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Critical review

Local buzz, global pipelines, or simply too much buzz? A critical study

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ABSTRACT

The conceptual framework of local buzz and global pipelines has received much attention. It suggests that regional collaboration (local buzz) in particular will induce value creation if combined with international collaboration (global pipelines). Here, we analyze national data from Norway and find that both regional and international collaboration can foster product innovation. However, for medium-sized enterprises, we only found a substitution effect from combining regional and international collaboration. For small enterprises, there was even a subtractive effect. For large enterprises, we found an additive effect, and for very large enterprises, there was a multiplicative effect. It thus appears that large enterprises have an increased absorptive capacity in handling both regional and international collaboration. We conclude that the local buzz and global pipelines proposition is rejected for small and medium-sized enterprises, and gains partial to full support for large and very large enterprises.

Contents

1. Introduction

The conceptual framework of local buzz and global pipelines has received much attention in the research literature. It suggests that the collaboration of firms in the same geographical region (local buzz) in particular will induce technological spillovers and value creation if these activities are combined with international collaboration (global pipelines), and vice versa. The terms local buzz and global pipelines were introduced by Bathelt et al. (2004), and their publication has been cited more than 1000 times. The line of reasoning behind the concepts of local buzz and global pipelines dates back to writings on weak and strong ties (Granovetter, 1973; Krackhardt, 1992), structural holes and network closures (Burt, 1992; Coleman, 1988), bridging and bonding social capital (Putnam, 2000), and small-world networks (Watts and Strogatz, 1998). Local buzz can be favorable because an embedded context of local bonding will induce trust, reduce transaction costs, create technological spillovers, and provide fine-grained information sharing to enable the mingling of different ideas. Global pipelines play the role of bridging structures that provide access to novel and non-redundant information that can create further technological spillover and spur innovation.

Despite the intuitive appeal of the concepts of local buzz and global pipelines, and their strong impact in the literature, we have yet to see studies that explicitly examined whether these concepts merely substitute for each other or have an additive or multiplicative effect on value creation. Fitjar and Rodriguez-Pose (2015) come close by examining the interaction effects on innovation from international collaboration and regional R&D investments and education level. Overall, they found that international collaboration is positive for innovation; however, the interaction effects from international collaboration and regional R&D investments

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and education level showed mixed results. Moreover, they did not find that regional collaboration has an innovation effect. Altogether, their results indicate that global pipelines matter more for value creation than local buzz.

We argue that studying the concepts of local buzz and global pipelines explicitly is warranted. First, in the absence of empirical evidence, academics may face the risk of wrongly informing stakeholders in the design of innovation systems and other infrastructure for regional value creation. Second, research on small-world networks, which is connotatively related to the concepts of local buzz and global pipelines, has shown mixed results (Aarstad, 2014). Therefore, it is not farfetched to assume that the concepts of local buzz and global pipelines may also show mixed results.

To address our research question, we carried out enterprise- and regional-level analyses on a national sample from the Norwegian part of the Community Innovation Survey (CIS), which is collected by Statistics Norway in collaboration with Eurostat. In some models, we analyzed data from more than 6500 enterprises operating in numerous industries, and the sample covers all regions of the country. Because participation in the Norwegian part of the CIS project was mandatory, we avoid potential non-respondent bias in the data. Aarstad et al. (2016) analyzed these data and found that international and regional innovation collaboration, which they label R&D collaboration, had positive innovation effects. In contrast to Fitjar and Rodriguez-Pose (2015), it may indicate that not only global pipelines, but also local buzz is positive for innovation.[1] However, to scrutinize the potentially genuine influence of local buzz and global pipelines, it is crucial to study the possible *interaction effects* between concept indicators. For instance, if local buzz and global pipelines have positive performance effects, and we in addition observe a *positive* interaction effect, we can deduce that the effect of the two concepts is multiplicative (i.e., the effect of local buzz is stronger if global pipelines are also present, and vice versa). This would indicate strong support for the local buzz and global pipelines proposition. If local buzz and global pipelines have positive performance effects, but there is *no* interaction effect, we can deduce that the two concepts do not have a multiplicative effect, but instead have an additive effect. This would indicate partial support for the proposition. Finally, if local buzz and global pipelines have positive performance effects, but we also observe a *negative* interaction effect, we may deduce that the two concepts merely substitute for each other. This would reject the proposition.

We also examine whether large enterprises handle the dual challenges of regional and international innovation collaboration better than small enterprises. Our motive in addressing this issue is that large enterprises may have more organizational resources, or absorptive capacity "to recognize the value of new, external information [from both regional and international collaboration], assimilate it, and apply it to commercial ends" (Cohen and Levinthal, 1990, p. 128). Absorptive capacity is critical for innovation (Cohen and Levinthal, 1990), and the concept has received much scholarly attention. However, to date, studies have not investigated whether large enterprises have increased absorptive capacity to handle the dual challenges of regional and international collaboration.

We argue that the approaches described above enable us to better comprehend different facets of local buzz and global pipelines as potential drivers of enterprise performance. We analyze primarily regional innovation collaboration as an indicator of local buzz and international innovation collaboration as an indicator of global pipelines. Our enterprise performance variable is product innovation, which we define with Utterback and Abernathy (1975, p. 642) as "a new [or substantially improved] technology or combination of technologies introduced commercially [as a good or service] to meet a user or market need."

2. Methodology and results

We studied data from the Norwegian part of the CIS, were participation was mandatory. In the following, we briefly explain how the dependent, independent and control variables are modeled.[2]

Product innovation as the dependent variable was measured as a dummy. The respondents were asked if the enterprise had introduced products at the market between 2008 and 2010 that were not only new or improved for the enterprise, but also for the enterprise's market. Regional and international innovation collaboration as the independent variables were also modeled as dummies. The respondents were asked whether they had regional or international innovation collaboration between 2008 and 2010. Enterprise size was measured as the number of employees in 2010.[3]

We control for national innovation collaboration (dummy), productivity (revenues in Norwegian kroner per employee in 2010), R&D intensity (R&D investments per employee in 2010), and whether the enterprise is multidivisional (dummy). Norway is divided into 89 economic geographical regions, and we control for regional population density (number of inhabitants per square kilometer). We also control for related and unrelated industry variety at regional level by modeling entropy based on enterprise Standard Industrial Classification (SIC) Codes (for details, see Aarstad et al., 2016, pp. 848–849). In addition, we control for industry heterogeneity (see Aarstad et al., 2016, pp. 850, 855). To minimize problems regarding potential non-normality, continuous variables were transformed for the whole sample by using Van der Waerden's (1953) method of generating normal quantile values. The procedure reduces skewness and kurtosis for the whole sample.

Table 1 presents the results of multilevel mixed-effects logistic regressions using Stata 13 (StataCorp., 2013).[4] In Model 1, we observe that international and regional innovation collaboration increased the propensity for product innovation. However, we also see that the interaction effect between the concepts is negative. We noted above that this may imply that regional and international collaboration substitute for each other, and odds ratios—based on regression estimates in Model 1 and reported in Fig. 1—indicate that this is the case. Fig. 1 shows that having regional collaboration *only* increased the odds for product innovation by about 2.6, while having international collaboration *only* increased the odds by about 3.5. Finally, having *both* regional and international collaboration increased the odds for product innovation by about 3.1. Thus, although regional and international collaboration tend to have substitution effects on the propensity for product innovation, the data also indicate that international collaboration has a stronger innovation effect than regional collaboration.

[1] The reason Fitjar and Rodriguez-Pose (2015) did not find an innovation effect from regional collaboration may be due to the non-respondent bias in their data and only analyzing enterprises within cities. Enterprises in their sample had at least 10 employees, while enterprises in the study by Aarstad et al. (2016) had at least five employees. Therefore, small enterprises located outside city regions may have an innovation effect from regional collaboration, while large enterprises in cities do not.

[2] For comprehensive information about the research context and methodology, see Aarstad et al. (2016).

[3] It may be a limitation that product innovation was measured between 2008 and 2010, while enterprise size was measured as the number of employees in 2010. However, using data from Dun and Bradstreet, we found that the correlation between enterprise size in 2008 and 2010 was 0.914 ($p < 0.001$). Thus, we argue that enterprise size in 2010 is a very good proxy for enterprise size between 2008 and 2010. (In line with the CIS data, we only included enterprises that in 2010 had at least five employees and fewer than 18,000 employees.)

[4] See Aarstad et al. (2016, p. 851) for numerous statistical details.

Table 1
Multilevel logistic regression analyses.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Fixed effects						
Enterprise level						
Multidiv. enterprise	0.061	0.045	−0.008	−0.035	0.040	0.027
	(0.125)	(0.126)	(0.307)	(0.308)	(0.317)	(0.320)
Size (**S**)	−0.055	−0.085	0.045	−0.255	0.123	−0.163
	(0.050)	(0.054)	(0.125)	(0.178)	(0.133)	(0.199)
Productivity	0.114*	0.111*	−0.087	−0.078	−0.085	−0.081
	(0.046)	(0.046)	(0.115)	(0.114)	(0.126)	(0.128)
R&D intensity	1.52***	1.53***	0.363***	0.387**	0.490**	0.501**
	(0.056)	(0.057)	(0.139)	(0.138)	(0.163)	(0.164)
Nat. innov. collab.	0.205	0.202	0.035	0.046	−0.358	−0.350
	(0.156)	(0.157)	(0.233)	(0.233)	(0.246)	(0.249)
Int. innov collab. (**I**)	1.26***	1.29***	0.684**	0.567*		
	(0.210)	(0.230)	(0.246)	(0.247)		
Reg. innov. collab. (**R**)	0.964***	0.985***			0.088	−0.108
	(0.174)	(0.176)			(0.242)	(0.266)
Regional level						
Unrel. variety	−0.021	−0.016	−0.070	−0.051	−0.016	−0.025
	(0.054)	(0.055)	(0.138)	(0.137)	(0.154)	(0.156)
Population density	−0.177†	−0.180†	−0.557*	−0.544*	−0.531	−0.534
	(0.099)	(0.099)	(0.279)	(0.276)	(0.330)	(0.335)
Rel. variety	0.230*	0.232*	0.829**	0.824**	0.693*	0.700*
	(0.105)	(0.106)	(0.305)	(0.302)	(0.343)	(0.349)
Enterprise-level interactions						
I ∗ R	−1.08***	−1.37***				
	(0.284)	(0.308)				
I ∗ S		−0.017		0.485*		
		(0.179)		(0.204)		
S ∗ R		−0.206				0.430†
		(0.167)				(0.223)
S ∗ R ∗ I		0.654*				
		(0.269)				
Random effects						
Regional effect	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industr. within regions	0.295	0.300	1.03	0.966	1.10	1.17
	(0.096)	(0.097)	(0.600)	(0.559)	(0.611)	(0.635)
Wald χ^2	1119.0***	1123.7***	27.35**	31.82***	16.12†	18.96*
Log likelihood	−2179.4	−2172.9	−353.7	−350.8	−312.3	−310.3
Likelihood ratio χ^2	25.6***	26.14***	7.97**	7.83**	8.72**	9.56**
Num. of regions	89	89	76	76	69	69
Num. industr. within regions	2010	2010	362	362	312	312
Num. of observations	6584	6584	557	557	508	508

Dependent variable: Product innovation. p = 0.015 for S * R * I in Model 2, p = 0.018 for I * S in Model 4, p = 0.053 for S * R in Model 6, two-tailed tests of significance. Standard error in parentheses.
† $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

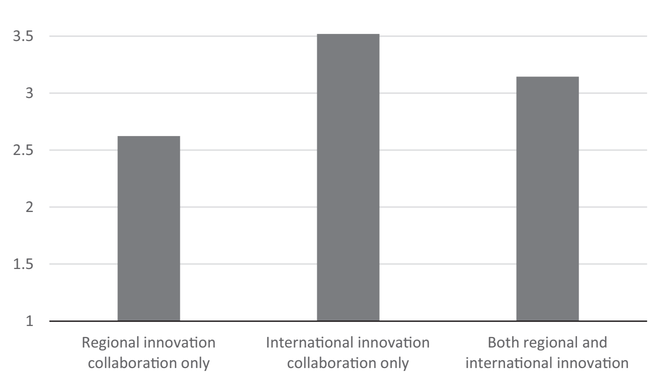

Fig. 1. Odds ratios of product innovation (vertical axis) as a function of regional innovation collaboration only (e^{R}), international innovation collaboration only (e^{I}), and both regional and international innovation collaboration ($e^{R+I+I*R}$). Odds ratios are based on parameter values from Table 1, Model 1.

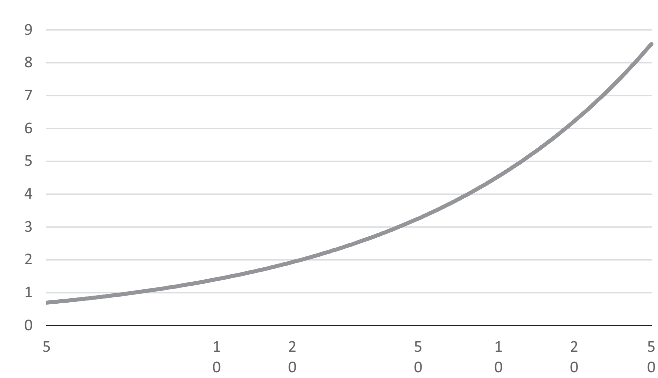

Fig. 2. Odds ratios of product innovation (vertical axis) as a function of both regional and international innovation collaboration and firm size (horizontal axis). Odds ratios are based on significant parameter values from Table 1, Model 2 ($e^{I+R+I*R+S*R*I}$; $S \in 5$, 500 employees).

In Model 2, we observe that the three-way interaction term between firm size and regional and international collaboration ($S * R * I$) increases the propensity for product innovation.[5] The direct innovation effects from regional and international collaboration are in line with those reported in Model 1. Fig. 2 reports odds ratios for product innovation as a function of enterprise size and enterprises having both regional and international collaboration. Odd ratios are based on significant parameter values in Model 2. Fig. 2 shows that the probability for product innovation increases as enterprise size increases. Specifically, we observe that enterprises with about 50 employees have a probability for innovation corresponding to our finding reported in the third column in Fig. 1. In other words, for medium-sized enterprises of about 50 employees, regional and international collaboration substitute for each other. For enterprises with 50–200 employees, we observe an additive innovation effect; odds ratios are higher than having either regional or international collaboration; cf. the two first columns in Fig. 1.[6] For enterprises with more than about 200 employees, we observe a multiplicative effect; odds ratios are higher than the sum of regional and international collaboration; cf. the two first columns in Fig. 1. Finally, for enterprises with fewer than 50 employees, we observe that the probability for product innovation decreases below the effect from having either regional or international collaboration; cf. the two first columns in Fig. 1. In other words, for small enterprises, we do not even find a substitution effect, but instead a subtractive effect.

In the following, we carry out split-sample analyses for two reasons. First, modeling interactions—in particular, the three-way interaction reported in Model 2—can induce multi-collinearity and unstable estimates (see O'Brien, 2007 for a review on multicollinearity). Split-sample analyses reduce this potential problem. Second, product innovation is modeled as a binary dependent variable and researchers have emphasized that the interpretation of interaction terms can be challenging when this is the case (Hoetker, 2007; Norton et al., 2004). Split-sample analyses also reduce this potential problem.[7]

Models 3 and 4 include all enterprises having regional collaboration, excluding all enterprises without regional collaboration. Previous models have shown that regional collaboration increases the propensity for product innovation. The additive innovation effect from international collaboration confirms our previous analyses indicating that international collaboration has a stronger innovation effect than regional collaboration. The positive interaction effect between international collaboration and enterprise size in Model 4 also confirms our previous analyses showing that large enterprises with regional collaboration have a stronger innovation effect from international collaboration than small enterprises.

Models 5 and 6 include all enterprises having international collaboration, excluding all enterprises without international collaboration. Previous models have shown that international collaboration increases the propensity for product innovation. The absent additive innovation effect from regional collaboration confirms our previous analyses indicating that international collaboration has a stronger innovation effect than regional collaboration. The positive interaction effect between regional collaboration and enterprise size in Model 6 also confirms our previous analyses showing that large enterprises with international collaboration have a stronger innovation effect from regional collaboration than small enterprises.

Not surprisingly, R&D intensity is associated with innovation propensity in all models; however, the effect is particularly reduced in models that only include enterprises with regional innovation collaboration (Models 3 and 4). A likely interpretation is that regional collaboration can partly compensate for limited or no R&D investments.

In line with Aarstad et al. (2016), we report that related variety has a positive innovation effect, but it is particularly strong for enterprises with regional collaboration (Models 3 and 4). The negative effect of population density on innovation is also particularly strong for enterprises with regional innovation collaboration (Models 3 and 4). This might indicate that a related and complementary industry structure with relatively low cognitive distance in rural areas (low in population density) is particularly beneficial for enterprises with regional innovation collaboration.

3. Conclusion

In this study, we have tested how regional and international innovation collaboration, as indicators of local buzz and global pipelines (Bathelt et al., 2004), affect enterprises' propensities for product innovation. We have argued that empirical support for the local buzz and global pipelines proposition would imply a multiplicative effect in that local buzz in particular would induce value creation if combined with global pipelines, and vice versa. The analyses showed that both regional and international innovation collaboration can foster innovation. However, for medium-sized enterprises with about 50 employees, we merely found a substitution effect from combining regional and international collaboration (compared with having either regional or international collaboration). For enterprises with fewer than 50 employees, there was in fact a subtractive effect. Thus, the innovation effect from combining regional and international collaboration was lower than having either regional or international collaboration. For enterprises with 50–200 employees, we found an additive effect, and for enterprises with more than about 200 employees, we found a multiplicative effect. We conclude that the local buzz and global pipelines proposition is rejected for small and medium-sized enterprises (because of its subtractive and substitution effect), and gains partial to full support for large and very large enterprises (because of its additive and multiplicative effect).

Our findings showed that international collaboration has an overall stronger innovation effect than regional collaboration. At the outset, this may imply that global pipelines matter more for enterprise innovation than does local buzz. However, according to Jakobsen and Lorentzen (2015), only studying regional innovation collaboration as an indicator of local buzz may underestimate the concept's genuine connotation. In line with these scholars' concerns, we argue that to fully elucidate the local buzz concept, regional collaboration should be studied in conjunction with other enterprise- and regional-level indicators. For instance, we found that R&D investments matter relatively little for enterprises with regional innovation collaboration. Furthermore, we found that a regional industry structure of related variety and low regional population density matter relatively more for enterprises with regional collaboration. A preliminary conclusion is that regional innovation collaboration is most beneficial for practically oriented enterprises with limited R&D investments located in rural but industrially related areas. Future research should investigate these issues in more detail.

In addition to contributing empirically to the concepts of local buzz and global pipelines (Bathelt et al., 2004), this study

[5] Firm size used as the continuous variable in interaction terms was mean centered for the whole sample. For further readings, see Cronbach (1987).

[6] Strictly speaking, if $I * R > I$, $I * R > R$, but $I * R < I + R$, which is the case for enterprises having 50–200 employees, there is actually a combined substitution and additive effect. As S increases, the substitution effect decreases, and the additive effect increases. The substitution effect is about 0 when S approaches 200, i.e. $I * R \gg I$, $I * R \gg R$, and $I * R \approx I + R$. Thus, for enterprises with about 200 employees, we have a "pure" additive effect and no substitution effect.

[7] Despite this potential problem, we present two models with interaction terms (Models 4 and 6). However, they are less complex than the three-way interaction in Model 2. In addition, we also present two models absent of interactions (Models 3 and 5).

contributes to our knowledge of absorptive capacity (Cohen and Levinthal, 1990). We have shown that large enterprises in particular seem to have the necessary absorptive capacity to handle the dual challenges of regional and international collaboration.

One limitation of this study is the cross-sectional research design. To increase internal validity, future research should analyze regional and international innovation collaboration in a longitudinal research design or by the use of appropriate instrumental variables. Future research should also aim to analyze other performance measures and indicators of local buzz and global pipelines than those studied here.

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