



How to cite this article:

Yaacob, N. A., Sarkam, S. F., & Othman, S. N. (2017). Academic Researchers Motivation Factors: A Conceptual Framework. *Journal of Technology and Operations Management*, 12(1), 1–10. <https://doi.org/10.32890/jtom2017.12.1.1>.

ACADEMIC RESEARCHERS MOTIVATION FACTORS: A CONCEPTUAL FRAMEWORK

¹Noorulsadiqin Azbiya Yaacob, ²Saida Farhanah Sarkam, & ³Siti Norezam Othman³

^{1,3}School of Technology Management and Logistics, Universiti Utara Malaysia, Sintok, Kedah, Malaysia

²Faculty of Business Management, Universiti Teknologi MARA Pahang, Raub, Pahang, Malaysia

Corresponding author: sadiqin@uum.edu.my

Received: 1/12/ 2016 **Revised:** 5/02/2017 **Accepted:** 4/04/2017 **Published:** 27/06/2017

ABSTRACT

The Malaysian government has been striving to provide an environment conducive to research commercialisation in the country. Despite the efforts, the targeted research commercialisation rate has yet to be achieved. This paper explores the motivation of the academic researchers who had successfully commercialised their research. Literature classifies motivation factors as extrinsic, intrinsic, and prosocial, which might exist independently or in a combination (mixed-motivation). Within the academic research commercialisation context, a considerable number of existing studies have discussed the role of extrinsic motivation factors, while the issues of intrinsic and prosocial factors have not been much studied. Thus, this study proposed a conceptual framework to further understand the role of each motivation factor as well as the role of mixed-motivation factors among academic researchers who had successfully commercialised their research results. Finally, this research enriches the dearth of research commercialisation literature in Malaysian university settings.

Keywords: Academic research commercialisation, extrinsic motivation factors, intrinsic motivation factors, prosocial motivation factors

INTRODUCTION

Malaysia is a developing country that aims to achieve developed and high-income status by the year 2020. This vision has long been emphasised on research and development (R&D) activities in the country's five-year development plans; in fact, the first Science and

Technology (S&T) Plan for the country was implemented since 1986. The country's research investment had grown bigger over the years although the amount was reportedly lower than other developing countries. The Gross Expenditure on Research and Development (GERD) in 2006 was RM3.6 billion, which was equal to 0.64 percent of the country's Gross Domestic Product (GDP) (OECD, 2013).

The ratio of GERD to GDP is an important indicator to measure the intensity of R&D investment in a country. However, the GERD ratio declined to 0.21 percent in 2008, perhaps due to the global economic crisis. In the same year, the country had begun implementing a number of innovation blueprints, including the National Innovation Agenda and the New Economic Model (AIM, 2011; EPU, 2010). At that time, the government realised the need to leverage its level of research commercialisation in order to spur the planned innovation agenda accordingly. As a result, the GERD ratio escalated by 23.2 percent to 1.01 percent in 2009 (MASTIC, 2013). It was a major breakthrough in research investment by the country as the Tenth Malaysia Plan aimed to achieve a lower number (1.0 percent of GERD), by the year 2015 (EPU, 2006; 2010). This commitment shows the seriousness of the Malaysian Government in intensifying R&D activities in the country. By injecting such investment, the government aims to get back some returns on the R&D investment, especially from the commercialised research university inventions.

Statement of the Problem

The Malaysian government has taken many initiatives to improve the research commercialisation rate in the country. In 2009 for example, they enacted the Intellectual Property Law as a notable step in facilitating the academic researchers to protect their inventions from being imitated by others. The gazetted law also addresses the issues of wealth distribution for the inventors and the incentives for invention disclosures. The inventors might receive up to RM10,000 for each patent granted and a lucrative percentage out of the revenues garnered from an invention, which ranged from below RM250,000 to above RM5 million (MOSTI, 2009). The rewarding offers are worthwhile for those scientists as a payback for their years of hard work on their inventions.

At the same time, the Ministry of Higher Education (MOHE) is working hard to encourage the rate of university research commercialisation activities by tabling the National Higher Education Plan, which lists targeted outcomes on research commercialisation rate and other indicators from 2007 to beyond 2020 (MOHE, 2007). However, while the government has taken a lot of initiatives and provided incentives that are worth billion ringgit of spending, the desired commercialisation performance has not been fully achieved yet. For example, the first phase of the MOHE's plan (2007–2010) had targeted a university research commercialisation rate of five percent by the year 2010. However, the actual rate reviewed was only three percent. The figure was alarming as the second phase target of the plan (2011–2015) is eight percent. The actual figure might explain that the academic researchers were not being motivated by the external rewards only per se. They might be motivated by other factors that have not been included in the Intellectual Property Policy. Thus, other academic researchers and the policy makers can learn from the academic researchers whom had successfully commercialised their research results on the motivation factors that drove them to commercialise.

Based on the literature review, most of the academic research commercialisation studies concern more on the first type of motivation factors, which are extrinsic motivation factors in commercialising their research results (Baldini, Grimaldi, & Sobrero, 2007; Göktepe-Hulten & Mahagaonkar, 2010) and less number of studies has discussed the second type of motivation factors, which are the intrinsic motivation factors. The third type of motivation factor, is prosocial motivation, is defined as doing things for others. It is a crucial component in research commercialisation activities because the outputs from research grants, which are the tax-payers money, should be beneficial to the society (Grant & Berry, 2011; Grant, 2008; Lam, 2011; Lindenberg, 2001). The lack of research on prosocial motivation makes it a good avenue to be researched on (Lam, 2011). The remaining questions are therefore: How to encourage academic researchers to commercialise their research results? What are the motivation factors that could encourage academic researchers to commercialise their research results?

LITERATURE REVIEW

Researchers' motivation factors

The importance of academic researchers' motivation in accelerating research commercialisation activities is extensively debated in the literature. Motivation is one of the important factors to assess the academics' productivity as discussed by Bland and her team (2002). This is also in line with Ambos and her team (2008) who emphasise that individual motivation is vital in generating commercially potential outputs. Other than that, institutional factors might also influence the academic research commercialisation activities, but the utmost important factor is from the individuals themselves, including their motivations to commercialise (D'Este & Patel, 2007; Göktepe-Hulten & Mahagaonkar, 2010).

Furthermore, there is an emerging pattern of literature on studying researchers' motivation in research commercialisation field of study (Baldini *et al.*, 2007; Baldini, 2010, 2011; Göktepe-Hulten & Mahagaonkar, 2010; Lam, 2011; Sauermann & Roach, 2012; Tartari & Breschi, 2012). The taxonomies of literature and meta-analysis works also agree that researcher's motivation is an avenue for further researches (Baycan & Stough, 2012; Markman *et al.*, 2008; Rothaermel *et al.*, 2007).

According to Deci and Ryan (2000), there are two types of motivations that move people to do something. The motivation can be extrinsic motivation or intrinsic motivation. Extrinsic motivation is driven by the external factors, other than the self-factor while intrinsic motivation is innate-driven and from the self-factor of a person. On the other hand, prosocial motivation can be defined as the aspiration to assist other people. It can be driven extrinsically or intrinsically from one-self (Grant & Berg, 2010). In this study, there are only three types of motivation factors that being discussed, even though there are a lot of motivation typologies existed in other motivation theories out there.

Extrinsic motivation

Extrinsic motivation is the driver for people to do something as a response to external factors, other than the self-factor, such as pecuniary and nonpecuniary rewards (Amabile, Hill, Hennessey, & Tighe, 1994). Pecuniary or financial rewards for academic research commercialisation activities include personal earnings, royalty payments, salary increment,

commission, prize money, and consulting and speaking fees. Researchers, like any other human beings, love to have more money. They patent for the patent royalties and publish papers in the return of salary increment. Moreover, the number of citations is equal to some amount of monies.

In this new era, academic science has become a vehicle of commercial activity. The curiosity of scientific research becomes less important factor compared to the marketability and applicability (Walsh & Hong, 2009). The incentivising culture in the university is often needed to attract researchers' involvement in commercialising the embryonic technologies from the lab to the market. These daunting tasks are worthwhile at the expense of handsome monetary rewards for the academic researchers (Geuna & Muscio, 2009; Jensen & Thursby, 2001; Markman *et al.*, 2008). Scholars have proved that there is a positive relationship between financial rewards and academic research commercialisation (Jensen *et al.*, 2003; Lach & Schankerman, 2008; Owen-Smith & Powell, 2001; Thursby *et al.*, 2001).

The career rewards are also an appealing factor. This factor includes intangible returns such as reputation, job promotion, and prestige to expand research careers of the researchers. Decades ago, scientists rushed for the recognition of their discovery. The best reward was when they were heading anyone else. To some extent, 'winning the game' means they were the winner and everybody else was the loser (Stephan & Levin, 1992). Mertonian ethos introduced the 'priority-recognition reward system' that encourages scientists to share their findings and contribute to the body of scientific knowledge (Merton, 1957). The 'economics of science' has driven academics to cash-in their career rewards for money, such as the recognition of scientific community that makes them getting the prize money, i.e., the prize values "several years' salary come at once" (Bains, 2005; Lam, 2011; Stephan & Levin, 1992; Stephan, 1996).

However, several scholars conclude that there is no positive effect of financial rewards to the academic researchers. Some researchers prefer to get access to industry resources than the personal monetary incentives. The resources include additional research funds, the sponsored research, industry facilities (i.e., laboratories and equipment), and skills from the industry (Baldini, 2010, 2011; Colyvas *et al.*, 2002; Markman *et al.*, 2004). They are not very keen on being entrepreneurs or leaving the academia to join the company, but they are interested with the abovementioned benefits in order to develop their research further for their career reputation (Bengtsson, Nilsson, & Rickne, 2009; D'Este & Perkmann, 2010; Fini *et al.*, 2009).

Intrinsic motivation

Even though the university management is motivated with the commercialisation revenues, not all academic researchers have the same motivation factors. As suggested by Rosenberg (1974), the university scientists are 'independent from economic needs'. Some academic researchers are genuinely motivated by the accomplishment of their research -from the prototype to the end-product, and from the lab to the end-user (Göktepe-Hulten & Mahagaonkar, 2010; Thursby & Thursby, 2002).

This is where the innate-driven, intrinsic motivation should become the next focus in accelerating the academic research commercialisation activities. Intrinsic motivation is the driver for people to do something from their heart and for their own sake, which may create self-satisfaction and enjoyment (Amabile *et al.*, 1994; Lindenberg, 2001). Intrinsic

motivation is a classic term in motivation theories, and it has been used in other fields of research including education, parenting, and work productivity (Deci & Ryan, 2000; Grant, 2008; Lindenberg, 2001). There is not much literature discussing intrinsic motivation factors on academic research commercialisation as compared to the extrinsic motivation studies.

Prosocial motivation

Prosocial motivation is different from intrinsic motivation and extrinsic motivation. Prosocial motivation is in the middle of the two extremes as it can be internalised in different degrees, unlike, for example, the intrinsic motivation that already comes from internal (Grant & Berry, 2011; Grant, 2008; Lam, 2011). According to Grant and Berg (2010), prosocial motivation is an act of doing something with the desire to offer efforts to benefit others or with the intention of helping others (Grant & Berg, 2010). If the researchers are only intrinsically motivated, they will see the research “as an end in and of itself”, and they will not continue with the commercialisation process. Research commercialisation is an effort to contribute in regional economic development that benefits the society at the end of the process. It is almost the same as *public service*, which are intrinsic work attributes shared by many professional groups, as in the context of this study, the academic researchers (Andersen & Pallesen, 2008).

Researchers' mixed-motivation factors

A number of scholars have discussed the personal motivations in academic research commercialisation on the extrinsic motivation factors only (Baldini *et al.*, 2007; Colyvas *et al.*, 2002; Fini, Grimaldi, & Sobrero, 2009; Göktepe-Hulten & Mahagaonkar, 2010; Lach & Schankerman, 2008; Larsen, 2011; Markman *et al.*, 2004; Owen-Smith & Powell, 2001; Thursby *et al.*, 2001), while a few researches on intrinsic motivation in accelerating research commercialisation activity have been done (Bengtsson *et al.*, 2009; Ismail, Omar, & Majid, 2011; Lam, 2011). In addition, this present research initiates the discussion on the third type of motivation, the prosocial motivation driven by the need to fulfil necessity of others. The prosocial motivation is widely discussed in the literature from many other fields, but not in research commercialisation field (Lam, 2011).

CONCEPTUAL FRAMEWORK

The proposed conceptual framework (see Figure 1) for this study is developed based on the literature reviews and the elements of each motivation factors were taken from the past studies. The qualitative method is used in order to understand the complex phenomenon being investigated in depth, i.e., the motivation factors of academic research commercialisation.

Whilst previous literature discussed the three motivation factors independently, scholars argued that an individual's behaviour could be driven by more than one motivation at a time (Diefendorff & Chandler, 2010). Some literature also combines two of them (e.g., intrinsic-prosocial, or intrinsic-extrinsic motivation), but there is a dearth of study that combines three of them simultaneously (Benedetti, 2012).

Benedetti (2012) also argued that the mixed-motivation factors were much discussed in the Organisational Behaviour and Human Resource studies. However, some studies discussed the mixed-motivation not directly to the academic research commercialisation subject matter but

in innovation and entrepreneurship (Bhaduri & Kumar, 2009; de Jong, 2006; Zbierowski, Weclawska, Tarnawa, Zadura-lichota, & Bratnicki, 2012). These two fields are closely linked to the research commercialisation literature. Yet, the prosocial factor is still uncovered, and the mixed-motivation of the three motivation factors is understudied. Hence, this study tries to look on the mixed-motivation factors of the trio (extrinsic-intrinsic-prosocial) in driving academic researchers to commercialise their research results.

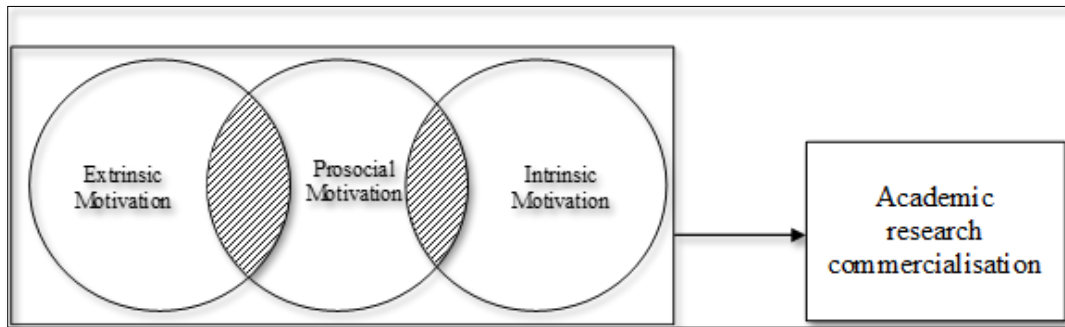


Figure 1. *The proposed conceptual framework*

CONCLUSION

This paper proposes the conceptual framework on understanding how the motivation factors encourage the academic researchers to successfully commercialise their research results. In order to answer “what had motivated” research questions, the researcher had to interview the academic researchers involved in successful commercialised research projects. By understanding those academic researchers’ motivation, the university administrators and policy makers could implement appropriate strategies to encourage the researchers to commercialise their research results.

Finally, the future studies can consider extending the discussions on the mixed-motivation factors in the academic research commercialisation activities. The mixed-motivation is an interesting topic not only to research in the technology management field but also in other fields such as organisational behaviour and human resource management. The occurrence of the three factors simultaneously or subsequently can be discussed further in future studies in other fields too.

ACKNOWLEDGMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

- AIM. (2011). *Innovating Malaysia* (p. 31). Cyberjaya, Selangor: Agensi Inovasi Malaysia.
- Amabile, T. M., Hill, K. G., Hennessey, B. A., & Tighe, E. M. (1994). The Work Preference Inventory: Assessing intrinsic and extrinsic motivational orientations. *Journal of Personality and Social Psychology*, 66(5), 950–67. Retrieved October 23, 2016, from <http://www.ncbi.nlm.nih.gov/pubmed/8014837>
- Ambos, T. C., Mäkelä, K., Birkinshaw, J., & D’Este, P. (2008). When does university research get commercialized? Creating ambidexterity in research institutions. *Journal of Management Studies*, 45(8), 1424–1447. doi:10.1111/j.1467-6486.2008.00804.x
- Andersen, L. B., & Pallesen, T. (2008). “Not just for the money?” How financial incentives affect the number of publications at Danish research institutions. *International Public Management Journal*, 11(1), 28–47. doi:10.1080/10967490801887889
- Bains, W. (2005). How academics can make (extra) money out of their science. *Journal of Commercial Biotechnology*, 11(4), 353–363. doi:10.1057/palgrave.jcb.3040137
- Baldini, N. (2010). Do royalties really foster university patenting activity? An answer from Italy. *Technovation*, 30(2), 109–116. doi:10.1016/j.technovation.2009.09.007
- Baldini, N. (2011). University patenting: Patterns of faculty motivations. *Technology Analysis & Strategic Management*, 23(2), 103–121. doi:10.1080/09537325.2011.543329
- Baldini, N., Grimaldi, R., & Sobrero, M. (2007). To patent or not to patent? A survey of Italian inventors on motivations, incentives, and obstacles to university patenting. *Scientometrics*, 70(2), 333–354. doi:10.1007/s11192-007-0206-5
- Baycan, T., & Stough, R. R. (2012). Bridging knowledge to commercialization: the good, the bad, and the challenging. *The Annals of Regional Science*. doi:10.1007/s00168-012-0510-8
- Benedetti, A. A. (2012). Event-level intrinsic, extrinsic, and prosocial motivation: Effects on well-being (unpublished doctoral dissertation). Buchtel College of Arts and Sciences, The University of Akron, Ohio, USA.
- Bengtsson, L., Nilsson, A. S., & Rickne, A. (2009, April). *Why and how do researchers engage themselves in commercialization of research?* Paper presented at the International Conference on Organizational Learning, Knowledge and Capabilities (OLKC). Amsterdam, the Netherlands.
- Bhaduri, S., & Kumar, H. (2009). *Tracing the motivation to innovate: A study of grassroot innovators in India*. Jena, Germany: Max Planck Institute of Economics.
- Bland, C. J., Seaquist, E., Pacala, J. T., & Finstad, D. (2002). One school’s strategy to assess and improve the vitality of its faculty. *Academic Medicine*, 77(5), 368–376.
- Colyvas, J., Crow, M., Gelijns, A., Mazzoleni, R., Nelson, R. R., Rosenberg, N., & Sampat, B. N. (2002). How do university inventions get into practice? *Management Science*, 48(1), 61–72.
- 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(9), 1295–1313. doi:10.1016/j.respol.2007.05.002

- D'Este, P., & Perkmann, M. (2010). Why do academics engage with industry? The entrepreneurial university and individual motivations. *The Journal of Technology Transfer*, 36(3), 316–339. doi:10.1007/s10961-010-9153-z
- De Jong, J. P. J. (2006). *The decision to innovate: Literature and propositions*. Zoetermeer, The Netherlands: SCientific AnaLysis of Entrepreneurship and SMEs (SCALES)
- Deci, E. L., & Ryan, R. M. (2000). The “ what ” and “ why ” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. doi:10.1207/S15327965PLI1104_01
- Diefendorff, J. M., & Chandler, M. M. (2010). Motivating Employees. In S. Zedeck (Ed.), *Handbook of Industrial and Organizational Psychology*. Washington, DC: American Psychological Association.
- EPU. (2006). *Ninth Malaysia Plan 2006-2010*. Putrajaya, Malaysia: Economic Planning Unit.
- EPU. (2010). *Tenth Malaysia Plan 2010-2015*. Putrajaya, Malaysia: Economic Planning Unit.
- Fini, R., Grimaldi, R., & Sobrero, M. (2009). Factors fostering academics to start up new ventures: An assessment of Italian founders' incentives. *Journal of Technology Transfer*, 34, 380–402. doi:10.1007/s10961-008-9093-z
- Geuna, A., & Muscio, A. (2009). The Governance of university knowledge transfer: A critical review of the literature. *Minerva*, 47(1), 93–114. doi:10.1007/s11024-009-9118-2
- Göktepe-Hulten, D., & Mahagaonkar, P. (2010). Inventing and patenting activities of scientists: In the expectation of money or reputation? *Journal of Technology Transfer*, 35(4), 401–423. doi:10.1007/s10961-009-9126-2
- Grant, A. M. & Berg, J. M. (2010). Prosocial motivation at work: How making a difference makes a difference. In K. Cameron and G. Spreitzer (Eds.), *Handbook of Positive Organizational Scholarship*. Oxford University Press.
- Grant, A. M. (2008). Does intrinsic motivation fuel the prosocial fire? Motivational synergy in predicting persistence, performance, and productivity. *Journal of Applied Psychology*, 93(1), 48–58. doi:10.1037/0021-9010.93.1.48
- Grant, A. M., & Berry, J. W. (2011). The necessity of others is the mother of invention: Intrinsic and posocial motivations, perpesctive taking, and creativity. *Academy of Management Journal*, 54(1), 73–96. doi:10.5465/AMJ.2011.59215085
- Ismail, K., Omar, W. Z. W., & Majid, I. A. (2011). The commercialisation process of patents by universities. *African Journal of Business Management*, 5(17), 7198–7208. doi:10.5897/AJBM09.255
- Jensen, R. A., & Thursby, M. C. (2001). Proofs and prototypes for sale: The licensing of university inventions. *American Economic Review*, 91(1), 240–259.
- Jensen, R. A., Thursby, J. G., & Thursby, M. C. (2003). Disclosure and licensing of university inventions : “ The best we can do with the s ** t we get to work with .” *International Journal of Industrial Organization*, 21, 1271–1300. doi:10.1016/S0167-7187(03)00083-3
- Lach, S., & Schankerman, M. (2008). Incentives and Invention in Universities. *RAND Journal of Economics*, 39(2), 403–433. doi:10.2139/ssrn.406921

- Lam, A. (2011). What motivates academic scientists to engage in research commercialization: “Gold”, “ribbon” or “puzzle”? *Research Policy*, 40(10), 1354–1368. doi:10.1016/j.respol.2011.09.002
- Lindenberg, S. (2001). Intrinsic motivation in a new light. *Kyklos*, 54(2/3), 317–342.
- Markman, G. D., Siegel, D. S., & Wright, M. (2008). Research and technology commercialization. *Journal of Management Studies*, 45(8), 1401–1423.
- MASTIC. (2013). Kajian R&D Kebangsaan. Retrieved September 23, 2016, from <http://www.mastic.gov.my/web/guest/statistik-kajian-rnd-kebangsaan>
- Merton, R. K. (1957). Priorities in scientific discovery: A chapter in the sociology of science. *American Sociological Review*, 22(6), 635–659.
- MOHE. (2007). *National Higher Education Plan 2007-2010*. Putrajaya, Malaysia: Ministry of Higher Education.
- MOSTI. (2009). *Intellectual Property Commercialisation Policy for Research & Development (R&D) Projects Funded by the Government of Malaysia* (p. 35). Putrajaya, Malaysia: Ministry of Science, Technology and Innovation.
- OECD. (2013). Malaysia: Innovation profile. In *Innovation in Southeast Asia* (p. 348). Paris, France: OECD Publishing. doi:10.1787/9789264128712-en
- Owen-Smith, J., & Powell, W. W. (2001). To Patent or not: Faculty decisions and institutional success at technology transfer. *Journal of Technology Transfer*, 26, 99–114.
- Rosenberg, N. (1974). Science, invention and economic growth. *The Economic Journal*, 84(333), 90–108. doi:10.2307/2230485
- Rothaermel, F. T., Agung, S. D., & Jiang, L. (2007). University entrepreneurship: A taxonomy of the literature. *Industrial and Corporate Change*, 16(4), 691–791. doi:10.1093/icc/dtm023
- Sauermann, H., & Roach, M. (2012). *Taste for science, taste for commercialization, and hybrid scientists*. Paper presented at the 34th DRUID Celebration Conference 2012. Copenhagen, Denmark.
- Stephan, P. E. (1996). The economics of science. *Journal of Economic Literature*, 34(3), 1199–1235.
- Stephan, P. E., & Levin, S. G. (1992). *Striking the mother lode in science: The importance of age, place, and time* (p. 194). New York: Oxford University Press, Inc.
- Tartari, V., & Breschi, S. (2012). Set them free : Scientists’ evaluations of the benefits and costs of university – industry research collaboration. *Industrial and Corporate Change*, 21(5), 1–31. doi:10.1093/icc/dts004
- Thursby, J. G., Jensen, R., & Thursby, M. C. (2001). Objectives, characteristics and outcomes of university licensing: A survey of major U.S. universities. *Journal of Technology Transfer*, 26, 59–72.
- Walsh, J. P., & Hong, W. (2009). For money or glory? Commercialization, competition, and secrecy in the entrepreneurial university. *The Sociological Quarterly*, 50, 145–171.

- Zbierowski, P., Weclawska, D., Tarnawa, A., Zadura-lichota, P., & Bratnicki, M. (2012). *Global Entrepreneurship Monitor: Poland*. Radom, Poland: Global Entrepreneurship Monitor.
- Powell, W. W., & Owen-Smith, J. (1998). Universities and the market for intellectual property in the life sciences. *Journal of Policy Analysis and Management*, 17(2), 253–277.