur when researchers effectively interact with the market, find funding and transfer their knowledge to a more practical context (Khademi & Ismail, 2013). Collaboration between researchers and external parties can enhance the efficiency of technology transfer as demonstrated by several recent studies. The study has shown that the technology transfer process is increased when universities and researchers are flexible and when they cooperate with outside organisations. By considering the researcher's perception of the university's environment and the commercialisation of their research, the output should be able to more accurately determine the creation of a new business (Audretsch et al., 2025). The

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mediation effect of the researcher's commercial expertise on the influence of institutional factors on the commercialisation of research is an important area of investigation.

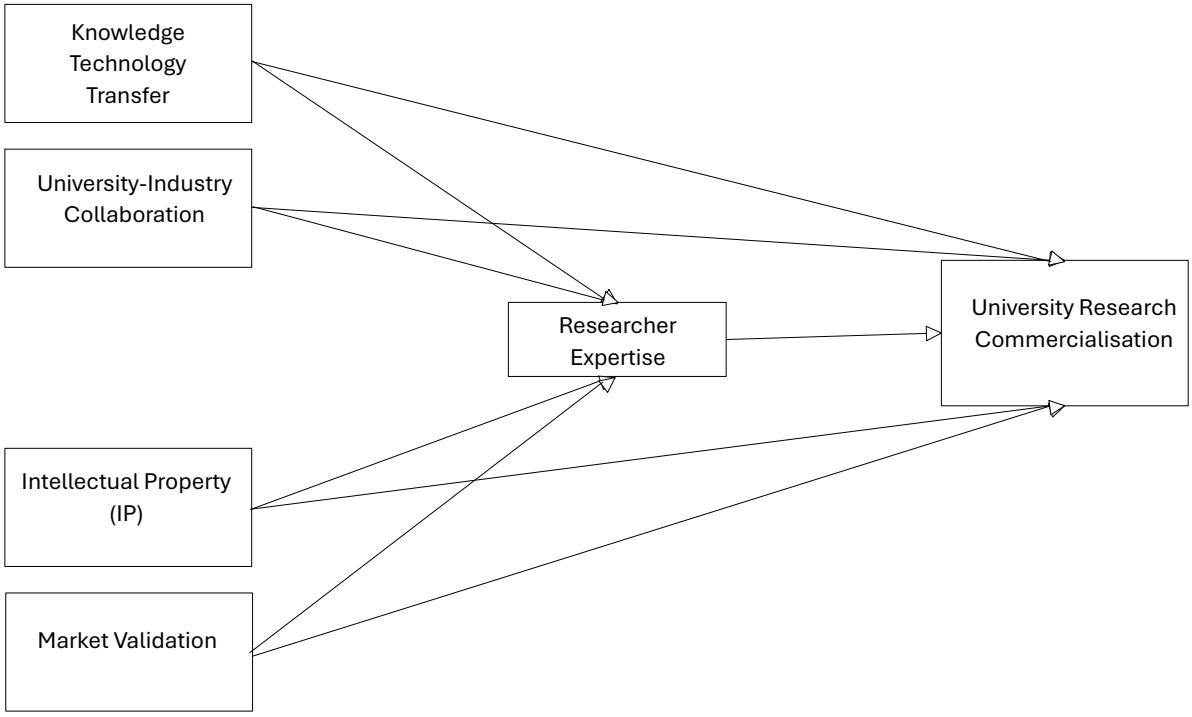


**Figure 1: Proposed Research Framework**

The Figure 1 shows the proposed conceptual model. It consists of four independent variables (IVs): Knowledge and Technology Transfer (KTT), Intellectual Property (IP) Management, University-Industry Collaboration (UIC), and Market Validation (MV). These are proposed to influence the dependent variable (DV), University Research Commercialisation (URC), both directly and indirectly through the mediating.

## Conclusion

A connection between various institutional facilitators and the effective transfer of technology from the university to industry is crucial. These facilitators include knowledge transfer, intellectual property management, the collaboration of university and industry and market validation. The Spillover Theory of Entrepreneurship is significantly enhanced by human capital, which transforms educational knowledge into viable business opportunities. Understanding the processes involved here is vital for practical purposes and in theory, it shows how individuals facilitate the sharing of information and provides a real framework that policy makers and universities can use. By introducing tailored training, matching reward schemes to stimulate business ventures and through industry involvement via liaison officers and market-led legislation, institutions can greatly enhance their innovative performance. The system has the potential to facilitate the commercialisation of research in Malaysia and the strengthening of global policies to support academics who are innovators in the innovation system.

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EISSN: 2637-0905
Volume: 8 Issue: 29 (March 2026) PP. 37-50

## References

Abd Rahim, N., Mohamed, Z. B., & Amrin, A. (2021). From lab to market: Challenges faced by academic entrepreneur in technology transfer pursuit. *International Journal of Business and Society*, *22*(3), 1256–1268. https://doi.org/10.33736/ijbs.4300.2021

Abid, N., Cunningham, J. A., & Perea-Vicente, J. (2025). A thematic review of 45 years of The Journal of Technology Transfer. *The Journal of Technology Transfer*, *50*, 1739–1784. https://doi.org/10.1007/s10961-024-10154-x

Acs, Z., Audretsch, D., & Lehmann, E. (2013). The Knowledge Spillover Theory of Entrepreneurship. *Small Business Economics*, *41*, 757–774. https://doi.org/10.1093/acprof:oso/9780195183511.003.0003

Audretsch, D., Belitski, M., & Fiedler, A. (2025). The knowledge spillover theory of entrepreneurship and innovation : taking stock and new directions. *The Journal of Technology Transfer*.

Aziz;, N. I. S. K. A. S. A., & Rajiani, I. (2020). From Innovation To Market: Integrating University And Industry Perspectives Towards Commercialising Research Output. *Forum Scientiae Oeconomia*, *8*(4), 5–18. https://doi.org/10.23762/Fso_vol8_no4_6

Azlin, N., Zaki, M., Rahman, A., Rahim, A., & Hashim, F. M. (2023). *Effective Process of Commercialization at the Research Institutions in*. *1*(1), 45–57.

Battaglia, D., Paolucci, E., & Ughetto, E. (2023). Hurdles in University-Industry Technology Transfer: Why Research-Based Inventions are Not Transferred to the Market? *IEEE Transactions on Engineering Management*, *PP*, 1–13. https://doi.org/10.1109/TEM.2023.3269731

Bereuter, T., Dvořáková, A., & Rudyk, I. (2023). Market Success for Inventions: Patent Commercialization Scoreboard and Innovation Support. *Management for Professionals*, *Part F285*, 355–373. https://doi.org/10.1007/978-3-031-16993-9_19

Biranvand, A. (2020). Factors affecting knowledge commercialisation in university: A case study. *DESIDOC Journal of Library and Information Technology*, *40*(2), 421–430. https://doi.org/10.14429/djlit.40.02.14829

Choo Ta, G., Abdul Halim, S., Amir Sultan, M. M., Razali, W. D., Mokhtar, M., & Komoo, I. (2024). Journey of a university research institute: transition from multi-disciplinary to inter-disciplinary research in supporting sustainable development goals (SDGS). *International Journal of Sustainability in Higher Education*. https://doi.org/10.1108/IJSHE-01-2024-0009

Dolmans, S. A. M., Walrave, B., Read, S., & van Stijn, N. (2021). Knowledge transfer to industry: how academic researchers learn to become boundary spanners during academic engagement. *Journal of Technology Transfer*, *47*(5), 1422–1450. https://doi.org/10.1007/s10961-021-09882-1

Dzakiy, U. N., Simatupang, T. M., & Prasetio, E. A. (2023). Factors, Routes, and Existing Theories of Technology Commercialization in University: A Conceptual Framework. *STI Policy and Management Journal*, *8*(1), 83–104. https://doi.org/10.14203/stipm.2023.365

Feldman, M. P. (2014). *Entpreprenerial Universities and Technology Transfer : A Conceptual Framework for Understanding Knowledge-Based Economic Development Entpreprenerial Universities and Technology Transfer : A Conceptual Framework for Understanding Knowledge-Based Economic D. January 2006*. https://doi.org/10.1007/s10961-005-5029-z

Guindalini, C., Verreynne, M. L., & Kastelle, T. (2021). Taking scientific inventions to market: Mapping the academic entrepreneurship ecosystem. *Technological Forecasting and Social Change*, *173*, 121144. https://doi.org/10.1016/j.techfore.2021.121144

Habidin, N. F., Nur, S., & Yahaya, A. (2024). *Intellectual Property and Academia Commercialization in Malaysia*. *14*(8), 172–186. https://doi.org/10.6007/IJARBSS/v14-i8/22241

Ismail, N., Nor, M. J. M., & Sidek, S. (2015). A Framework for a Successful Research Products Commercialisation: A Case of Malaysian Academic Researchers. *Procedia - Social and Behavioral Sciences*, *195*(July), 283–292. https://doi.org/10.1016/j.sbspro.2015.06.163

Khademi, T., & Ismail, K. (2013). Commercialization success factors of university research output. *Jurnal Teknologi (Sciences and Engineering)*, *64*(3), 137–141. https://doi.org/10.11113/jt.v64.2284

Khademi, T., Ismail, K., Lee, C. T., & Shafaghat, A. (2015). Enhancing Commercialization Level of Academic Research Outputs in Research University. *Jurnal Teknologi*, *4*, 141–151.

Kim, J. K., & Cho, K. T. (2022). Effects of Technology Commercialization Proactiveness on Commercialization Success: The Case of ETRI in Korea. *Sustainability (Switzerland)*, *14*(12). https://doi.org/10.3390/su14127056

Kotiranta, A., Tahvanainen, A., Kovalainen, A., & Poutanen, S. (2020). Forms and varieties of research and industry collaboration across disciplines. *Heliyon*, *6*, e03404. https://doi.org/10.1016/j.heliyon.2020.e03404

Lee, K., & Jung, H. J. (2021). Does TTO capability matter in commercializing university technology? Evidence from longitudinal data in South Korea. *Research Policy*, *50*, 104133. https://doi.org/10.1016/j.respol.2020.104133

Leitner, K. H., Bergner, S., & Rybnicek, R. (2021). The role of heads of departments in the commercialization of university research. *Journal of Business Economics*, *91*(3), 353–378. https://doi.org/10.1007/s11573-020-01003-y

LiXi, W., & Rahman, F. A. (2024). New Media's Influence in Shaping Political Awareness, Attitudes and Behaviours: The Media Literacy as a Moderator and Peer Influence as a Mediator. *International Journal of Advanced Research in Education and Society*, *6*(2), 266–279. https://api.semanticscholar.org/CorpusID:270897261

*Malaysia Education Blueprint 2015-2025 (Higher Education)*. (2015). www.moe.gov.my

Mascarenhas, C., Mendes, T., Galvão, A. R., Marques, C. S., & Ferreira, J. J. (2024). Academic researchers' motivations to engage in university–industry collaboration in cross-border regions. In *Journal of Technology Transfer* (Issue 0123456789). Springer US. https://doi.org/10.1007/s10961-024-10082-w

Meissner, D., & Shmatko, N. (2017). "Keep open": the potential of gatekeepers for the aligning universities to the new Knowledge Triangle. *Technological Forecasting and Social Change*, *123*, 191–198. https://doi.org/10.1016/j.techfore.2016.03.012

Mensah, G. B. (2023). *Monetizing Research in the 21st Century: The Commercialization of Industrial and Social Sciences*. *November*. https://doi.org/10.13140/RG.2.2.36809.52328

Ministry of Science Technology and Innovation. (2021). National Science, Technology and Innovation Policy 2021-2030. *Ministry of Science, Technology and Innovation*, 1–24.

Miranda, F. J., Pérez-Mayo, J., García-Gallego, J. M., Valero-Amaro, V., & Rubio, S. (2021). An assessment of the determinants of licensing of university patents: a survey of Spanish universities. *Academia Revista Latinoamericana de Administracion*, *34*(3), 478–492. https://doi.org/10.1108/ARLA-07-2020-0162

MOHE. (2015). *Malaysia Education Blueprint*. *1*(1), 1–40. https://doi.org/10.1088/1751-8113/44/8/085201

Naqiyuddin, A., Rahman, A., Rauf, A., Jaafar, R., Mohd Idris, M. F., Abd Majid, Z., & Mohd Rom, K. B. (2016). Commercialisation Activities in Malaysian Universities : Issues and Challenges. *Journal of Administrative Science*, *13*(2), 2007–2010. https://jas.uitm.edu.my/index.php/14-archieve-2015/38-volume-13-no-2-dec-2016

Padilla, B., Sossa, J. W. Z., Ocampo-l, C., & Ramírez-Carmona, M. (2023). University Technology Transfer from a Knowledge-Flow Approach — Systematic Literature Review. *Sustainability*, *15*(6550), 1–21.

Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A., & Sobrero, M. (2013). Academic engagement and commercialisation: A review of the literature on university-industry relations. *Research Policy*, *42*(2), 423–442. https://doi.org/10.1016/j.respol.2012.09.007

Plata, C. (2024). Innovation investment and performance: the moderating role of university collaborations. *Journal of Management History*. https://doi.org/10.1108/JMH-09-2023-0100

Ramli, M. F., Majid, M., Ya'acob, F. F., & Badyalina, B. (2021). Barrier Towards Commercialisation of Research Findings Among Science and Engineering Academicians at Malaysian Public Universities. *International Journal of Academic Research in Business and Social Sciences*, *11*(7). https://doi.org/10.6007/ijarbss/v11-i7/10020

Ramli, M. F., & Senin, A. A. (2021). Factors Affecting Effective University-Industry Collaboration During the Development Research Stage. *International Journal of Management Studies*, *28*(2), 127–159. https://doi.org/https://doi.org/10.32890/ijms2021.28.2.6

Sapah, R. M., Ali, M. H., & Ibrahim, R. (2022). *Critical Factors in Technology Transfer Office ( TTO ) Process That Support Successful Technology Transfer Within Research Universities ( RUs )*. *4*(3), 42–50.

Sattiraju, V. K., Pandey, R., Pallela, R., Sircar, A., Ligade, V. S., Muragundi, P. M., & Janodia, M. D. (2022). Intellectual property rights policies of higher education institutions (HEIs) in India: a cross-sectional study. *Journal of Science and Technology Policy Management*, *13*(4), 837–848. https://doi.org/10.1108/JSTPM-01-2021-0002

Shaaran, S., Fansuree, E., & Ngah, R. (2021). *Conceptualizing Entrepreneurial Orientation and Organizational Performance of SME Firms : Organizational Culture as Antecedent and Innovation Management as Moderator*. *7*(2).

Shahidan, N. H., Abdul Latif, A. S., & Abdul Wahab, S. (2019). The Need for a University Start-up Framework for Commercialisation of Intellectual Property Rights (IPR): A Malaysia Perspective. *Sustainable Business and Society in Emerging Economies*, *1*(2), 123–134. https://doi.org/10.26710/sbsee.v1i2.1112

Shamsir, M. S., & Abd Jamil, A. (2019). Escaping the Middle Innovation Trap: Case Studies of Two Successful Spin-off Companies from a Malaysian Research University. *Journal of Research Management & Governance*, *2*(1), 10–21. https://doi.org/10.22452/jrmg.vol2no1.2

Singh, A. K., & Kumar, S. (2022). Expert's Perception on Technology Transfer and Commercialization, and Intellectual Property Rights in India: Evidence from Selected Research Organizations. *Journal of Management, Economics, and Industrial Organization*, *6*(1), 1–33. https://doi.org/10.31039/jomeino.2022.6.1.1

Suhaimi, N. S., Abdul Halim, M. A. S., & Hashim, H. A. (2020). Commercialization of academic research: assessing the perception of academicians at a public university in Malaysia. *Journal of Applied Research in Higher Education*, *14*(1), 59–76. https://doi.org/10.1108/JARHE-04-2020-0071

Suominen, A., & Deschryvere, M. (2024). Barriers to immaterial property rights development in research organizations: an explorative study from Finland. *Journal of Technology Transfer*, *0123456789*. https://doi.org/10.1007/s10961-024-10062-0

Sutopo, W., Khofiyah, N. A., Hisjam, M., & Ma'aram, A. (2022). Performance Efficiency Measurement Model Development of a Technology Transfer Office (TTO) to Accelerate Technology Commercialization in Universities. *Applied System Innovation*, *5*(1). https://doi.org/10.3390/asi5010021

Szulczewska-Remi, A., & Nowak-Mizgalska, H. (2023). Who really acts as an entrepreneur in the science commercialisation process: the role of knowledge transfer intermediary organisations. *Journal of Entrepreneurship in Emerging Economies*, *15*(1), 1–31. https://doi.org/10.1108/JEEE-09-2020-0334

Tweheyo, G., Abaho, E., & M Verma, A. (2022). The Commercialisation of University Research Outputs: A Review of Literature. *Texila International Journal of Management*, *8*(2), 144–162. https://doi.org/10.21522/tijmg.2015.08.02.art012

Wekesa, M., Mikinyango, A., Okayo, A., Wekesa, K., & Sikuku, J. W. (2024). *Commercialization of Intellectual Property Rights at Universities as an Additional Revenue Stream*. *3*(3), 37–49. https://doi.org/10.56397/LE.2024.03.06

Xia, Y., & Jia, Y. (2023). The impact of industry-university-research projects on biopharmaceutical companies' innovation performance: moderating roles of government subsidies for innovation. *Frontiers in Public Health*. https://doi.org/10.3389/fpubh.2023.1271364

Yoo, H. S., & Jung, Y. L. (2024). The Effect of the Commercialization Failure of SMEs' R&D on Survival. *IEEE Transactions on Engineering Management*, *71*, 6078–6089. https://doi.org/10.1109/TEM.2024.3378690

Zarea, F., Douglas, E. J., Obschonka, M., Davidsson, P., Audretsch, D. B., & Hutmacher, D. W. (2025). When the marketplace comes to the research laboratory : technology transfer efficiency of innovation - driven publicly funded research centers. *The Journal of Technology Transfer*, *50*, 2556–2586. https://doi.org/10.1007/s10961-025-10188-9

Zhou, J., & Wang, M. (2023). Technology in Society The role of government-industry-academia partnership in business incubation : Evidence from new R & D institutions in China. *Technology in Society*, *72*, 102194. https://doi.org/10.1016/j.techsoc.2022.102194