

Educational Partnerships and Innovation in Small Firms: Evidence from Finland

Outi-Maaria Palo-oja¹ and Sofi Granö²

¹LAB University of Applied Sciences, Lappeenranta, Finland

²LAB University of Applied Sciences, Lahti, Finland

Outi-Maaria.Palo-oja@lab.fi

Sofi.Grano@lab.fi

Abstract: University–industry collaboration is frequently promoted as a means of strengthening innovation in small and medium-sized enterprises (SMEs), particularly in regional ecosystems where firms and higher education institutions (HEIs) interact closely. This paper investigates whether small companies that collaborate with HEIs exhibit higher innovation activity than firms without such partnerships and assesses whether this relationship varies across firm characteristics. The study draws on survey data collected in 2025 from 291 small companies (fewer than 50 employees and less than €10M revenue) in South Karelia, Finland; the analytic sample includes 242 firms with complete information. In the survey, firms report recent innovation activity, cooperation partners, and other information, such as perceived barriers and enablers to development. Using logistic regression, we estimate the relationship between HEI collaboration and a binary indicator of whether the firm developed a new product, service, or process within the past two years. The results show a positive and statistically significant relationship between HEI collaboration and innovation activity. In substantive terms, the results indicate that the likelihood of innovating is 41.7 per cent among non-collaborating firms and 55.7 per cent among collaborating firms, holding covariates constant. We further report marginal effects to facilitate interpretation and to assess whether the relationship differs by firm size, revenue class, industry, and municipality. The estimated collaboration effect is broadly stable across these categories, suggesting that HEI collaboration is positively associated with innovation activity, and that there is little meaningful variation in the effect measured separately by firm size, revenue class, industry, or municipality. The analysis is exploratory and based on cross-sectional survey data; accordingly, the findings should be interpreted as associational rather than causal. By focusing on small firms in a non-metropolitan setting, the study complements prior evidence that is often dominated by high-tech or R&D-intensive contexts. Overall, the results highlight HEI collaboration as a promising—and broadly relevant—lever for supporting innovation activity in small firms and for informing place-based innovation policy and institutional outreach.

Keywords: Higher Education Institutions, University-Industry Collaboration, Innovation Activity, Regional Innovation Ecosystems, Smes, Finland

1. Introduction

Small firms are central to regional economies, yet their innovation activities are often constrained by limited internal resources and restricted access to specialised knowledge. Collaboration with higher education institutions (HEIs) is frequently promoted as a mechanism through which small enterprises can access external expertise, talent and problem-solving capacity. Still, evidence on whether such partnerships are associated with everyday innovation outcomes across different types of small firms remains mixed.

The study is guided by two research expectations. First, small firms that collaborate with HEIs are expected to be more likely to report recent innovation activity than firms without such collaboration. Second, this association is expected to be observable across different types of small firms, rather than being limited to particular firm-size groups, revenue classes, industries or municipalities. These expectations reflect the idea that HEI collaboration may provide an accessible channel for external knowledge exchange in regional SME contexts, especially where firms have limited internal R&D capacity.

This paper examines the relationship between HEI collaboration and innovation activity among small firms in South Karelia, Finland. It draws on survey data collected in 2025, which provides a regional snapshot of firms' innovation activities and cooperation partners. Using data from 242 firms and logistic regression, we assess whether firms that collaborated with an HEI during the previous two years were more likely to introduce a new product, service, or process. We also examine whether this relationship differs by firm size, revenue class, industry, or municipality.

While existing literature frequently assumes that the benefits of external collaborations are contingent on a firm's internal absorptive capacity, size, and technical intensity (Audretsch and Guenther, 2023; Brunswicker and Vanhaverbeke, 2015; Lee and Miozzo, 2019) this study advances theoretical debates by exploring alternative pathways for knowledge transfer. Specifically, we contribute to the open innovation literature by highlighting how practice-oriented, informal HEI collaborations, such as student projects and internships, operate through a

Doing, Using, and Interacting (DUI) learning mode (Lee and Miozzo, 2019). By bypassing the need for complex administrative infrastructure, these informal partnerships facilitate an “innovation without research” model that is uniquely suited for smaller enterprises (Apa et al., 2021).

This paper, therefore, moves beyond merely confirming prior associations in a new non-metropolitan setting. Our exploratory results indicate a positive association between HEI collaboration and innovation: holding covariates constant, the predicted probability of innovating is 41.7 per cent for non-collaborating firms and 55.7 per cent for collaborating firms. Marginal-effect estimates are stable across firm size, revenue class, industry, and municipality. In other words, firms that reported collaborating with an HEI were more likely to report innovation activity, and this difference appears relatively similar across different types of firms in the sample. By showing that the collaboration–innovation association does not systematically vary by these categories, our findings suggest that regional HEI collaboration may provide a broadly accessible knowledge channel for diverse small firms, including those with limited internal resources.

2. Theoretical Foundation

Small and medium-sized enterprises (SMEs) often face resource constraints that limit their capacity to sustain formal in-house research and development (R&D), making external knowledge sourcing an important route to innovation (Brunswicker and Vanhaverbeke, 2015). To overcome these limitations, SMEs increasingly collaborate with universities and other higher education institutions (HEIs) to access complementary knowledge, resources and capabilities that support innovation and scaling efforts (Cao et al., 2026).

HEIs can play an important role in SME open innovation by providing access to scientific knowledge, specialist expertise, research infrastructure and skilled talent that resource-constrained firms may struggle to develop internally (Brunswicker and Vanhaverbeke, 2015; Cao et al., 2026; Rantala et al., 2026). However, the benefits of external knowledge depend partly on SMEs’ absorptive capacity, defined as the ability to recognise, assimilate, and commercially exploit external knowledge (Cohen and Levinthal, 1990; Grandinetti, 2016). This is particularly important because many SMEs innovate through informal, practice-based and externally supported activities rather than through formal in-house R&D. As a result, their university engagements often differ from the more structured R&D collaborations typical of large corporations (Apa et al., 2021; Brunswicker and Vanhaverbeke, 2015; Cao et al., 2026).

Recent literature highlights the importance of practice-oriented and informal university-SME collaborations, including student projects, internships, mentoring, networking and day-to-day interactions, as channels through which tacit and context-specific knowledge can be exchanged (Apa et al., 2021; Brown and Frame, 2016; Darabi et al., 2020). For SMEs, these less formal mechanisms can be particularly valuable because they rely on relational learning, trust and problem-solving rather than on the more resource-intensive structures associated with formal R&D contracts or technology-transfer agreements (Apa et al., 2021; Darabi et al., 2020). Reflecting this broader understanding, theoretical perspectives on SME-university collaboration have moved beyond linear technology-transfer models towards knowledge co-development and value co-creation logics, in which HEIs are embedded in local innovation ecosystems and work with firms to co-develop practical solutions rather than merely supplying codified research outputs (Cao et al., 2026; Osorno-Hinojosa et al., 2022).

This aligns closely with the “Doing, Using and Interacting” mode of learning, which emphasises innovation through experience-based problem-solving, applied use and interaction with external partners (Lee and Miozzo, 2019; Parrilli and Radicic, 2021). Unlike the more formal Science, Technology and Innovation mode (Jensen et al., 2007), which is often associated with codified research, laboratory-based knowledge and structured R&D activity, the DUI perspective highlights the importance of tacit knowledge, workplace learning and context-specific collaboration. This is particularly relevant for SMEs, whose innovation processes are often embedded in everyday operational challenges rather than formal R&D systems.

Existing literature often suggests that formal R&D partnerships are more accessible to larger SMEs or firms in science-based and high-technology sectors (Audretsch and Guenther, 2023; Lee and Miozzo, 2019). However, practice-oriented and informal forms of HEI collaboration, such as student projects, internships, mentoring and networking, may operate through a DUI learning mode, where knowledge is exchanged through doing, using and interacting rather than through formal R&D structures alone (Apa et al., 2021; Parrilli and Radicic, 2021). This suggests that HEI collaboration may provide a relatively accessible channel for external knowledge exchange among diverse SMEs, including firms with limited internal R&D capacity (Apa et al., 2021; Cao et al., 2026).

From this perspective, informal HEI-SME collaboration should not be seen as a weaker form of formal R&D partnership, but rather as a different route through which SMEs can access knowledge, test ideas and develop solutions that fit their own business context. It also broadens how university–industry collaboration is understood, moving beyond formal technology transfer towards more practical, trust-based and co-created forms of engagement.

Based on this reasoning, we expect HEI collaboration to be positively associated with innovation activity among small firms, and for this association to be observable across firm sizes, sectors, revenue classes and municipalities.

3. Data and Methods

This study uses survey data collected in 2025 as part of the EK-Inno project in South Karelia, Finland. The data consists of phone interview responses from 242 small firms (1–49 employees and annual turnover below €10 million). Table 1 presents descriptive statistics. The dependent variable is innovation activity, measured as a binary indicator of whether the firm reported developing a new product, service, or process during the past two years. The outcome captures whether a firm reported such activity during this period. It therefore measures innovation activity rather than the commercial or performance impact of innovation. Approximately 47 per cent of firms report having innovated (Table 1).

The independent variable is HEI collaboration, coded as 1 if the firm reported collaborating with LAB University of Applied Sciences, LUT University, or another HEI in response to the item “Which organisations have you collaborated with during the past two years?”, and 0 otherwise. In the survey, approximately 36 per cent of companies have collaborated with a HEI.

The survey measured firms’ main industry using the Finnish TOL 2008 classification. TOL 2008 is the Finnish implementation of the European NACE Rev. 2 industrial classification and is used by Statistics Finland as a framework for statistics on economic activity, including production, employment and national accounts (Statistics Finland, 2008). For the analysis, the original TOL main sections were recoded into five broader sector groups because several individual industries contained only a small number of observations, making detailed industry-level comparisons unreliable. The five categories are: agriculture, forestry and fishing (A); industry, including mining, manufacturing, energy, water supply and waste management (B–E); construction (F); market services, including trade, transport, accommodation and food services, and information and communication (G–J); and finance, business, public and other services (K–S).

In the analysis, we include variables for firm size (number of employees), revenue class, and industry to account for observable differences in firms’ resources and baseline innovation propensity, and municipality fixed effects to capture unobserved local conditions (e.g., proximity to HEIs and regional support structures) that may jointly shape collaboration opportunities and innovation.

As the dependent variable is binary, we estimate a logistic regression model. Specifically, we model the probability that firm i reports innovation activity (i.e., having developed a new product, service, or process during the past two years) as a function of collaboration with a higher education institution (HEI) and a set of firm characteristics. The model takes the form

$$\log\left(\frac{P(\text{innovated}_i = 1)}{1 - P(\text{innovated}_i = 1)}\right) = \alpha + \beta_1 \text{HEI}_{\text{collab}_i} + \gamma X_i + \delta_m + \varepsilon_i,$$

where $\text{HEI}_{\text{collab}_i}$ is an indicator of whether the firm i collaborated with an HEI during the past two years. X_i includes categorical variables for the number of employees, revenue class, and industry group, while δ_m denotes municipality fixed effects to account for unobserved local context and spatial differences in access to HEIs and regional support structures. Parameters are estimated by maximum likelihood, and we report heteroskedasticity-robust standard errors. Because log-odds coefficients are not directly interpretable in probability terms, the results are additionally presented using predictive margins and marginal effects (average changes in predicted probabilities associated with HEI collaboration) in Figures 1–5, which are reported overall and within firm-size, revenue, industry categories, and municipalities, to assess potential heterogeneity in the collaboration–innovation association.

Given the cross-sectional survey design, the estimated relationships should be interpreted as exploratory and associational, rather than causal. In particular, HEI collaboration may be endogenous to innovation propensity

(e.g., more innovative firms may be more likely to seek partnerships), and unobserved factors may jointly influence both collaboration and innovation.

Table 1: Sample characteristics and key variables

Dependent Variable (Binary)	Mean	SD	N	n
Innovated (0/1) (company developed a new product/service/process in the last 2 years)	0.467	0.499	242	
Independent Variable (Binary)				
Collaborated with: Higher education institution(s) (0/1)	0.364	0.482	242	
Firm Characteristics (Categorical)				
Firm size: 1 employee				59
Firm size: 2-4 employees				126
Firm size: 5-9 employees				32
Firm size: 10-19 employees				15
Firm size: 20-49 employees				10
Revenue class: €0–0.2 million				98
Revenue class: €0.2–0.4 million				47
Revenue class: €0.4–1 million				56
Revenue class: €1–2 million				21
Revenue class: €2–10 million				20
Industry category: Agriculture, forestry and fishing				24
Industry category: Industry				22
Industry category: Construction				45
Industry category: Market services				92
Industry category: Finance, business, public, and other services				59

Note: The original survey included 291 firms; observations with missing values were excluded, leaving a final analytic sample of 242 firms.

4. Analysis

Table 2 reports the logistic regression estimates. Our interpretation focuses on Model 3, which includes the full set of variables. Model 2 excludes municipality fixed effects; the estimated coefficients are substantively unchanged. Model 1 is included as a baseline specification. In Model 3, HEI collaboration is positively and statistically significantly associated with innovation activity ($\beta=0.624$, $p<0.05$). To aid interpretation, we translate the log-odds estimates into predicted probabilities and marginal effects in Figures 1–5.

Figure 1 presents predictive margins from Model 3, showing the predicted probability of innovating for firms with and without HEI collaboration, holding other included variables constant (95% confidence intervals). Figure 1 indicates that, overall, there is a substantial association between collaboration (pooled across firms) and innovation outcomes. Specifically, the predicted probability of introducing a new product, service, or process is 41.7 per cent for firms that did not collaborate with an HEI, compared with 55.7 per cent for firms that did collaborate.

Figures 2, 3, 4, and 5 instead report the marginal effect of HEI collaboration on the probability of innovating, evaluated separately across four firm characteristics (number of employees, revenue, industry, and municipality). Figure 2 shows that the estimated effect is highly stable across employee-size groups, ranging from approximately 13.6 to 13.8 percentage points. Figure 3 presents the corresponding estimates by revenue class and likewise suggests only limited variation: the marginal effect ranges from 12.3 percentage points in the 0.2-0.4 million euro category to 14.3 percentage points in the 0-0.2 million euro category.

Figure 4 further indicates that industry classification is not associated with meaningful heterogeneity in the collaboration effect; the estimated marginal effects are similar across sectors, ranging from 11.1 to 14.1 percentage points. Figure 5 reports the average marginal effect of HEI collaboration on the probability of innovation by municipality. The point estimates are broadly similar across locations (ranging from 12.3 to 14.0), with the exception of Rautjärvi (7.7 percentage points). The confidence intervals are quite wide, indicating limited precision. Taken together, the figure provides no strong evidence that the collaboration–innovation association differs systematically across municipalities in this sample.

In the regression estimates, some revenue and industry categories are statistically significant predictors of baseline innovation propensity; however, the implied differences are substantively small. For instance, in Model 3, the coefficients for industry categories 2, 4, and 5 are only marginally significant ($p < 0.1$) relative to category 1, and when expressed in predicted-probability terms, they correspond to differences of at most 3 percentage points. Overall, Figures 2–5 provide no evidence of meaningful heterogeneity in the association between HEI collaboration and innovation across firm characteristics.

Table 2: Logistic regression results: the effects of collaborating with a HEI on innovation activity

	(Model 1)	(Model 2)	(Model 3)
Collaborated with HEI	0.716*** (0.272)	0.589** (0.295)	0.624** (0.310)
Firm size (ref: 1 employee)			
Cat: 2-4 employees		0.149 (0.362)	0.055 (0.378)
Cat: 5-9 employees		0.511 (0.579)	0.348 (0.614)
Cat: 10-19 employees		0.269 (0.972)	0.339 (1.061)
Cat: 20-49 employees		0.305 (0.974)	0.378 (1.039)
Revenue (ref: €0–0.2 million)			
Rev: €0.2–0.4 million		-0.587 (0.414)	-0.727* (0.438)
Rev: €0.4–1 million		0.661* (0.397)	0.730* (0.405)
Rev: €1–2 million		-0.041 (0.765)	-0.002 (0.800)
Rev: €2–10 million		-0.149 (0.860)	-0.444 (0.962)
TOL (ref: 1 Agriculture, forestry, and fishing)			
Ind: 2 Industry		1.373** (0.681)	1.209* (0.719)
Ind: 3 Construction		1.131* (0.604)	0.979 (0.657)
Ind: 4 Market services		1.184** (0.555)	1.029* (0.598)
Ind: 5 Finance, business, public, and other services		1.479** (0.578)	1.135* (0.639)
Municipality (ref. Lappeenranta)			
Imatra			-0.082 (0.376)
Ruokolahti			-0.547 (0.792)
Parikkala			0.156 (0.760)
Luumäki			0.020 (0.664)
Savitaipale			-0.698 (0.654)
Rautjärvi			1.976* (1.118)
Taipalsaari			0.125 (0.703)
Lemi			-0.210 (0.725)
Constant	-0.395** (0.165)	-1.716*** (0.569)	-1.415** (0.658)

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. N=242.

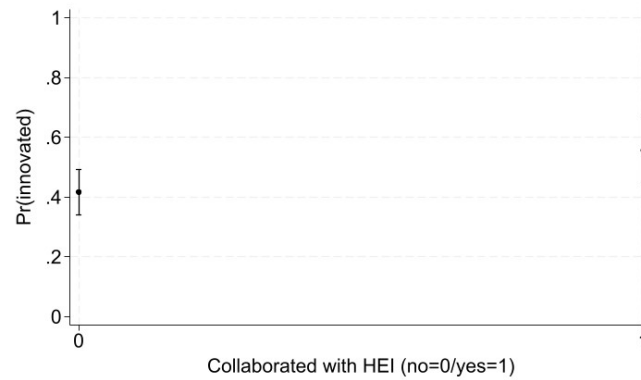


Figure 1: Predicted probability of innovating, by HEI collaboration status (predictive margins, 95% CIs)

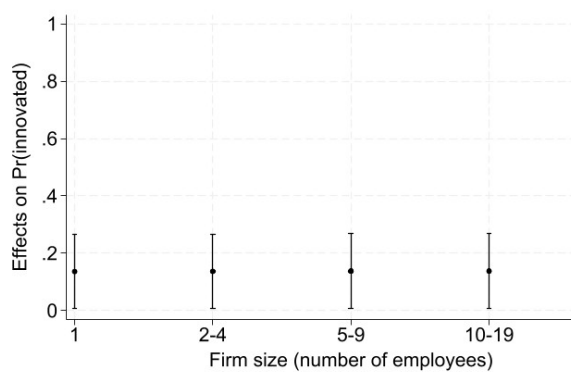


Figure 2: Average marginal effect of HEI collaboration on the probability of innovating, by employee-size (95% CIs)

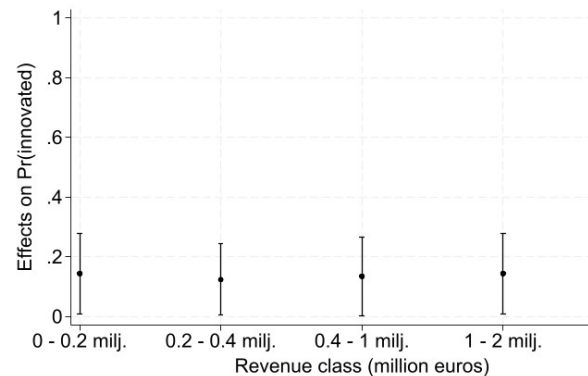


Figure 3: Average marginal effect of HEI collaboration on the probability of innovating, by revenue classification (95% CIs)

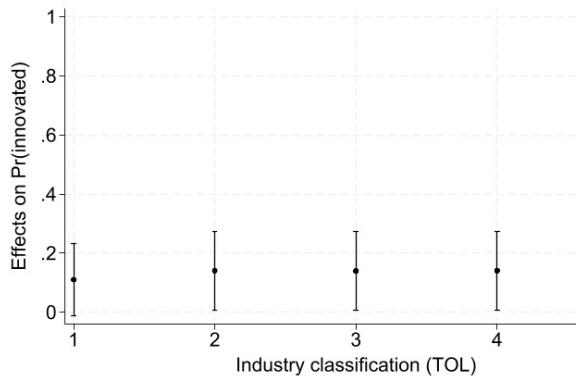


Figure 4: Average marginal effect of HEI collaboration on the probability of innovating, by industry classification (95% CIs)

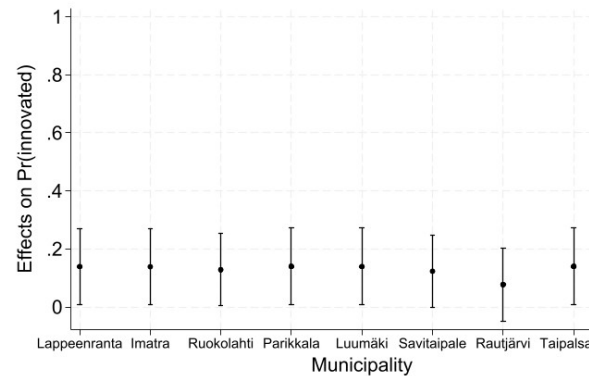


Figure 5: Average marginal effect of HEI collaboration on the probability of innovating, by municipality (95% CIs)

5. Discussion and Conclusion

Our findings provide exploratory empirical evidence that small enterprises engaged in HEI collaboration report higher levels of innovation activity, and that this positive association may extend across the broader SME landscape. Building on previous open innovation studies (Apa et al., 2021; Brunswicker and Vanhaverbeke, 2015; Cao et al., 2026), the analysis shows that the collaboration–innovation association remains positive after accounting for firm size, revenue class, industry, and municipality, and that it appears broadly stable across these categories. This suggests that, in small-firm regional contexts, HEI collaboration may provide a valuable

knowledge channel for a broad range of firms rather than being confined to a narrow group of larger, higher-revenue, or more technology-intensive firms. This finding qualifies absorptive capacity arguments by indicating that some forms of HEI engagement may reduce the capability threshold required for small firms to access and use external knowledge (Apa et al., 2021; Cohen and Levinthal, 1990; Grandinetti, 2016). Although the survey does not distinguish between different types, intensities, or durations of HEI engagement, the survey context suggests that this binary indicator likely captures a heterogeneous mix of collaborations perceived by small firms as meaningful interaction with an HEI. These may include relatively low-threshold and practice-oriented forms of engagement (e.g., student projects and internships) alongside more formal cooperation. This interpretation is consistent with research showing that informal, practice-oriented university–SME collaboration can support innovation by providing firms with access to external knowledge and problem-solving capacity (Apa et al, 2021).

In this sense, the findings can be interpreted alongside the DUI mode of learning, in which innovation emerges through doing, using, and interacting rather than through formal R&D alone (Lee and Miozzo, 2019). The observed association between HEI collaboration and innovation across diverse small firms is theoretically consistent with the DUI learning perspective, but the interpretation of informal and practice-oriented mechanisms should be treated as theoretically plausible rather than directly observed in the model. Nevertheless, this interpretation is consistent with recent evidence from Finnish SMEs, which shows that firms may use academic research not only for direct commercialisation but also to develop knowledge capital and support broader company development (Rantala et al, 2026). Because the study is based on cross-sectional survey data, the findings should be interpreted as associational rather than causal.

Geographical proximity can make informal HEI–SME collaboration easier to develop. Tacit knowledge is often shared through repeated contact, trust and a shared understanding of local conditions, all of which are more likely to emerge within local or regional innovation ecosystems (Boschma, 2005). For many smaller firms, particularly those outside major cities or knowledge-intensive clusters, as was the case in our study, nearby universities may become important partners because alternative sources of expertise, such as corporate R&D centres or specialist consultants, are less accessible. Johnston and Prokop (2025) describe this as a “location push effect”. However, our findings suggest that geographical proximity alone does not necessarily explain firms’ engagement with HEIs. Although the region studied included a university in one of the Finnish towns, the companies in our data based in this town did not appear to differ markedly from those located farther from the university. This indicates that the presence of a nearby university may create opportunities for collaboration, but it does not automatically lead to stronger or more distinctive HEI–SME engagement. In this context, regional HEIs can still act as important local innovation intermediaries. Still, their role depends not only on physical proximity, but also on the accessibility, relevance and practical organisation of collaboration opportunities.

Several limitations should be noted. First, the cross-sectional design means that the analysis identifies associations rather than causal effects. More innovative firms may be more likely to seek HEI collaboration, and unobserved managerial capabilities or growth orientation may influence both collaboration and innovation. Second, both collaboration and innovation are self-reported, which may introduce response bias. Third, the HEI collaboration variable does not distinguish between different types, intensities or durations of engagement. Fourth, some subgroup estimates are based on small numbers of firms, meaning that the heterogeneity analysis should be interpreted as exploratory. The logistic regression models estimate the main association between HEI collaboration and innovation activity, but they do not test more complex interaction effects, such as whether the association is stronger for particular industries, size groups or revenue classes; instead, heterogeneity is examined descriptively through subgroup-specific marginal effects. Finally, the sample is drawn from a single Finnish region, meaning that the findings may not be easily generalisable to other contexts. Instead, the study is likely to be particularly relevant to settings characterised by small-firm dominance, limited internal R&D capacity, and relatively close institutional proximity between firms and HEIs, while also offering broader analytical insight into how HEI collaboration may support innovation in resource-constrained SME environments.

The findings of this study offer implications for educational institutions and regional policymakers. Because the results suggest that HEI collaboration is positively associated with innovation activity across a broad range of small firms, with little evidence of systematic differences by size, industry, or municipality, policies should reflect this inclusivity. It appears unjustified for practitioners to restrict innovation funding or support programmes exclusively to stronger-performing, science-based, or high-tech enterprises (Johnston and Prokop, 2025). Instead, policymakers should focus on reducing administrative barriers and fostering practice-oriented, informal engagement models that better reflect the diversity of SMEs. By doing so, HEI partnerships may provide a broadly accessible route for supporting innovation activity across diverse small firms in regional ecosystems.

Ethics Declaration

This study used aggregated survey data from small firms in South Karelia, Finland, collected through the EK-Inno project. No individuals or firms are identifiable. As the study involved no sensitive personal data or interventions, formal ethical approval was not required under the institution's guidelines. Participation was voluntary, and the data were used solely for research purposes.

AI Declaration

AI tools, including Scopus AI, ChatGPT and Grammarly, were used to support the research and writing process. These tools assisted with literature exploration, language editing, improving clarity, conciseness and academic tone, and refining wording and structure during the drafting process. The authors made all empirical analyses, interpretations and final decisions about the content. The authors reviewed and approved the final manuscript and take full responsibility for its accuracy, integrity and originality.

References

- Apa, R., De Marchi, V., Grandinetti, R., Sedita, S.R., 2021. University-SME collaboration and innovation performance: the role of informal relationships and absorptive capacity. *The Journal of Technology Transfer* 46, 961–988. <https://doi.org/10.1007/s10961-020-09802-9>
- Audretsch, D.B., Guenther, C., 2023. SME research: SMEs' internationalization and collaborative innovation as two central topics in the field. *Journal of Business Economics* 93, 1213–1229. <https://doi.org/10.1007/s11573-023-01152-w>
- Boschma, R., 2005. Proximity and Innovation: A Critical Assessment. *Regional Studies* 39, 61–74. <https://doi.org/10.1080/0034340052000320887>
- Brown, C., Frame, P., 2016. Role of transitory communities of practice in business school collaborative knowledge-sharing projects: from the partner's perspective. *International Journal of Innovation and Learning* 19, 109–124. <https://doi.org/10.1504/IJIL.2016.073306>
- Brunswick, S., Vanhaverbeke, W., 2015. Open Innovation in Small and Medium-Sized Enterprises (SMEs): External Knowledge Sourcing Strategies and Internal Organizational Facilitators. *Journal of small business management* / 53, 1241–1263. <https://doi.org/10.1111/jsbm.12120>
- Cao, Z., Verreynne, M., de Oliveira, R.T., 2026. Reflecting back and looking forward: A systematic literature review of SME–university collaborations. *International journal of management reviews*. 28. <https://doi.org/10.1111/ijmr.12393>
- Cohen, W.M., Levinthal, D.A., 1990. Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly* 35, 128–152. <https://doi.org/10.2307/2393553>
- Darabi, F., Saunders, M.N.K., Clark, M., 2020. Trust initiation and development in SME–university collaborations: implications for enabling engaged scholarship. *European Journal of Training and Development* 45, 320–345. <https://doi.org/10.1108/EJTD-04-2020-0068>
- Grandinetti, R., 2016. Absorptive capacity and knowledge management in small and medium enterprises. *Knowledge Management Research & Practice* 14, 159–168. <https://doi.org/10.1057/kmrp.2016.2>
- Jensen, M.B., Johnson, B., Lorenz, E., Lundvall, B.Å., 2007. Forms of knowledge and modes of innovation. *Research Policy* 36, 680–693. <https://doi.org/10.1016/j.respol.2007.01.006>
- Johnston, A., Prokop, D., 2025. Collaborations between universities and entrepreneurial ventures: a micro-firm perspective. *Journal of Small Business and Enterprise Development* 32, 1055–1080. <https://doi.org/10.1108/JSBED-04-2024-0217>
- Lee, H., Miozzo, M., 2019. Which types of knowledge-intensive business services firms collaborate with universities for innovation? *Research Policy* 48, 1633–1646. <https://doi.org/10.1016/j.respol.2019.03.014>
- Osorno-Hinojosa, R., Koria, M., Ramírez-Vázquez, D. del C., 2022. Open Innovation with Value Co-Creation from University–Industry Collaboration. *Journal of Open Innovation: Technology, Market, and Complexity* 8, 32. <https://doi.org/10.3390/joitmc8010032>
- Parrilli, M.D., Radicic, D., 2021. STI and DUI innovation modes in micro-, small-, medium- and large-sized firms: distinctive patterns across Europe and the U.S. *European Planning Studies* 29, 346–368. <https://doi.org/10.1080/09654313.2020.1754343>
- Rantala, T., Saunila, M., Ukko, J., Rinkinen, S., 2026. SMEs as cutting-edge research utilizers: the strategies, motivations, and barriers of forerunners. *The Journal of Technology Transfer* 51, 854–879. <https://doi.org/10.1007/s10961-025-10239-1>
- Statistics Finland, 2008. Standard Industrial Classification TOL 2008. https://stat.fi/en/luokitukset/toimiala/toimiala_1_20080101