Geography, Innovation and Policies: insights from Canada

'*On the link between service clusters and the use of services for innovation*'

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Context of the research

- Innovation is a process becoming more open or distributed, in turn associated with increasing levels of collaboration and outsourcing. This has led the analysis to investigate more closely the role and links with external partners on innovation.

- Among them has emerged a set of actors who may be termed as KIBS (Knowledge-Intensive Business Service) and who serve as sources, facilitators and carriers of innovation (Di Maria et al., 2012; Sundbo and Toivonen, 2012; Martinez-Fernandez, 2011; Doloreux and Shearmur, 2012; Miles, 2008; Den Hertog, 2000).

- In recent years, the question of the benefits of geographical clusters on firms' innovation performance has spurred a great deal of academic research, both in management (Folta et al., 2006; Gilbert et al., 2008; McCann and Folta, 2011) and in economic geography (Martin and Sunley, 2003; Simmie, 2004; Wolfe and Gertler, 2004; Giuliani and Bell, 2005; Isaksen, 2009; Wolfe, 2009).

Context of the research

- Surprisingly, little research has hitherto been conducted on the cluster phenomena and the use of services and KIBS event though KIBS

    - are key factors in the innovation process (den Hertog, 2000; Doloreux & Shearmur, 2012; Allee, 2008),

    - and it has been suggested that they are important components of regional innovation systems (Cooke & Leydesdorff, 2006; Rodriguez et al, 2012)

    Our interest here is first of all the possible association between the geographical concentration of KIBS and the use of KIBS.

Objectives

The objective is to investigate how the geographical concentration of KIBS in a given region and clusters affects the use of KIBS by manufacturing .

O1:   To examine if firms use more KIBS when they located in a milieu with high concentration of KIBS

O2:   To analyse if innovative firms use more KIBS when they located in a milieu with high concentration of KIBS .

O3:   To analyse, among the innovative firms, if these patterns differ among different types of innovation – product, process, and organisational.

Contributions

- Most of the literature in this field has been paid relatively **scarce attention to the ways the use of KIBS improves users' ability to develop, absorb and apply knowledge in their innovation process**. Most empirical research has been focused on KIBS as innovators not as sources, facilitators and carriers of innovation.

- Second, and related to this, the bulk of current research has focused on spatial co-location of business activities and the benefits of geographical concentration in the innovation process rather than on actual relation between the use of KIBS and type of clusters. While most research has shown the ways clusters and/or the local business environment of a firm matters for innovation, **the literature is nearly silent concerning the ways in which the attributes and characteristics of a given cluster – or a given industrial context- affect the likelihood of using external services in the innovation process.**

The starting point (1/3)

- **KIBS and manufacturing innovation**
  - It is recognised – in theory and on the strength of case studies – that KIBS can be a key external factor for knowledge and know-how acquisition.

- **BUT relatively scant evidence:**

- **- precisely which KIBS influence what types of innovation?**

- **- is this influence evident when large populations of establishments are studied?**

- - a variety of processes can be envisioned:

- 1) an innovative establishment may call upon KIBS as collaborators.

- 2) an innovative establishment may call upon KIBS as sub-contractors.

- 3) an non-innovative establishment may obtain an idea for innovation from a KIBS supplier.

- 4) an non-innovative establishment may be recognised as having potential by a KIBS supplier, and a partnership may ensue.

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The starting point (2/3): The geographical question

1- Territorial approach:

- **KIBS**: they are an important component of the local/regional innovation system in which they located within

- **Innovation:** geographical concentration of different economic and insitutional actors in a given milieu foster innovation and knowledge exchange – agglomeration economies, geographical proximity, social and institutional context…

Therefore, the recourse to local/regional KIBS facilitates innovation

The starting point (3/3): The geographical question

2- A-spatial approach:

- **KIBS**: they are an important component of the business eco-system for exchanges of knowledge and information

- **Innovation:** services and KIBS-use can occur across distance; temprorary face-to-face remain important, but not co-location or geographical proximity; transport networks and cost-related and time remain important.

Therefore, what is important is the relations between constitutive elements that generate, disseminate, and utilize knowledge and these relations are not bound or favor by geographical proximity

Data and Methods

- **Survey**

    - Survey of 804 manufacturing establishments, April to June 2011.

    - Population: CRIQ data base, 8809 establishments of over 5 employees.

    - Random sample.
        - - it is representative: - geographically (type of region: metropolitan area, central, peripheral, and urban/rural).
        - by sector (5 Pavitt (1984) sectors)
    - Questionnaire on use of services ('tangible' services)
    - Innovation questions are asked at the end of the questionnaire: respondents are not aware, when answering service-use questions, that innovation questions will be asked.

Table 2.A : Service types according to their role in the value chain

Category	Service type
Identification of high-value knowledge	Identification of technological and equipment requirements Identification of R&D needs Consulting services for access to technology, patents, etc.
Knowledge validation	Consulting services for business plan preparation Assistance with prototype design or technological feasibility tests Consulting services for patent preparation Certification of product or process safety
Implementation	Consulting services for improving management processes Consulting services for implementing a process or bringing a product on line Consulting services for accessing capital or financing Fiscal services
Commercialization *Support services/implementation*	Consulting services for commercialization or marketing Human resource management services Services offered by lawyer or notary Accounting services

Data and Methods

- Regional data

  - ## 102 regions in Quebec
    - 62 rural (no municipality of over 10 000)
    - 42 urban (municipality of over 10 000, Census Metropolitan Area or Census Agglomeration)

  - ## 24 high order services, mainly 3 digit (some aggregations)
    - KIBS (9 - NAICS 54)
    - Information and cultural (6 - NAICS 51)
    - Finance and insurance (7- NAICS 52)
    - Leasing (2 - NAICS 53)

Analysis

- This is an exploratory analysis.

- It highlights correlations between variables after accounting for control factors.

- These correlations sometimes *corroborate* certain causal theories.

- However, the correlations do not *demonstrate* causality, which is often complex and circular.

A little bit of context on KIBS (but not too much)

Where are KIBS located?

Table 2: KIBS employment and location quotients in Québec

	KIBS	LQ
Montréal	153 250	1.29
Québec	26 695	1.08
Central cities, over 50K	13 965	0.71
Central cities, under 50K	5 720	0.74
Rural central	15 500	0.51
Peripheral cities, over 50K	4 435	0.75
Peripheral cities, under 50K	5 675	0.52
Rural peripheral	3 815	0.34

note: a central city (or rural area) is one located within 100km of Montréal, Québec or Ottawa

How far KIBS users from their providers?

Métropoles	temps moyen	10% à moins de	25% à moins de	50% à moins de	25% à plus de	10% à plus de
Montréal	25	2.7	5.5	11.6	21.9	36.9
Québec	44	5.1	5.9	11.4	20.7	231.2
moins d'une heure (environ) d'une métropole						
ville, plus de 50 K	42	1.8	3.7	9.3	64.1	122.4
ville, moins de 50 K	44	1.2	2.3	15.6	63.8	108.1
rural (pas de ville + de 10K)	64	9.0	22.3	41.8	78.1	151.1
plus d'une heure d'une métropole						
ville, plus de 50 K	62	3.3	4.4	9.9	31.1	223.1
ville, moins de 50 K	197	2.5	5.8	25.8	199.2	749.2
rural (pas de ville + de 10K)	173	13.8	27.0	71.3	228.3	616.4

bleu: moins de 15 minutes
vert: 15 à 60 minutes
orange: 1 à 2 heures
rouge: plus de 2 heures

Main results from the empirical analysis

Methodology

Factor analysis (102 regions)
Variables: Location Quotients
. for high-order service sectors

- reduce variables,
- identify sectors that tend to co-locate

Cluster analysis (102 regions)
Variables: Factor scores
. across 102 Quebec regions
. major metros kept separate

- classify each region according to factor profiles

Identify regional clusters of service

Logistic regression (804KIBS firms)
. clusters are explanatory variables for use of KIBS
. subdivide each cluster
. 3 types of KIBS innovation

- does being in a particular cluster increase propensity to use KIBS?

Effect of clusters on the use of KIBS

Service clusters and KIBS use: cluster analysis

❑ 8 factors explain 67% of variance of 24 sectors

Table 3. Descriptive names of factors

Factor 1:	Management, marketing and real estate
Factor 2:	Telecoms, engineers, R&D (high-tech)
Factor 3:	Accounting, legal, broking
Factor 4:	Financial authorities
Factor 5:	Insurance and finance
Factor 6:	Rental / not financial intermediaries
Factor 7:	Data processing
Factor 8:	Insurance broking

Service clusters and KIBS use: cluster analysis

- ❑ 7 clusters retained (hierarchical clustering of factor scores) + Montréal + Québec + Ottawa

Table 4. Cluster description and profiles: mean factor scores

Cluster 1:	Low to average service provision
Cluster 2:	Low service provision
Cluster 3:	Insurance broking & some management, marketing
Cluster 4:	High tech & multimedia
Cluster 5:	Data processing
Cluster 6:	Management, marketing & FIRE
Cluster 7:	Financial authorities

Cluster description and profiles: mean factor scores

CLUSTER	n regions	n obs.	F1	F2	F3	F4	F5	F6	F7	F8	med. KIBS emp.
1	46	240	-0,41	-0,36	0,26	-0,18	0,08	-0,20	-0,20	-0,19	54(
2	8	24	0,38	0,26	**-1,34**	-0,44	-0,48	0,04	-0,09	**-1,30**	33:
3	12	73	**0,62**	-0,30	0,19	-0,41	**-0,72**	0,47	0,00	**1,29**	81(
4	8	67	-0,58	**2,11**	0,03	-0,37	-0,01	0,50	-0,46	0,60	175:
5	6	42	-0,03	0,25	0,20	0,24	-0,29	-0,19	**2,38**	0,06	74:
6	4	23	**1,81**	-0,13	-0,22	-0,22	**2,12**	-0,09	-0,57	0,65	200:
7	4	14	0,14	-0,06	0,08	**3,08**	0,09	0,19	-0,19	-0,18	95:
Quebec	1	89									
Montreal	1	222									
Total	90	794									

KIBS use: Do service clusters play a role?

Innovators and non-innovators

	All observations		Non-Innovators		Innovators	
	All	All	All	All	All	All
pseudo r2	0,007	0,229	0,028	0,230	0,021	0,178
nul -2LL	3024	3024	853	853	2033	2033
model -2LL	3019	2823***	847	793***	2021	1927***
n	794	794	239	239	555	555
Clusters						
(Wld Chi2 test, DF=8)	5,66	13,05	6,51	9,17	10,91	18,02**
cluster 1: low to average service provision	-	-	-	-0,60**	-	-0,15
cluster 2: low service provision	-	-	-	-	-	0,54
cluster 3: ins. broking & some management, marketing	-	-	-	-	-	0,12
cluster 4: high tech & multimedia	-	-	-	-	-	-0,28
cluster 5: data processing	-	-	-	-	-	-0,53
cluster 6: management, marketing & FIRE	-	0,71**	-	-	-	1,34***
cluster 7: financial authorities	-	-	-	-	-	-0,59
Québec (ref= Montréal)			-	-	-	0,06
Control variables						
Labour		-		-		-
Research		-0,41**		-		-0,44*
Scale (ref= specialised & science based)		-		-		-
Size1, 0-5		-1,56***		-1,54***		-1,35***
Size2, 5-10		-1,24***		-0,98***		-1,09***
Size3, 10-20 (ref= over 20 employees)		-0,86***		-0,82**		-0,85***
Age1, pre 1980		-0,89***		-		-1,02***
Age2, 1980-89		-0,81***		-0,83**		-0,78***
Age3, 1990-99 (ref= founded 2000 or later)		-0,58***		-		-0,59**
RDemp1, none		-1,66***		-2,03***		-1,31***
RDemp2, 1-10%		-0,85***		-1,27*		-0,62**
RDemp3, 10-35% (ref= over 35% of employees in R&D)		-0,65**		-		-0,59*
export1, none		-		-		-
export2, 1-10%		0,60**		-		0,64**
export3, 10-50% ref= over 50% of output exported)		-		-		0,56*

KIBS use: Do service clusters play a role?

Product and process innovations

	Product	Process	Organisational
pseudo r2	0,214	0,206	0,199
nul -2LL	962	715	517
model -2LL	898***	668***	485
n	279	210	153
Clusters			
(Wld Chi2 test, DF=8)	17,62**	5,20	5,39
cluster 1: low to average service provision	-0,28	-0,14	-0,13
cluster 2: low service provision	0,65	0,21	0,12
cluster 3: ins. broking & some management, marketing	0,51	0,51	0,36
cluster 4: high tech & multimedia	0,19	-0,02	0,71
cluster 5: data processing	-1,57***	-0,75	-0,92
cluster 6: management, marketing & FIRE	1,25*	0,44	1,10
cluster 7: financial authorities	-0,44	-0,17	-0,79
Québec (ref= Montréal)	0,15	0,24	-0,31
Control variables			
Labour	-0,01	-0,01	0,20
Research	-0,46	-0,50	0,15
Scale (ref= specialised & science based)	-0,23	-0,10	-0,39
Size1, 0-5	-2,04***	-2,70***	-2,12***
Size2, 5-10	-1,23***	-0,88*	-1,49***
Size3, 10-20 (ref= over 20 employees)	-1,02***	-0,95***	-0,79*
Age1, pre 1980	-0,82**	-0,73*	-0,65
Age2, 1980-89	-0,64*	-0,64	-0,17
Age3, 1990-99 (ref= founded 2000 or later)	-0,70**	-0,26	-0,42
RDemp1, none	-1,78***	-2,11***	-2,28***
RDemp2, 1-10%	-1,04**	-1,45**	-1,79**
RDemp3, 10-35% (ref= over 35% of employees in R&D)	-1,30***	-1,64***	-1,15
export1, none	0,32	0,02	-0,35
export2, 1-10%	0,68	-0,16	0,12
export3, 10-50% ref= over 50% of output exported)	0,46	0,22	-0,22

Do clusters add anything to 'geography'?

- It is well know that economic growth in Canada varies across certain geographic dimensions (Shearmur & Polèse, 2007).

  - city size
  - location of city (close to or far from a large metro area)
  - urban (agglomeration of over 10 000 people)/ rural

- Do our results for the use of KIBS and clusters merely pick up these general patterns of economic development?

Regional typology (Shearmur and Polèse, 2002; 2006;2008)

- Montreal
- Quebec
- Central cities, 50-500K
- Central cities 10-50K
- Central rural Peripheral cities, 50-500K
- Peripheral cities, 10-50K
- Peripheral rural   (

KIBS use:
Do regions play a role?

Innovators and non-innovators

	All	Non innovator	Innovators
pseudo r2	0,225	0,229	0,168
nul -2LL	3024	853	2033
model -2LL	2827***	793***	1934***
n	794	239	555
Region type (Wald Chi	8,75	8,71	13,34*
Quebec	0,23	0,10	0,25
Central cities, 50-500K	0,05	-0,09	0,09
Central cities 10-50K	-0,42*	-0,74*	-0,36
Central rural	0,17	-0,22	0,25
Peripheral cities, 50-50	-0,29	0,39	-0,45
Peripheral cities, 10-50	0,19	0,53	0,09
Peripheral rural	0,17	-0,38	0,44
Labour	-0,24	-0,08	-0,26
Research	-0,42**	-0,10	-0,42*
Scale	-0,17	0,04	-0,21
Size1, 0-5	-1,57***	-1,47***	-1,33***
Size2, 5-10	-1,22***	-0,86**	-1,04***
Size3, 10-20	-0,83***	-0,70**	-0,80***
Age1, pre 1980	-0,87***	-0,39	-1,03***
Age2, 1980-89	-0,80***	-0,76**	-0,79***
Age3, 1990-99	-0,58***	-0,44	-0,61***
RDemp1, none	-1,64***	-1,86***	-1,25***
RDemp2, 1-10%	-0,83***	-1,00	-0,55*
RDemp3, 10-35%	-0,64**	-0,36	-0,57*
export1, none	0,10	0,30	0,26
export2, 1-10%	0,54**	0,75	0,53*
export3, 10-50%	0,29	-0,09	0,50

**KIBS use:
Do regions play
a role?**

**Product,
process and
org. innovations**

	Product	Process	Mkt & Mngt (Radical)
pseudo r2	0,184	0,212	0,253
nul -2LL	962	715	517
model -2LL	908***	666***	474,64***
n	279	210	153
Region type (Wald Chi2 tes	8,79	6,78	14,94**
Quebec	0,43	0,35	-0,18
Central cities, 50-500K	0,35	0,13	1,96***
Central cities 10-50K	-0,20	-0,54	-0,91
Central rural	0,52**	0,39	-0,04
Peripheral cities, 50-500K	-1,00	-1,00	-1,12
Peripheral cities, 10-50K	-0,03	0,33	0,09
Peripheral rural	0,07	0,53	0,22
Labour	-0,01	0,08	0,18
Research	-0,46	-0,52	0,39
Scale	-0,24	-0,07	-0,42
Size1, 0-5	-1,89***	-2,59***	-2,12***
Size2, 5-10	-1,05***	-0,89**	-1,62***
Size3, 10-20	-0,87***	-0,94***	-0,72*
Age1, pre 1980	-0,75**	-0,70	-0,39
Age2, 1980-89	-0,65*	-0,68	0,06
Age3, 1990-99	-0,68**	-0,27	-0,16
RDemp1, none	-1,68***	-2,17***	-2,56***
RDemp2, 1-10%	-0,93**	-1,46**	-2,15***
RDemp3, 10-35%	-1,20***	-1,69***	-1,27*
export1, none	0,24	-0,16	-0,44
export2, 1-10%	0,46	-0,31	-0,34
export3, 10-50%	0,30	0,12	-0,17

Conclusions

Summary of the findings

■ No (strong) evidence that the concentration of services are of importance in explaining the use of KIBS

   1) it is essentially the internal capacities of firms that explain their use of KIBS (employees of R & D, size etc ...).

   2) The environment does seems to play a key role, the picture is complex. Different geography for different KIBS' users.

- These results are suggestive

It should be emphasized that the profiles (or clusters) differentiate the innovators: however, they do not differentiate innovative and non-innovators.

- note also that in all models Quebec's three major metro areas are singled out, and have no positive effect on the use of KIBS.

In short, and given our observations, there are three possibilities:

i. <u>There are indeed links between service clusters and KIBS use for innovation, but the overall picture is complex and there is not specific patterns that can be identified</u>.

ii. <u>There are no links between service clusters and KIBS use</u>.

iii. <u>KIBS innovation is not associated with any local factors **at this scale**</u>.

Conclusions

Implications and limitations

- the results of this study first fill a puzzle to the mainstream literature on clusters, regional innovation systems and networks, which considers geographical proximity to be a driver of knowledge exchange and interactions with external sources of knowledge.

  - A problem of scale?

  - A problem of 'tools' that don't capture the dynamics of innovation

  - A case that is (too much) context-specific?