Strengthening University-Industry Synergy: Improving Lecturers' Readiness for Innovation Commercialization Through Patent Workshops

Elisabeth Deta Lustiyati[1], Khaula Lutfiati Rohmah[2], Dian Rhesa Rahmayanti[3], Metty[4], Setyo Mahanani Nugroho[5]
Universitas Respati Yogyakarta
Sleman, Indonesia
elisabethdeta@respati.ac.id, khaulawisesa@gmail.com, dianrhesa@yahoo.co.id, mettyiskandar@gmail.com, setyomahanani@gmail.com

Abstract—Sustainable economic growth relies on innovation, especially in higher education through research. However, limited collaboration with industry hinders commercialization, often due to financial and intellectual property (IPR) issues. This study evaluates changes in lecturers' responsiveness to innovation commercialization before and after industry collaboration. Using a cross-sectional design, the study involved eight Universitas Respati Yogyakarta lecturers who participated in innovation commercialization seminars. Data were collected via pre- and post-tests, with an intervention of workshops and patent drafting assistance from experts. Results showed a significant increase in IPR knowledge, with scores improving by 33% ($p = 0.0117$), and lecturers demonstrating greater readiness to file patents, though some required further support. The workshop effectively enhanced lecturers' knowledge and readiness, supported by strategic university policies.

Keywords— innovation commercialization; intellectual property rights (IPR); patent drafting; higher education collaboration

I. INTRODUCTION

The ability of a nation to promote sustainable economic growth depends on its capacity to foster innovation [1]. Innovation advancement requires the active involvement of higher education institutions through research bodies. However, these institutions predominantly focus on basic research, emphasizing international publications of fundamental scientific findings. Research institutions lack the drive for academic collaboration with industry, as well as efforts to stay relevant and to develop application-oriented research ideas.

In the current academic environment, even academics engaged in industry report difficulties in identifying industry partners. This issue is problematic and must be addressed [2]. Universities and industry must increase their mutual understanding to stimulate economic growth and national development. Structured opportunities for meetings between industrial players and academics should be expanded so that both sectors can gain exposure to each other's strategic goals. Furthermore, the lack of financial autonomy and legal status concerning intellectual property rights hinders universities from collaborating effectively with industry and taking strategic steps [2].

Future success for both sectors will not only rely on enhancing the individual expertise of those involved in such initiatives but also on a deeper cultural shift within higher education institutions themselves so that they become 'sources' of new ideas and innovations. More universities, with government support, have begun the process of patent application. In contrast, the previous practice was for individual academics to assign intellectual property rights to industrial partners. The initial push for patents often focused on the 'quantity' of applications without regard for the quality of the underlying technology [3]. A larger number of 'academics active in industry' are needed to produce not only higher-quality patented technologies but also the institutional capacity to filter which technologies are suitable for patenting and the appropriate applications. Additionally, if these innovative products successfully generate licenses, academics will need greater capacity to market the patents [4].

In the development of licenses and copyrights from academics' innovative ideas, the government needs to create effective policies that do not conflict with the existing legal framework. Universities must strategically develop operational institutional capacity [5]. The gap between universities and industry remains wide — in fact, it has been widening due to changes in industry structure, with an increasing number of foreign investors [6]. More universities are oriented towards research publications as performance targets, making it challenging to encourage academics to engage in industry collaborations, which require significant effort, time, and intellectual commitment [7]. One approach that Universitas Respati Yogyakarta, represented by its Research and Community Service Institute (LPPM), can take is to bridge this gap. The institution can develop strategies and build collaborative support structures between educational institutions and industry. This initiative begins by assessing the responsiveness of lecturers in downstreaming innovative ideas through collaboration with industry after gaining knowledge in the workshop "Strategies for Designing Innovative Products with Commercial Value."

This research is important because measuring lecturers' responsiveness to the process of bringing innovations to the

market is a key factor in strengthening the connection between academia and industry. The results of this study not only have the potential to enhance lecturers' capacity for innovation but also help them better understand market needs and opportunities. Thus, this research will promote better synergy between higher education and industry [8].

Based on the above background, the research question formulated is: "How does the level of lecturers' responsiveness to the downstreaming process of innovative products change before and after the intervention or collaboration with industry partners?" This study is limited to measuring changes in responsiveness using quantitative analytical measurements, without delving into an assessment of responsiveness through in-depth interviews to gain initial understanding and shifts in lecturers' perceptions and experiences of the downstreaming process of innovative products after the intervention and collaboration.

The objective of this study is to assess the involvement and responsiveness of lecturers in the downstreaming process of innovative products. The benefits of this research include several aspects: 1) Enhancing the effectiveness of collaboration between lecturers and industry partners to produce more applicable innovations that can be brought to market, 2) Optimizing the role of academics (lecturers) in supporting innovation activities and collaboration with industry, 3) Developing appropriate training programs to improve lecturers' competencies in generating market-relevant innovations, and 4) Expanding academic-industry partnerships to increase technology transfer and product development.

II. Research Methods

This study is an observational analytic research with a cross-sectional approach. The population consists of all lecturers at Universitas Respati Yogyakarta in 2024, totaling 163 lecturers. The sample includes lecturers who have participated in the seminar "Downstreaming Lecturer Innovation Products Through Collaboration with Industry," and have research outputs within the last 5 years categorized as either actual commercialization or potential commercialization. This study utilizes primary data, measured directly during observation. The primary data include knowledge scores before and after participating in the "Lecturer Innovation Product Patent Draft Workshop." Data analysis was conducted using a paired sample t-test to compare two groups of paired samples.

III. Results and Discussion

This workshop was conducted to address the need for lecturers to understand and master the technical skills required for drafting patent documents. Based on preliminary observations, there is a gap between the capacity of lecturers to produce innovative research and their ability to file patents for their research outputs. This gap is caused by a lack of understanding of the patent filing procedures, appropriate patent document structure, and strategies for protecting intellectual property rights through patents.

The patent draft workshop was a collaborative effort between the Entrepreneurship Study Center, PPPM UNRIYO, and the Ministry of Law and Human Rights (Regional Office of the Special Region of Yogyakarta). The workshop was attended by two speakers from the Regional Office, Mrs. Sri Wulan Prihatin, S.T., and Mr. Andri Krisna Budi Wibowo, S.T., along with eight selected UNRIYO lecturers. The selection criteria for participants were based on several factors:

a. The lecturer participated in the seminar organized by the Entrepreneurship Study Center and PPPM UNRIYO, titled "Downstreaming Impactful Lecturer Innovation Products Through Collaboration with Industry Partners."

b. The lecturer did not yet hold a patent.

c. The lecturer had research with patent potential.

d. The lecturer was willing to attend the patent draft workshop from start to finish.

Initially, 12 participants were selected for the workshop, but only eight attended due to scheduling conflicts with lectures and accreditation meetings in their respective departments.

The workshop lasted six hours and included pre-tests, material sessions from the Regional Office of the Ministry of Law and Human Rights, post-tests, and practical patent draft writing.

A. Lecturers' Knowledge on Intellectual Property Rights

This research was conducted through a series of workshops and training aimed at introducing and deepening lecturers' understanding of various aspects of Intellectual Property Rights (IPR), including patents, copyrights, trademarks, and industrial designs. The following results show the level of knowledge of lecturers before and after the workshop intervention:

TABLE I. Lecturers' Knowledge Before and After the Patent Draft Workshop

Lectures' Knowledge	***Minimum Score***	***Maximum Score***	***Average Score***
Before the patent draft workshop	45	70	55.62 ± 9.80
After the patent draft workshop	55	95	75 ± 11,63
Improvement Percentage	22%	36%	33%

The results indicate a significant improvement in lecturers' knowledge following the workshop. Before the workshop, the minimum score was 45, which increased to 55 after the workshop, reflecting a 22% improvement. This suggests a substantial enhancement in the basic understanding of patent drafts among the lecturers. The maximum score rose from 70 before the workshop to 95 afterward, representing a 36% increase. This indicates that lecturers with a relatively good prior understanding also experienced a significant improvement. The average knowledge score increased from 55.62 ± 9.80 before the workshop to 75 ± 11.63 afterward, demonstrating a 33% improvement. This suggests that, overall, lecturers' collective

knowledge regarding patent drafts improved significantly after the training.

These results demonstrate the effectiveness of the training program in enhancing lecturers' knowledge of patent drafting. The 46% average improvement provides evidence that the educational approach through workshops successfully introduced new insights and deepened lecturers' understanding of Intellectual Property Rights (IPR), particularly in the area of patents.

This study involves two related or paired data sets on a ratio scale, where the outcomes are measured at two different points in time from the same subjects. In this case, we compare the Pre-Test and Post-Test results from the same lecturers before and after attending the workshop. The paired t-test is designed to evaluate whether there is a significant change in the measured variable before and after the intervention in the same subjects, making it highly suitable for assessing the effectiveness of the workshop.

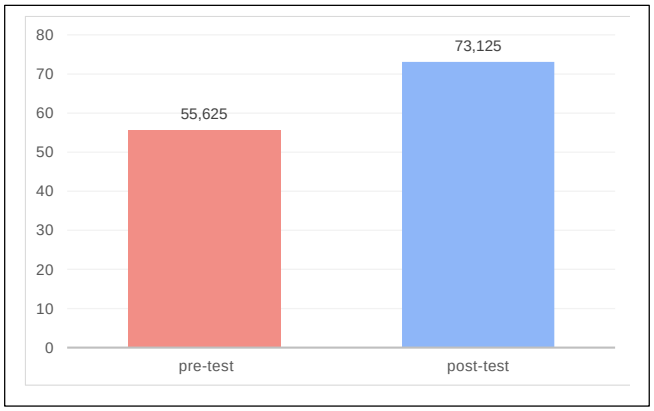

Figure. Average Scores of Pre-Test and Post-Test for Lecturers on the Improvement of Knowledge in Copyright and Patents of Innovative Works by Lecturers."

These results demonstrate the effectiveness of the training program in enhancing lecturers' knowledge of patent drafting. The 46% average improvement provides evidence that the educational approach through workshops successfully introduced new insights and deepened lecturers' understanding of Intellectual Property Rights (IPR), particularly in the area of patents.

This study involves two related or paired data sets on a ratio scale, where the outcomes are measured at two different times from the same subjects. The next step in data analysis is to assess the data distribution. If the data are normally distributed, parametric statistical tests will be used to determine whether there is a significant difference in participants' knowledge before and after attending the patent draft training.

TABLE II. SHAPIRO-WILK TEST OF NORMALITY

	Statistic	**Df**	**Sig.**
Pre Test	0,851	8	0,097
Post Test	0,957	8	0,783

The Shapiro-Wilk statistic measures how closely the data follow a normal distribution. The higher this value (approaching 1), the better the data fit a normal distribution. The normality interpretation also relies on the significance value (Sig.), where if the Sig. value is greater than 0.05, the data are considered normally distributed. Based on the normality test results, the distribution of pre-test data (Sig. 0.097) and post-test data (Sig. 0.783) falls within the normal distribution.

In this case, we compare the Pre-Test and Post-Test results from the same lecturers before and after attending the workshop. The paired t-test is designed to evaluate whether there is a significant change in the measured variable before and after the intervention in the same subjects, making it highly suitable for assessing the effectiveness of the workshop.

TABLE II. PAIRED SAMPLES TEST

	Mean	***Std Dev***	***95% CI***		***t***	***Sig.***
			Lower	***Upper***		
Pre test - Post test	-17,50	14,64	-29,74	-5,26	-3,381	0,0117

The results of the paired t-test in this study illustrate the significant impact of the intervention in the form of a workshop on the improvement of lecturers' knowledge regarding intellectual property rights (IPR), particularly related to drafting patents. The results from the paired t-test yield the following data:

a. Statistical Significance

The produced p-value is 0.0117, which is smaller than the significance threshold of 0.05. This indicates that there is a statistically significant difference between the Pre-Test and Post-Test scores. In other words, the intervention in the form of the workshop has a tangible impact on the improvement of lecturers' knowledge. These results suggest that the materials and methods used in the workshop effectively enhanced lecturers' understanding.

b. Significant Knowledge Improvement

The average difference between the Pre-Test and Post-Test is -17.50 points. This difference indicates that the Post-Test scores are significantly higher compared to the Pre-Test, with an average improvement of 17.50 points. This improvement confirms that the lecturers possess a better understanding of patent drafting after participating in the workshop.

c. 95% Confidence Interval

The 95% confidence interval for the mean difference ranges from -29.74 to -5.26, which means we can be 95% confident that the improvement in lecturers' knowledge falls within this range.

Since this interval does not include zero, it further strengthens the assertion that the difference is statistically significant and not due to chance or random variability.

d. Interpretation of t Value and df

The obtained t value is 3.381, with a degree of freedom (df) of 7. The relatively large t value indicates that the average difference between the Pre-Test and Post-Test is not solely attributed to random variability in the data but rather due to the actual effect of the workshop provided.

The significant improvement in knowledge scores after the workshop demonstrates that lecturers at UNRIYO are now better prepared to engage in patent registration, which can be viewed as a form of knowledge transfer from the lecturers' research findings.

Pratomo [9] asserts that even those who are knowledgeable about intellectual property rights (IPR) often possess minimal understanding of the processes and requirements for effectively managing copyrights. This lack of awareness and understanding constitutes a significant issue that must be addressed to protect the intellectual contributions of academics. Performance Management Systems (PMS) can facilitate lecturers' engagement in knowledge transfer (KT) activities to the community, one of which is through patents. According to Gonzalez [10], tools within the performance management system, such as strategic plans, budgeting, meetings, and reward systems, can enhance lecturers' involvement in knowledge transfer activities. In the context of UNRIYO, this implies that the institution needs to continue its support through strategic policies that promote patent registration, for example, by incorporating patent achievement indicators into lecturers' strategic plans and providing incentives for such achievements. The knowledge acquired from the workshop will only be effective if supported by clear policies and a management structure that encourages lecturers to engage in patent activities.

b. Assistance in Drafting Patents

In this activity, participants are required to prepare draft patent applications based on research outcomes that have the potential for patentability prior to the event. The fourth session of the workshop focuses on assistance in drafting patent applications for lecturers' innovative products, where participants will receive feedback on their patent drafts. Based on evaluation results from the inventory of innovative product drafts, out of a total of 8 participants, 3 are ready to draft patents as they have developed innovative products in the fields of nutrition, midwifery, and electrical engineering. The remaining five participants need to enhance their innovative products through the patent materials provided, including patent searches and utilization. The implementation of the patent drafting workshop at UNRIYO has successfully contributed positively to the enhancement of lecturers' capacities in patent drafting. However, challenges regarding assistance and the duration of activities still require attention for the sustainability of this program. The implementation of these recommendations is expected to further support lecturers' productivity in generating patents, which in turn can enhance the competitiveness of higher education institutions in research and innovation. The ownership of IPR by lecturers can elevate academic reputation, open collaboration opportunities, and facilitate knowledge transfer to industry [11]. IPR encompasses the rights granted to creators and owners of artistic and creative works. Copyright allows creators to control the reproduction, distribution, and utilization of their works [12].

Meanwhile, in the context of innovation and invention, IPR includes patents, which grant exclusive rights to inventors to produce, use, and sell their inventions for a specified period. Patents encourage research and development by providing incentives for innovators to share their knowledge with society [13]. Several studies have also highlighted the positive impact of IPR registration on creativity and economic development. According to Sinaga [14], IPR registration provides legal certainty regarding intellectual ownership, thereby creating a conducive environment for creators to innovate without hindrance.

IV. CONCLUSION

The conclusions of this study indicate a significant improvement in lecturers' knowledge regarding copyright and patents. Higher education institutions can maximize these results by integrating them with the development and execution of performance management systems that facilitate a more systematic approach to knowledge transfer.

ACKNOWLEDGMENT

We would like to express our sincere gratitude to the Institute for Research and Community Service (LPPM) at Universitas Respati Yogyakarta (UNRIYO) for their invaluable support and resources throughout this research project. We appreciate the commitment and dedication of the lecturers involved, whose insights and expertise significantly contributed to the success of this study. Their engagement in the workshops and willingness to share knowledge were instrumental in enhancing our understanding of intellectual property rights and patent processes.

REFERENCES

[1] Dhewanto, W., Sri, H., & Ratnaningtyas, S. (2013). Towards an Innovation Cluster in Indonesia-A Literature Study and Research Agenda. Jurnal Manajemen Teknologi, 12(1).

[2] Moeliodihardjo, B. Y., Soemardi, B. W., Brodjonegoro, S. S., & Hatakenaka, S. (2013). Developing strategies for University, Industry, and Government partnership in Indonesia.

[3] Wedekind, V., & Mutereko, S. (2016). Higher education responsiveness through partnerships with industry: The case of a university of technology programme.

Development Southern Africa, 33(3), 376-389. doi: 10.1080/0376835X.2016.1156516.

[4] Rosenberg, N., & Hagén, H. O. (2003). The responsiveness of the universities. A2003, 19.

[5] OECD. (2019). University-Industry Collaboration New Evidence and Policy Options. OECD Publishing.

[6] Paunov, C., Planes-Satorra, S., & Moriguchi, T. (2017). What role for social sciences in innovation?: Re-assessing how scientific disciplines contribute to different industries.

[7] Govindaraju, V. C., Ghapar, F. A., & Pandiyan, V. (2009). The role of collaboration, market and intellectual property rights awareness in university technology commercialization. International Journal of Innovation and Technology Management, 6(04), 363-378., doi: 10.1142/S0219877009001674.

[8] Sohn, S. Y., & Moon, T. H. (2003). Structural equation model for predicting technology commercialization success index (TCSI). Technological Forecasting and Social Change, 70(9), 885-899, doi: 10.1016/S0040-1625(03)00004-0.

[9] Pratomo, S. A. (2017). Manajemen Aset Kekayaan Intelektual. Kiat Bisnis, 6(5), 6., [Online]. Available: http://journal.unwidha.ac.id/index.php/KIATBISNIS/article/view/982/137.

[10] Gonzalez-Sanchez, M. B., Gutiérrez-López, C., & Barrachina Palanca, M. (2022). How can universities engage lecturers in knowledge transfer? analyzing the influence of performance management systems. Journal of knowledge management, 26(4), 1083-1110, https://doi.org/10.1108/JKM-02-2021-0131.

[11] Geuna, A., & Muscio, A. (2009). The governance of university knowledge transfer: A critical review of the literature. Minerva, 47, 93-114., doi: 10.1007/s11024-009-9118-2

[12] Richards, G., & Richards, W. G. (2009). Spin-outs: creating businesses from university intellectual property. Harriman House Limited.

[13] Mazza, A. M., & Merrill, S. A. (Eds.). (2011). Managing university intellectual property in the public interest. National Academies Press.

[14] Sinaga, N. A. (2020). Pentingnya Perlindungan Hukum Kekayaan Intelektual Bagi Pembangunan Ekonomi Indonesia. Jurnal Hukum Sasana, 6(2).