



International Conference on Industry Sciences and Computer Science Innovation

Assessment of motivators to enhance the collaboration between organizations and a Polytechnic Institute

António Rocha^{*a}, Ana Braga^a, João Neves^a, João Pereira^a, Fernando Romero^b

^a*Polytechnic Institute of Cávado and Ave, School of Technology, 2Ai - Applied Artificial Intelligence Laboratory, 4750-810, Barcelos, Portugal*

^b*Centro Algorítmico, School of Engineering, University of Minho, 4800-058, Guimarães, Portugal*

Abstract

The collaboration with the Polytechnic Institute serves as a catalyst for organizational growth and success. By participating in technology demonstrations, designing tailored training activities, accessing funding programs, hosting interns and students, executing experimental actions, and accessing new technologies, facilities, and equipment, organizations benefit from a holistic approach to innovation. This collaboration drives competitiveness and paves the way for the development of innovative solutions, enabling them to thrive in a rapidly evolving business landscape. In this study, a Polytechnic Institute conducted an online survey to evaluate the importance of various factors that motivate organizations to collaborate with them. The survey specifically targeted companies in the vicinity of the institute, aiming to gain insights into different motivators that foster collaboration. The results of the survey provide evidence that the nine motivators under analysis are important to strengthen the interactions between the Polytechnic Institute and the organizations.

© 2024 The Authors. Published by ELSEVIER B.V.

This is an open access article under the CC BY-NC-ND license (<https://creativecommons.org/licenses/by-nc-nd/4.0>)

Peer-review under responsibility of the scientific committee of the iSCSi – International Conference on Industry Sciences and Computer Science Innovation

Keywords: University-industry collaboration; technology transfer; knowledge exchange; motivations for collaboration.

1. Introduction

University-industry collaboration plays a crucial role in fostering innovation, knowledge exchange, and economic growth. Recognizing its significance, the Polytechnic Institute conducted an online survey to evaluate the importance

* Corresponding author.

E-mail address: arocha@ipca.pt

of various factors that motivate organizations to collaborate with them. The survey specifically targeted companies in the vicinity of the institute, aiming to gain insights into the different motivators that foster collaboration.

The survey questionnaire delved into several key areas to understand the significance of different factors in driving collaborative partnerships. Participants were asked to assess the importance of various activities and resources offered by the Polytechnic Institute. These included participation in technology demonstrations, involvement in designing training activities, accessing funding programs for co-promoted projects, hosting interns and students for project work, executing experimental actions with innovative technologies, accessing new technologies and solutions, accessing facilities and laboratories, and developing customized solutions.

By conducting this survey, the Polytechnic Institute aimed to identify the factors that hold the greatest appeal for companies seeking collaboration opportunities. The results of the survey provide valuable insights into the motivations and needs of organizations, enabling the institute to align its offerings and strategies accordingly. Ultimately, this research would contribute to strengthening the university-industry collaboration ecosystem, fostering mutually beneficial relationships, and driving innovation and economic development in the region.

In the following sections, a literature review is presented concerning the university-industry collaboration, and the methodology and survey findings are presented exploring the relevance of each factor in motivating organizations to collaborate with the Polytechnic Institute.

2. Literature review

Industries recognize the necessity of remaining at the forefront of innovation, they understand that collaborating with universities, which serve as hubs of knowledge and research, can provide them with a significant competitive edge [1].

Technological changes, often require specialized expertise and access to the latest research findings. Through engagement in university-industry collaboration organizations can leverage the intellectual resources and access to &D research and innovative solutions. This collaboration facilitates the transfer of technology, ideas, and expertise, fostering innovation and driving the development of novel products, processes, and services [2], [3].

Conversely, universities also benefit from collaborating with organizations to expand their research capabilities and secure funding for their academic pursuits. Traditional funding sources such as government grants and tuition fees may not always suffice to cover the mounting costs associated with knowledge creation and dissemination. Consequently, universities must turn to industry collaborations as a means of diversifying their funding streams and supporting their research activities and knowledge creation [2].

Both parties share an interest in knowledge exchange, although their underlying motivations may differ. Industries often seek access to specialized expertise, technologies, and innovative solutions, enabling them to develop, commercialize new products or enhance existing ones. For universities, collaborations with industry provide opportunities for applied research, access to manufacturing resources, and the potential commercialization of their research outcomes [1].

Shenhar (1993) [4], Chen (1994) [5], Santoro and Gopalakrishnan (2000) [6], and Ankrah and AL-Tabbaa (2015) [1] have made valuable contributions to the field of university-industry collaboration by proposing different typologies or taxonomies to classify these interactions. These classifications offer insights into the various structures and mechanisms through which organizations and universities interact. These interactions include not only technology and knowledge transfer but also informal and formal relationships between researchers and workers of both parts, formal targeted agreements, formal non-targeted agreements, and focused structures for R&D and innovation, to allow researchers and practitioners to navigate the complex landscape of collaborations and explore the dynamics and potential benefits associated with each type [1].

The interaction between research units and researchers and individuals of both parts can have profound implications for enhanced innovation within firms [7].

The establishment of relationships between universities and industry within the context of knowledge and technology transfer is typically facilitated by a specialized unit known as the knowledge exchange office or technology transfer office (TTO) [8]. The TTO plays a crucial role in interacting with organizations and managing intellectual property rights and facilitating knowledge and technology transfer processes. Its responsibilities include overseeing the creation of spin-offs, managing patents and licensing, fostering R&D collaborations with organizations, and

providing an entrepreneurial education [9], [10]. The support to the creation of academic spin-offs, holds the potential to drive and apply technological innovation promoting economic development [11], [12].

3. Methodology

To evaluate the importance of various factors in motivating organizations to collaborate with the Polytechnic Institute, and online survey was sent to a sample of approximately 500 companies in the vicinity of the Polytechnic Institute, aiming to understand the significance of different motivators for fostering collaboration.

The survey questions explored the importance of participation in technology demonstrations, involvement in designing training activities, accessing funding programs for co-promoted projects, hosting interns and students for project work, executing experimental actions with innovative technologies, accessing new technologies and solutions, accessing facilities and laboratories, and developing customized solutions.

The survey data were exported from the online survey and prepared for analysis. A total of 34 organizations answered the survey and the Likert scale responses, in a scale of 5 levels (not important, little importance, important, quite important, and very important), were converted to numerical values, between 1 and 5 for statistical analysis.

Descriptive statistics, such as the mean, 95% confidence interval for the mean, the median, and standard deviation, were computed to summarize the importance ratings for each motivator to enable the identification of the most crucial factors in motivating organizations to collaborate with the Polytechnic Institute.

The survey findings provide valuable insights for the Polytechnic institute, guiding strategic decisions and the development of tailored approaches to enhance collaboration with organizations.

4. Data analysis and results

Collaboration between organizations and a Polytechnical institute is of utmost importance. It enables the organizations to access technologies, innovative solutions, and state-of-the-art facilities. The Polytechnic institute provides a platform for the organizations to participate in technology demonstrations, design specific training activities, and access funding programs for co-promoted projects. Moreover, the collaboration allows for the hosting of interns and students, fostering talent development and bringing fresh perspectives. This partnership leads to the development of customized solutions, enhancing the organizations' competitiveness and driving their success in today's dynamic business landscape.

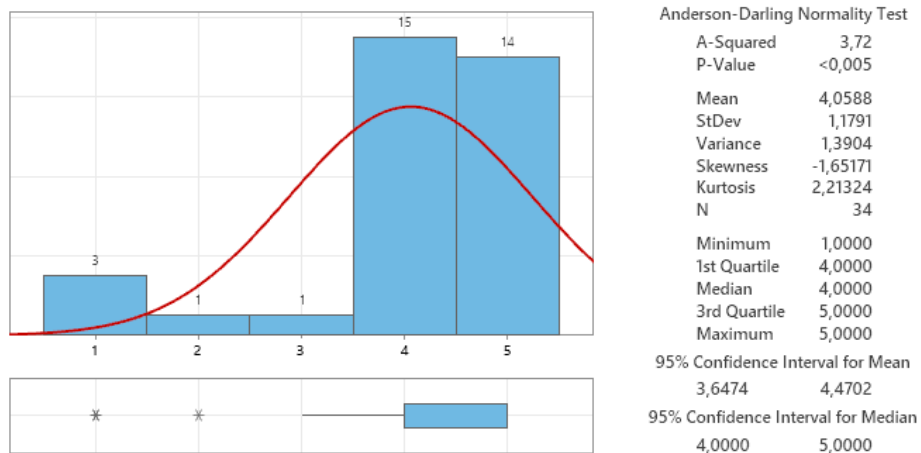


Fig. 1.: Access to new technologies and innovative solutions

Access to new technologies and innovative solutions is key to unlock the organizations innovation, it empowers individuals and industries to evolve in the way they work, embracing these advancements is essential for staying competitive and sustainable in the long run (Fig.1). Most of the organizations want to strengthen they collaboration with the Polytechnical institute to have access to new technologies and innovative solutions (Median = 4; Mean = 4.1;

95% conf. interval [3.6; 4.5]; StDev = 1.2).

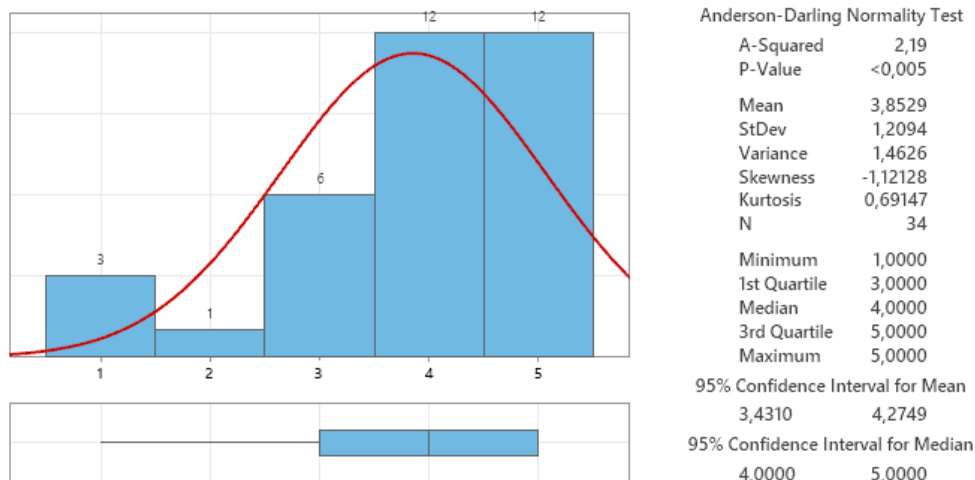


Fig. 2. Participation in the demonstration of technologies and innovative solutions

Active participation in the demonstration of technologies and innovative solutions is vital for progress, it enables firsthand exploration, feedback, and collaboration, fostering continuous improvement and ensuring that these advancements align with diverse needs and create meaningful impact in various sectors and communities (Fig.2). Most of the organizations want to strengthen they collaboration with the Polytechnical institute to be engaged in demonstrations of technology and innovative solutions (Median = 4; Mean = 3.9; 95% conf. interval [3.4; 4.3]; StDev = 1.2).

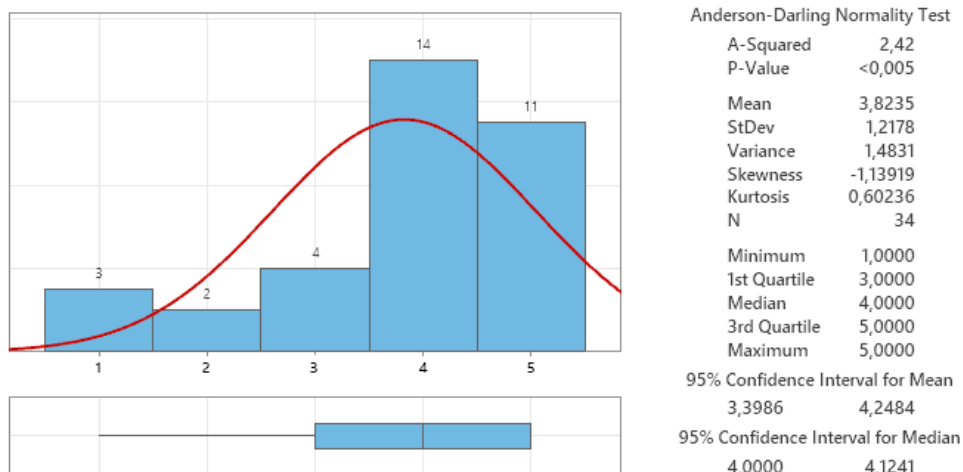


Fig. 3. Participation in experimental technological actions within the organization

Participation in experimental technological actions within organizations is crucial for fostering innovation, it encourages a culture of active experimentation and inventiveness, to assess what can work and how to benefit from R&D results. By actively engaging in these experiments, organizations can uncover new opportunities, refine processes, and stay ahead in a rapidly evolving technological landscape (Fig.3). Most of the organizations are willing to participate in experimental technological actions bringing the technology from the Polytechnic to the manufacturing facilities (Median = 4; Mean = 3.8; 95% conf. interval [3.4; 4.2]; StDev = 1.2).

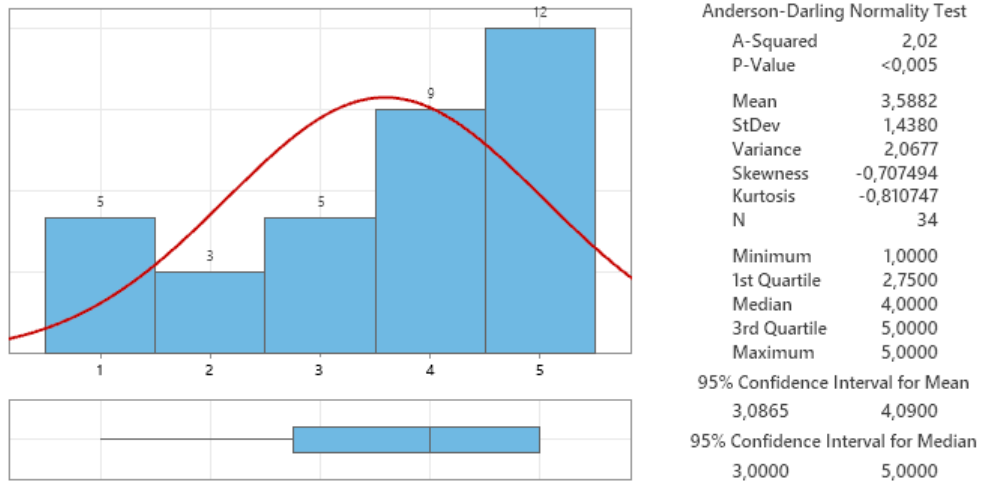


Fig. 4. Development of customized solutions for the organization

The development of customized solutions for organizations is a strategic imperative (Fig.4). Tailoring solutions to specific needs enhance efficiency, maximizes productivity, and drives competitive advantage. By leveraging technology, organizations can optimize processes and deliver outcomes that align precisely with their unique requirements and objectives. Most of the organizations are looking for possibilities of strengthening the cooperation with the Polytechnical institute to develop customized solutions (Median = 4; Mean = 4.2; 95% conf. interval [3.09; 4.1]; StDev = 1.4).

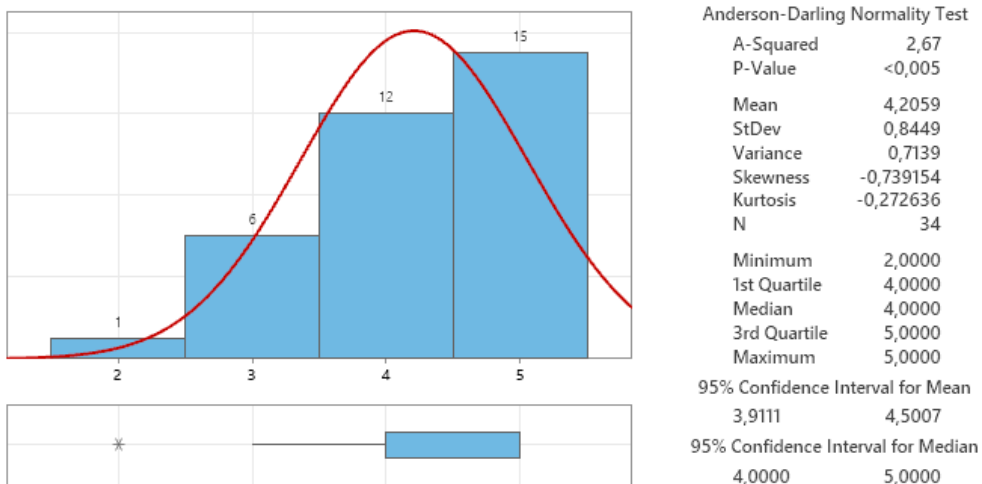


Fig. 5. Hosting of interns

Hosting interns offers invaluable benefits to organizations, it fosters knowledge exchange, brings fresh perspectives, and cultivates talent streams. Interns gain real-world experience, while organizations gain work, knowledge, and ideas, creating a win-win scenario for professional growth and organizational development (Fig.4). Most of the organizations want to reinforce their collaboration with the Polytechnical institute to receive students to make curricular internships (Median = 4; Mean = 4.2; 95% conf. interval [3.9; 4.5]; StDev = 0.8).

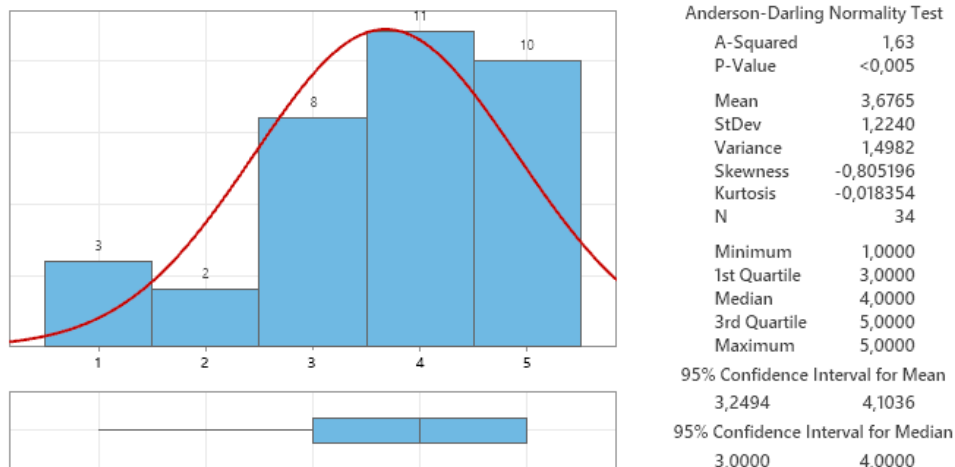


Fig. 6. Hosting students for project work

Hosting students for project work brings mutual benefits, organizations gain fresh insights and innovative ideas, while students acquire practical experience and exposure to real-world challenges. It nurtures talent, encourages collaboration, and cultivates a dynamic learning environment for both parties involved (Fig.6). Most of the organizations want to reinforce their collaboration with the Polytechnical institute to receive students to develop project work (Median = 4; Mean = 3.7; 95% conf. interval [3.3; 4.1]; StDev = 1,2).

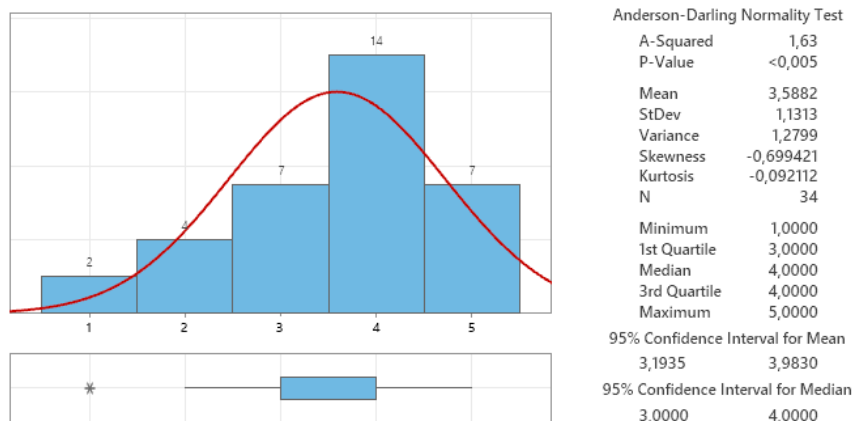


Fig. 7. Involvement in the design of training programs

Involvement in the design of training programs may ensure the response to specific objectives, and needs, leading to the maximization of learning outcomes. Active participation allows for customization, relevance, and effective knowledge transfer, empowering individuals and driving organizational growth (Fig.7). Most of the organizations want to reinforce their collaboration with the Polytechnical institute to design tailor-made training programs, among the learning areas referenced by the organizations are, industrial operations, welding, mechanical design, automation, industrial maintenance, CNC programming and leadership for operational managers (Median = 4; Mean = 3.6; 95% conf. interval [3.2; 4]; StDev = 1,1).

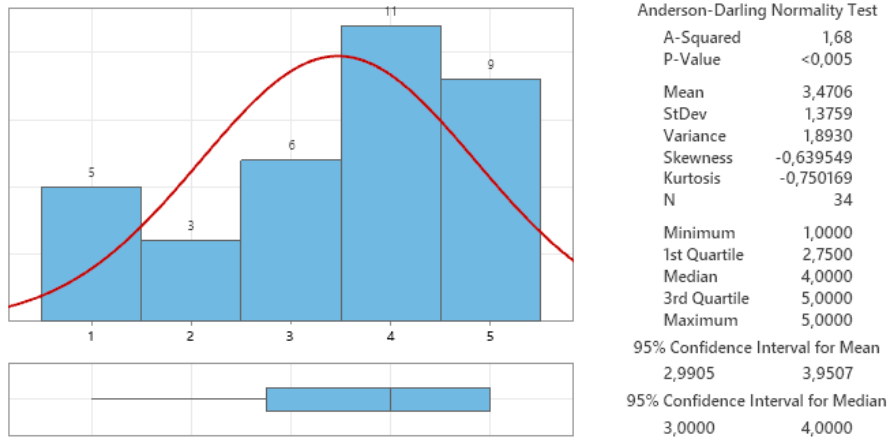


Fig. 8. Support in accessing funding programs for co-promoted projects

Providing support in accessing funding programs for co-promoted projects may help organizations to secure additional financial resources to unlock opportunities for growth and accelerate R&D projects in collaboration with the polytechnic (Fig.8). Most of the organizations consider important having support in the identification and in the preparation of applications to fund projects in cooperation with the Polytechnical institute (Median = 4; Mean = 3.5; 95% conf. interval [3; 4]; StDev = 1.4).

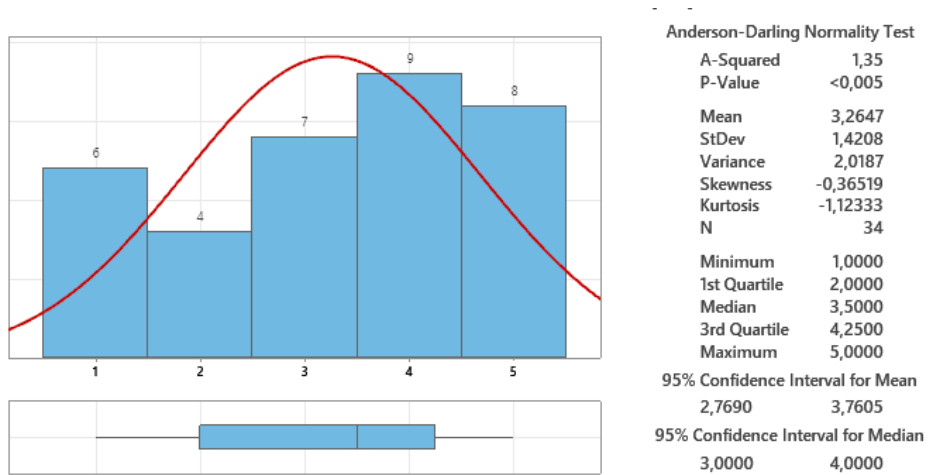


Fig. 9. Access to facilities, laboratories and equipment

Access to R&D facilities, laboratories, and equipment may drive research, development, and innovation. It may empower individuals and organizations to conduct experiments, gather data, and create breakthrough solutions, accelerating progress across diverse fields and propelling the organizations competitiveness and sustainability (Fig.9). Most of the organizations consider important having the possibility of having ace to the Polytechnical infrastructure and resources (Median = 3.5; Mean = 3.3; 95% conf. interval [2.8; 3.8]; StDev = 1.4).

4. Conclusion

The collaboration between universities and organizations, enables knowledge exchange, and contributes to the advancement of innovation and economic growth. It is through these collaborative efforts that universities fulfil their role as drivers of societal progress and contribute to the broader development of organizations and civil society.

Organizations by participating in the demonstration of technology and innovative solutions, can stay updated on

the latest advancements in the industry and explore potential applications for their own operations. Through the execution of experimental actions with innovative technologies and solutions, the organization can test and evaluate new approaches before implementing them on a larger scale, reducing the risk involved in the technology acquisition. This also ensures a more effective adoption of innovations. Access to new technologies and innovative solutions allows the organization to stay competitive in a rapidly evolving market. The Polytechnic Institute also provides services and access to state-of-the-art facilities, laboratories, and equipment, enabling the organizations to explore and experiment technologies.

Hosting interns and students for project work offers a win-win situation. The organization gains fresh perspectives, new ideas, and potential future employees, while the interns and students gain practical experience and exposure to real-world challenges.

Involvement in designing specific training activities might enable organization to tailor the training programs to their specific needs and enhance the skills of their workforce. This may lead to improved performance and productivity within the company.

The Polytechnic Institute may also provide valuable support in accessing funding programs for co-promoted projects. This financial assistance can facilitate the implementation of collaborative initiatives and drive innovation within the organization.

Lastly, the collaboration with the Polytechnic Institute fosters the development of customized solutions for the company. By leveraging the expertise of researchers and students, the organization can address specific challenges and develop tailored solutions that meet their unique requirements.

The collaboration with the Polytechnic Institute opens doors to a range of opportunities for the organization. It facilitates technology adoption, talent development, funding access, and customized solutions, ultimately contributing to the organization's growth, competitiveness, and success in the ever-changing business landscape, and this study provided evidence on some of the important collaborations that organizations look for in one Polytechnical institute.

Acknowledgement

This work was funded by national funds, through the FCT – Fundação para a Ciência e Tecnologia and FCT/MCTES in the scope of projects UIDB/05549/2020 and UIDB/00319/2020

References

- [1] Ankrah S, AL-Tabbaa O. (2015) “Universities–industry collaboration: A systematic review”, *Scandinavian Journal of Management*. Vol. **31** (3): 387-408, ISSN 0956-5221, DOI: 10.1016/j.scaman.2015.02.003.
- [2] Hagen, R (2002) “University transformation, and economic regeneration”, *International Journal of Public Sector Management*, Vol.**15**: 204–18, DOI: 10.1108/09513550210423370.
- [3] Wright, M., Clarysse, B., Lockett, A. and Knockaert, M. (2008) “Mid-range universities’ linkages with industry: Knowledge types and the role of intermediaries”, *Research Policy*, Vol. **37**: 1205-1223, DOI: 10.1016/j.respol.2008.04.021.
- [4] Shenhar, A. (1993) “The PROMIS project: industry and university learning together”, *International Journal of Technology Management*; Vol. **8**: 611–21, DOI: 10.1504/IJTM.1993.025800.
- [5] Chen EY. (1994) “The evolution of university-industry technology transfer in Hong Kong”, *Technovation*, Vol.**14**: 449-459.
- [6] Santoro, M. and Gopalakrishnan, S. (2000) “Institutionalization of knowledge transfer activities within industry-university collaborative ventures”, *Journal of Engineering and Technology Management - JET-M*, Vol. **17** (3-4): 299-319, DOI: 10.1016/S0923-4748(00)00027-8.
- [7] García-Vega M. and Vicente-Chirivella Ó. (2020) “Do university technology transfers increase firms’ innovation?”, *European Economic Review, Elsevier*; Vol. **123** (C), DOI: 10.1016/j.euroecorev.2020.103388.
- [8] Hockaday, T. (2020) “University Technology Transfer: What It Is and How to Do It”, *Johns Hopkins University Press*. ISBN-13: 978-1421437057.
- [9] Pujotomo, D., Helmi Syed Hassan, S., Ma’aram, A. and Sutopo, W. (2022) “Performance measurement of university-industry collaboration in the technology transfer process: A systematic literature review”, *F1000Research*, DOI: 10.12688/f1000research.121786.1.
- [10] Falani, S. and Torkomian A. (2023) “Technology Transfer Offices: a Systematic Review of the Literature and Future Perspective”, *Journal of Knowledge Economy*, DOI: 10.1007/s13132-023-01319-4.
- [11] Visintin, F. and Pittino, D. (2014) “Founding team composition and early performance of university - Based spin-off companies”, *Technovation*, Vol. **34** (1): 31–43, ISSN 0166-4972, DOI: 10.1016/j.technovation.2013.09.004.
- [12] Block JH, Fisch CO, van Praag M. (2017) “The Schumpeterian entrepreneur: a review of the empirical evidence on the antecedents, behaviour, and consequences of innovative entrepreneurship”, *Industry and Innovation*, Vol. **24** (1): 61-95, DOI: 10.1080/13662716.2016.1216397.