

Milieux Créateurs, their Differences, Determinants, and Policy Implications

By

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Outline

- **Research question**
- **Approach to analysis of milieux créateurs**
- **Hypotheses**
- **Contribution to scholarly knowledge**
- **Data**
- **Statistical approach**
- **Findings**
- **Conclusion and policy implications**

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Research Questions

- **What are innovative milieux?**
- **What are the determinants of innovative milieux?**
- **Are there differences between industries and regions in matter of determinants of innovative milieux?**
- **What are the policy implications resulting from the findings on determinants of innovative milieux?**

Approach to the Analysis of Innovative Milieux

- **Major difference of the approach to innovative milieux by comparison to other approaches:**
 - A different unit of analysis

What Is the Appropriate Unit of Analysis?

- **Firms as isolated agents of innovation**
- **Production systems: environment in which firms operate**

How Is the Environment of Firms Defined in the Literature?

- **Industrial districts (Marshall, etc.)**
- **National systems of innovation (Lundvall, Niosi, Nelson, etc.)**
- **Regional systems of innovation (Wolfe, De la Mothe, Holbrook, etc.)**
- **Clusters (Porter, etc.)**
- **Milieux innovateurs (Aydalot, Maillat, etc.)**

Common Characteristics of Production Systems

- 1) **Interactions** between firms and between firms and other actors: weak or strong cooperation generating networks of exchange of information and knowledge, and the construction of a ba, a collective space of exchange
- 2) **Learning**: weak or strong capacity to use information, knowledge and know how to develop or improve products or processes
- 3) **Geography and sectors**: regions, nations or industries

Hypotheses of the Innovative Milieux Approach

- Hypothesis about interactions and learning:
 - The higher are the interactions and learning, the more appropriate the milieu is to foster innovation
- Hypothesis about geography and industry:
 - in high tech industries, interactions and learning are more likely to be organized around industries than geography
 - in traditional industries, interactions and learning are more likely to be organized around geography than industries

Contribution to Scholarly Knowledge

- **Most studies on milieux créateurs are qualitative in nature and provide many untested hypotheses**
- **Studies on milieux créateurs are case studies**
- **This study is quantitative and comparative in nature**
- **This study attempts to test the basis hypotheses of the approach in using the Statistics Canada Innovation Survey, thus using data appropriate to see how milieux créateurs (interactions and learning) differ based on geography and industrial sectors**

Data

- **A subset of industries of the Statistics Canada Innovation Survey of 1999**

NAICS Codes used in the Survey of Innovation that Correspond to the ISRN Cluster Definitions

ISRN Cluster	NAICS code and title	No. of Enterprises in database
Photonics/Wireless Telecom & Information Technologies	3341 – Computer and Peripheral Equipment Manufacturing 3342 – Communications Equipment Manufacturing 3343 – Audio and Video Equipment Manufacturing 3344 – Semiconductor and other Electronic Equipment Manufacturing 3345 – Navigational, Measuring, Medical and Control Instruments Manufacturing 3346 – Manufacturing and Reproducing Magnetic and Optical Equipment	Total: 298 3341 – 45 3342 – 66 3343 – 5 3344 – 49 3345 – 118 3346 – 15
Wood products	3211 – Sawmills and Wood Preservation 3212 – Veneer, Plywood and Engineered Wood Product Manufacturing 3219 – Other Wood Product Manufacturing	Total: 688 3211 – 282 3212 – 114 3219 – 292
Food and Beverage (including wine)	311–Food Manufacturing 312 – Beverage and Tobacco Product Manufacturing	Total: 654 311 – 821 312 – 915
Auto	3361 – Motor Vehicle Manufacturing 3362 – Motor Vehicle Body and Trailer Manufacturing 3363 – Motor Vehicle Parts Manufacturing	Total: 308 3361 – 27 3362 – 98 3363 – 183

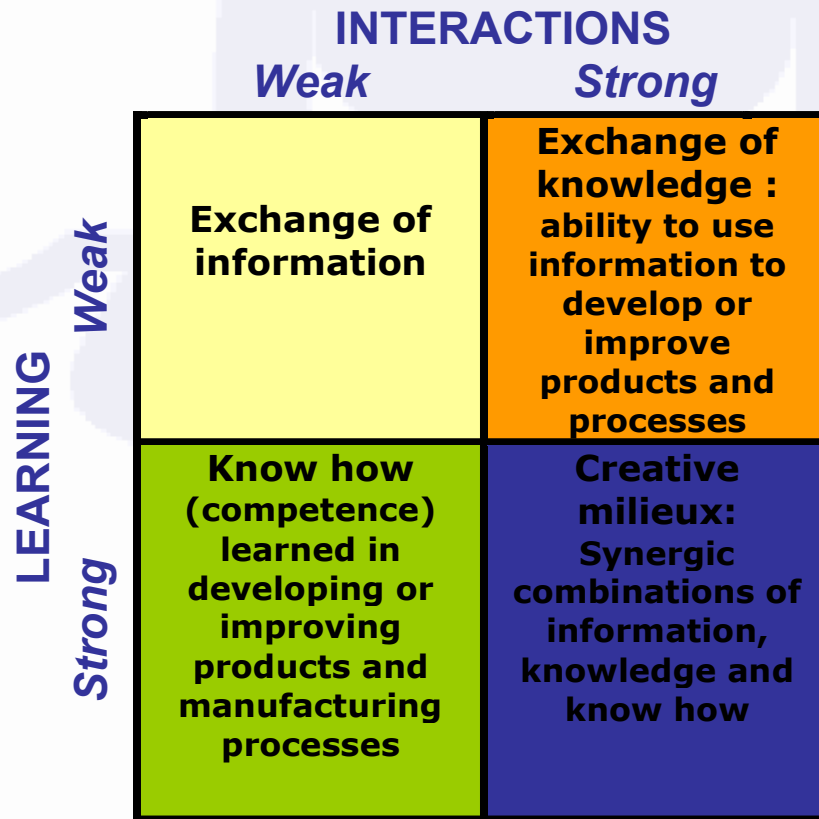
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Approach to Data Analysis

- In order to see what are the determinants of the various milieux and to see in what ways the most favorable innovative milieux compare to the others, we have estimated 25 binomial logit models.

Dependent Variable: Four Innovative Milieux



Operational Definitions of the Four Milieux: Milieux are build by using two indices (1)

LEARNING The sum of the number of the different activities which are linked to offering new or significantly improved products or to introducing new or significantly improved production/manufacturing processes.

- Research and development (R&D) linked to new or significantly improved products or production/manufacturing processes;
- Acquisition of machinery, equipment or other technology linked to new or significantly improved products or production/manufacturing processes;
- Industrial engineering and industrial design linked to new or significantly improved products or production/manufacturing processes;
- Tooling up and production start-up linked to new or significantly improved products or production/manufacturing processes;
- Training linked to the introduction of new or significantly improved products or production/manufacturing processes.

Median	4.0
Mean	3.79
Std	1.41

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Operational Definitions of the Four Milieux: Milieux are build by using two indices (2)

INTERACTIONS The sum of the number of the different sources of information used to develop new products and new manufacturing processes.

- Research and development (R&D) staff;
- Marketing staff;
- Production staff;
- Management staff;
- Related firms in your corporate group;
- Suppliers of equipment, material and components;
- Clients;
- Competitors;
- Consultancy firms;
- Trade fairs and exhibitions;
- Internet or computer based information networks;
- Professional conferences, meetings and publications;
- Universities and colleges;
- Federal government agencies and research laboratories;
- Provincial agencies and research laboratories.

Median	6.0
Mean	6.46
Std	2.87

Operational Definitions of the Four Milieux:

Median of the two indices were used to identify the Milieux

WW = Learning \leq 4 & Interaction \leq 6

WS = Learning \leq 4 & Interaction $>$ 6

SW = Learning $>$ 4 & Interaction \leq 6

SS = Learning $>$ 4 & Interaction $>$ 6

Independent Variables (1)

Competitive environment index

Level of agreement with the following statements (1 = Strongly disagree to 5 = Strongly agree).

- My client's demands are easy to predict;
 - My clients can easily substitute my products for the products of my competitors;
 - My competitor's actions are easy to predict;
 - The arrival of new competitors is a constant threat;
 - The arrival of competing products (goods or services) is a constant threat;
 - My firm can easily replace its current suppliers;
 - It is difficult to hire qualified staff and workers;
 - It is difficult to retain qualified staff and workers;
 - My products (goods and services) quickly become obsolete;
 - Production technologies change rapidly;
 - Office technologies change rapidly.
-

Size

Total number of the establishment's employees.

R&D activities

Binary variable coded 1 if, between 1997 and 1999, the firm undertook R&D activities and 0 otherwise.

Independent Variables (2)

Variety of barriers to innovation

The sum of the different obstacles met by the firms to access information regarding the development or improvement of products and processes.

- High cost of developing new or significantly improved products or processes;
- Inability to devote staff to projects to develop new or significantly improved products or processes on an on-going basis because of production requirements;
- Inability to qualify for government assistance programs or R&D tax credits;
- Lack of skilled personnel to develop or introduce new or significantly improved products or processes;
- Lack of financing for the development or introduction of new or significantly improved products or processes;
- Lack of marketing capability to market new or significantly improved products;
- Lack of information on technology relevant to the development or introduction of new or significantly improved products or processes;
- Lack of external technical support services required to develop or introduce new or significantly improved products or processes;
- Lack of access to expertise in universities that could assist in developing or introducing new or significantly improved products or processes;
- Lack of access to expertise in government laboratories that could assist in developing or introducing new or significantly improved products or processes;
- Lack of cooperation with other firms.

Independent Variables (3)

***Collaborative
arrangements***

• Binary variable coded 1 if, between 1997 and 1999, the firms were involved in cooperative and collaborative arrangements with other firms or organizations to develop new or significantly improved products and 0 otherwise.

Independent Variables (4)

Variety of government support programs used

The sum of the number of the different federal and provincial government programs used by the firms between 1997 and 1999.

- Research and development tax credits;
 - Government research and development grants;
 - Government venture capital support;
 - Government technology support and assistance programs;
 - Government information or internet services;
 - Government support for training.
-

Findings (1)

Duncan' Test by Industrial Sector

Means of the indices of **Learning** by industrial sector

(Duncan's test)

Learning index				
Industries	Number of observations	Subset for $\alpha = 0.05$		
		1	2	3
Wood products	506	3.71		
Food and beverage	734	3.87	3.87	
Photonics et al ^a	276		4.01	4.01
Auto	242			4.15
Significance ^b		.123	.173	.158

^a Photonics, Wireless Telecom and Information technologies.

^b Duncan's test compares means for groups in homogenous subsets.

When the significance test is above the threshold = 0.05, the null hypothesis (non differences of means) cannot be rejected.

Means of the indices of **internal sources** of information by industrial sector (Duncan's test)

Internal sources index				
Industries	Number of observations	Subset for $\alpha = 0.05$		
		1	2	3
Wood products	506	2.26		
Auto	242		2.64	
Photonics et al ^a	276			2.83
Food and beverage	734			2.85
Significance ^b		1.000	1.000	.891

^a Photonics, Wireless Telecom and Information technologies.

^b Duncan's test compares means for groups in homogenous subsets. When the significance test is above the threshold = 0.05, the null hypothesis (non differences of means) cannot be rejected.

Means of the indices of **market sources** of information by industrial sector (Duncan's test)

Market sources index			
		Subset for $\alpha = 0.05$	
Industries	Number of observations	1	2
Wood products	506	1.98	
Food and beverage	734		2.18
Photonics et al ^a	276		2.34
Auto	242		2.35
Significance ^b		1.000	.074

^a Photonics, Wireless Telecom and Information technologies.

^b Duncan's test compares means for groups in homogenous subsets. When the significance test is above the threshold = 0.05, the null hypothesis (non differences of means) cannot be rejected.

Means of the indices of **research sources** of information by industrial sector (Duncan's test)

Research sources index			
Industries	Number of observations	Subset for $\alpha = 0.05$	
		1	2
Auto	242	.23	
Wood products	506	.27	.27
Food and beverage	734	.31	.31
Photonics et al ^a	276		.36
Significance ^b		.102	.066

^a Photonics, Wireless Telecom and Information technologies.

^b Duncan's test compares means for groups in homogenous subsets. When the significance test is above the threshold = 0.05, the null hypothesis (non differences of means) cannot be rejected.

Means of the indices of **generally available sources** of information by industrial sector (Duncan's test)

Generally available sources of information index				
Industries	Number of observations	Subset for $\alpha = 0.05$		
		1	2	3
Wood products	506	1.31		
Food and beverage	734		1.48	
Auto	242		1.56	
Photonics et al ^a	276			1.98
Significance ^b		1.000	.270	1.000

^a Photonics, Wireless Telecom and Information technologies.

^b Duncan's test compares means for groups in homogenous subsets. When the significance test is above the threshold = 0.05, the null hypothesis (non differences of means) cannot be rejected.

Findings (2)

Estimated Logit Models of Factors Affecting the Milieux

Estimated Logit models of factors affecting the milieu for firms in Photonics, Wireless Telecom and Information technologies

(Statistics Canada: Survey of innovation 1999)

<i>Dependant variables</i>	Weak Interaction Weak Learning/ Weak Interaction Strong Learning		Weak Interaction Weak Learning/ Strong Interaction Weak Learning		Weak Interaction Weak Learning/ Strong Interaction Strong Learning		Weak Interaction Strong Learning/ Strong Interaction Strong Learning		Strong Interaction Weak Learning/ Strong Interaction Strong Learning	
	<i>Coeff. β</i>	<i>Exp (β)^a</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>
<i>Constant</i>	-5.643	.004	-6.301	.0001	-25.392	.000	-14.171	.000	-14.875	.000
<i>Competitive pressures (COMPET)</i>	.034	1.035	.119***	1.126	.202***	1.224	.163***	1.177	.079***	1.082
<i>Barriers to knowledge exchange (OBSTACLE)</i>	.132	1.142	.297***	1.346	.100	1.105	-.178	.837	-.121**	.886
<i>Use of government support (GVTSUPP)</i>	-.071	.932	-.055	.947	-.197	.821	.187*	1.206	.014	1.014
<i>Number of employees (TOTEMPL)</i>	.005**	1.005	.001	1.001	.015***	1.015	.002**	1.002	.004***	1.004
<i>Collaborative arrangements (USECOLL)</i>	1.710***	5.529	1.426***	4.163	.985**	2.677	.383	1.466	-.398	.671
<i>R&D activities (BINR&D)</i>	2.385***	10.858	.659*	1.933	1.606	4.982	.902	2.464	1.187	3.277
<i>Quebec (BINQUE)^b</i>	1.285**	3.615	.807*	2.241	1.639**	5.152	-.649	.522	.471	1.601
<i>Rest of Canada (BINROC)</i>	-.752	.471	.222	1.249	1.162**	3.197	.764	2.147	.201	1.222
<i>N</i>	57/33		57/84		57/102		33/102		84/102	
<i>Chi-square (d.f.)</i>	25.74 (8)		32.23 (8)		102.82 (8)		33.06 (8)		56.62 (8)	
<i>Nagelkerke R² (Pseudo R square)</i>	.357		.287		.685		.343		.367	
<i>Percentage of correct predictions</i>	73.0 %		72.4 %		87.1 %		81.9 %		69.2 %	

^a Exp(β) is the factor of change in the odds of the dependant variable, due to a one unit increase in the specific independent variable.

^b Ontario is the reference category.

Figures between parentheses indicate p-value. *, ** and *** indicate that variable is significant at 10 %, 5 % and 1 % level respectively.

Estimated Logit models of factors affecting the milieu for firms in Wood products

(Statistics Canada: Survey of innovation 1999)

<i>Dependant variables</i>	Weak Interaction Weak Learning/ Weak Interaction Strong Learning		Weak Interaction Weak Learning/ Strong Interaction Weak Learning		Weak Interaction Weak Learning/ Strong Interaction Strong Learning		Weak Interaction Strong Learning/ Strong Interaction Strong Learning		Strong Interaction Weak Learning/ Strong Interaction Strong Learning	
	<i>Coeff. β</i>	<i>Exp (β)^a</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>
<i>Constant</i>	-2.833	.059	-3.168	.042	-4.576	.010	-1.975	.139	-2.269	.103
<i>Competitive pressures (COMPET)</i>	.049*	1.050	.034	1.034	.043*	1.044	.008	1.008	.027	1.027
<i>Barriers to knowledge exchange (OBSTACLE)</i>	-.132	.877	.313***	1.368	.296***	1.345	.322***	1.379	-.021	.979
<i>Use of government support (GVTSUPP)</i>	.285***	1.329	.189*	1.208	.252**	1.286	-.081	.922	.075	1.077
<i>Number of employees (TOTEMPL)</i>	-.001	.999	.002***	1.002	.001*	1.001	.003***	1.003	-.002**	.989
<i>Collaborative arrangements (USECOLL)</i>	.440	1.552	.361	1.435	.633*	1.883	.371	1.449	.824**	2.280
<i>R&D activities (BINR&D)</i>	1.932***	6.903	.052	1.054	2.525***	12.491	.896**	2.449	2.603***	13.501
<i>Quebec (BINQUE)^b</i>	-.418	.658	-.046	.955	-.170	.844	.018	1.018	.017	1.017
<i>British Columbia (BINBC)</i>	-.693	.500	-.149	.862	-.769*	.463	-.972**	.378	-.590	.554
<i>Rest of Canada (BINROC)</i>	-.955*	.385	-.126	.882	-.933**	.370	.007	1.007	-.742	.467
<i>N</i>	201/89		201/92		201/125		89/125		92/125	
<i>Chi-square (d.f.)</i>	60.39 (9)		31.68 (9)		118.58 (9)		29.48 (9)		63.64 (9)	
<i>Nagelkerke R² (Pseudo R square)</i>	.333		.180		.512		.198		.379	
<i>Percentage of correct predictions</i>	75.1%		68.0%		80.0%		67.0%		75.2%	

^a Exp(β) is the factor of change in the odds of the dependant variable, due to a one unit increase in the specific independent variable.

^b Ontario is the reference category.

Figures between parentheses indicate p-value. *, ** and *** indicate that variable is significant at 10 %, 5 % and 1 % level respectively.

Estimated Logit models of factors affecting the milieu for firms in Food and beverages (including wine)

(Statistics Canada: Survey of innovation 1999)

<i>Dependant variables</i>	Weak Interaction Weak Learning/ Weak Interaction Strong Learning		Weak Interaction Weak Learning/ Strong Interaction Weak Learning		Weak Interaction Weak Learning/ Strong Interaction Strong Learning		Weak Interaction Strong Learning/ Strong Interaction Strong Learning		Strong Interaction Weak Learning/ Strong Interaction Strong Learning	
	<i>Coeff. β</i>	<i>Exp (β)^a</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>
<i>Constant</i>	-3.929	.020	-2.327	.098	-2.751	.064	.157	1.169	-1.225	.294
<i>Competitive pressures (COMPET)</i>	.062**	1.064	.007	1.007	-.008	.992	-.041**	.960	-.012	.988
<i>Barriers to knowledge exchange (OBSTACLE)</i>	-.024	.976	.074	1.077	.126**	1.134	.115**	1.122	.074*	1.077
<i>Use of government support (GVTSUPP)</i>	.098	1.102	.194**	1.214	.315***	1.370	.215***	1.240	.154**	1.167
<i>Number of employees (TOTEMPL)</i>	.000	1.000	.001**	1.001	.002***	1.002	.002***	1.002	.001***	1.001
<i>Collaborative arrangements (USECOLL)</i>	.651**	1.917	1.100***	3.006	1.017***	2.765	.581**	1.788	.453**	1.573
<i>R&D activities (BINR&D)</i>	2.027***	7.592	1.217***	3.376	2.316***	10.136	.432	1.540	1.425***	4.156
<i>Quebec (BINQUE)^b</i>	-.371	.690	-.035	.966	-.176	.838	.125	1.133	-.010	.990
<i>British Columbia (BINBC)</i>	.073	1.076	.607	1.835	-.423	.655	-.291	.747	-.807**	.446
<i>Rest of Canada (BINROC)</i>	-1.425***	.240	.119	1.127	-.052	.949	1.302***	3.677	-.015	.985
<i>N</i>	212/120		212/155		212/248		120/248		155/248	
<i>Chi-square (d.f.)</i>	75.32 (9)		60.22 (9)		180.95 (9)		57.87 (9)		47.75 (9)	
<i>Nagelkerke R² (Pseudo R square)</i>	.315		.228		.474		.219		.162	
<i>Percentage of correct predictions</i>	70.7%		67.8%		77.9%		73.3 %		68.0%	

^a Exp(β) is the factor of change in the odds of the dependant variable, due to a one unit increase in the specific independent variable.

^b Ontario is the reference category.

Figures between parentheses indicate p-value. *, ** and *** indicate that variable is significant at 10 %, 5 % and 1 % level respectively.

Estimated Logit models of factors affecting the milieu for firms in Auto industry

(Statistics Canada: Survey of innovation 1999)

<i>Dependant variables</i>	Weak Interaction Weak Learning/ Weak Interaction Strong Learning		Weak Interaction Weak Learning/ Strong Interaction Weak Learning		Weak Interaction Weak Learning/ Strong Interaction Strong Learning		Weak Interaction Strong Learning/ Strong Interaction Strong Learning		Strong Interaction Weak Learning/ Strong Interaction Strong Learning	
	<i>Coeff. β</i>	<i>Exp (β)^a</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>
<i>Independent variables</i>										
<i>Constant</i>	1.898	6.675	1.566	4.787	-3.370	.034	-5.470	.004	-4.478	.011
<i>Competitive pressures (COMPET)</i>	-.063	.939	-.062*	.940	.074**	1.077	.133***	1.143	.121***	1.129
<i>Barriers to knowledge exchange (OBSTACLE)</i>	-.282**	.754	-.123	.885	-.113	.893	.012	1.012	.010	1.010
<i>Use of government support (GVTSUPP)</i>	.553**	1.739	.356**	1.428	.328***	1.389	.082	1.085	.035	1.035
<i>Number of employees (TOTEMPL)</i>	-.001	.999	.000	1.000	.000**	1.000	.001**	1.001	.000	1.000
<i>Collaborative arrangements (USECOLL)</i>	-1.123*	.325	.120	1.127	-.003	.997	.849**	2.338	.526**	1.692
<i>R&D activities (BINR&D)</i>	1.615***	5.028	1.087**	2.965	2.768***	15.923	1.029**	2.799	1.189**	3.285
<i>Quebec (BINQUE)^b</i>	-.670	.512	-1.041*	.353	-.269	.764	.290	1.337	.095	1.099
<i>Rest of Canada (BINROC)</i>	-.522	.593	-.080	.923	1.571**	.208	-.133	.876	-1.153**	.316
<i>N</i>	55/43		55/48		55/96		43/96		48/96	
<i>Chi-square (d.f.)</i>	22.72 (8)		14.62 (8)		52.45 (8)		21.68 (8)		19.29 (8)	
<i>Nagelkerke R² (Pseudo R square)</i>	.312		.197		.428		.214		.181	
<i>Percentage of correct predictions</i>	74.9%		66.8%		82.7%		74.7%		76.0%	

^a Exp(β) is the factor of change in the odds of the dependant variable, due to a one unit increase in the specific independent variable.

^b Ontario is the reference category.

Figures between parentheses indicate p-value. *, ** and *** indicate that variable is significant at 10 %, 5 % and 1 % level respectively

Estimated logit models of factors affecting the milieu for firms in Photonics, Wireless Telecom and Information technologies

LEARNING

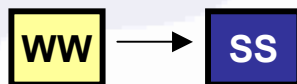
		INTERACTIONS	
		Weak	Strong
LEARNING	Weak	57 (20.5 %)	33 (12.1 %)
	Strong	84 (30.3 %)	102 (37.1 %)



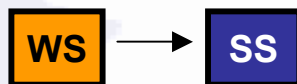
R&D (+) / Collaboration (+) / Quebec (+)



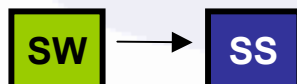
Competition (+) / Barriers (+) / R&D (+) /
Collaboration (+) / Quebec (+)



Competition (+) / Collaboration (+) /
Quebec (+) / Rest of Canada (+)



Competition (+) / Government support (+)



Competition (+) / Barriers (-)

Estimated logit models of factors affecting the milieu for firms in **Wood products**

LEARNING

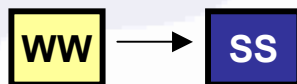
		INTERACTIONS	
		Weak	Strong
LEARNING	Weak	201 (39.6 %)	89 (17.5 %)
	Strong	92 (18.3 %)	125 (24.6 %)



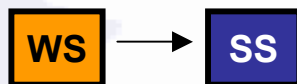
Competition (+) / R&D (+) / Government support (+) / Rest of Canada (-)



Barriers (+) / Government support (+)



Competition (+) / Barriers (+) / R&D (+) / Collaboration (+) / Government support (+) / British Columbia (-) / Rest of Canada (-)



Barriers (+) / R&D (+) / British Columbia (-)



Collaboration (+) / R&D (+)

Estimated logit models of factors affecting the milieu for firms in **Food and Beverages (including wine)**

LEARNING

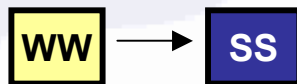
		INTERACTIONS	
		Weak	Strong
LEARNING	Weak	212 (28.8 %)	120 (16.4 %)
	Strong	155 (21.1 %)	248 (33.7 %)



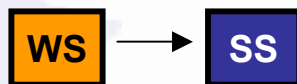
Competition (+) / R&D (+) / Collaboration (+) / Rest of Canada (-)



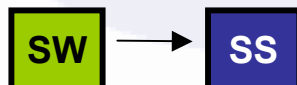
Collaboration (+) / R&D (+) / Government support (+)



Barriers (+) / R&D (+) / Collaboration (+) / Government support (+)



Competition (+) / Barriers (+) / Collaboration (+) / Government support (+) / Rest of Canada (+)



Barriers (+) / Collaboration (+) / Government support (+) / R&D (+) / British Columbia (-)

Estimated logit models of factors affecting the milieu for firms in **Auto industry**

LEARNING

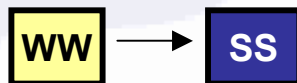
		INTERACTIONS	
		Weak	Strong
LEARNING	Weak	55 (22.7 %)	43 (17.9 %)
	Strong	48 (19.7 %)	96 (39.7 %)



Barriers (-) / R&D (+) / Collaboration (+) / Government support (+)



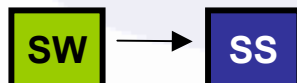
Competition (-) / R&D (+) / Government support (+) / Quebec (-)



Competition (+) / R&D (+) / Government support (+) / Rest of Canada (-)



Competition (+) / R&D (+) / Collaboration (+)



Competition (+) / Collaboration (+) / R&D (+) / Rest of Canada (-)

Conclusion and Policy Implications

- Findings suggest that milieux in which firms operate differ according to the extent of interactions and learning
- The existence of creative milieux is influenced by many factors:
 - industries
 - Regions
 - Competitive pressures
 - Government support
 - R&D
 - Barriers to innovation
 - Collaborative arrangements

Conclusion and Policy Implications (2)

- Different factors explain the probability of moving from less to more creative innovation milieux
- Policy implications:
 - Universal policies would not be efficient
 - Customized policies are required to take into account the diversity of situations and needs, and milieux in which operate

Merci pour votre attention

Means of the **firms' size** by industrial sector

(Duncan's test)

Size (Total of employees)			
Industries	Number of observations	Subset for $\alpha = 0.05$	
		1	2
Food and beverage	506	144.85	
Wood products	734	207.50	
Photonics et al ^a	275	216.02	
Auto	242		554.76
Significance ^b		.145	1.000

^a Photonics, Wireless Telecom and Information technologies.

^b Duncan's test compares means for groups in homogenous subsets. When the significance test is above the threshold = 0.05, the null hypothesis (non differences of means) cannot be rejected.

Means of the indices of use of **Government support** programs by industrial sector (Duncan's test)

Government support index				
Industries	Number of observations	Subset for $\alpha = 0.05$		
		1	2	3
Wood products	506	1.17		
Food and beverage	734	1.41	1.41	
Auto	242		1.63	
Photonics et al ^a	276			2.25
Significance ^b		.059	.086	1.000

^a Photonics, Wireless Telecom and Information technologies.

^b Duncan's test compares means for groups in homogenous subsets. When the significance test is above the threshold = 0.05, the null hypothesis (non differences of means) cannot be rejected.

Estimated Logit models of factors affecting the milieu for manufacturing firms

(Statistics Canada: Survey of innovation 1999)

<i>Dependant variables</i>	Weak Interaction Weak Learning/ Weak Interaction Strong Learning		Weak Interaction Weak Learning/ Strong Interaction Weak Learning		Weak Interaction Weak Learning/ Strong Interaction Strong Learning		Weak Interaction Strong Learning/ Strong Interaction Strong Learning		Strong Interaction Weak Learning/ Strong Interaction Strong Learning	
	<i>Coeff. β</i>	<i>Exp (β)^a</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>	<i>Coeff. β</i>	<i>Exp (β)</i>
<i>Constant</i>	-2.686	.068	-1.705	.182	-4.080	.017	-1.991	.137	-2.491	.083
<i>Competitive pressures (COMPET)</i>	.015**	1.015	.009	1.009	.041***	1.042	.040***	1.041	.037***	1.038
<i>Barriers to knowledge exchange (OBSTACLE)</i>	.058***	1.060	.137***	1.147	.107***	1.113	.055***	1.056	-.012	.988
<i>Use of government support (GVTSUPP)</i>	.116***	1.123	.173***	1.189	.267***	1.306	.164***	1.179	.125***	1.133
<i>Number of employees (TOTEMPL)</i>	.000**	1.000	.000	1.000	.001***	1.001	.000**	1.000	.000***	1.000
<i>Collaborative arrangements (USECOLL)</i>	.509***	1.663	.660***	1.935	.975***	2.652	.516***	1.676	.253***	1.287
<i>R&D activities (BINR&D)</i>	1.248***	3.484	.536***	1.708	1.923***	6.840	.718***	2.049	1.357***	3.886
<i>High technology sector (BINHIGH)</i>	.453**	1.572	.501***	1.650	.000	1.000	-.405**	.667	-.392**	.676
<i>Medium technology sector (BINMED)</i>	.106	1.112	.230	1.259	.199***	1.221	.112*	1.118	.332**	1.394
<i>Quebec (BINQUE)^b</i>	.222**	1.248	-.265***	.767	-.145**	.865	-.321***	.725	.144**	1.155
<i>British Columbia (BINBC)</i>	.071	1.074	.117	1.124	-.412***	.663	-.456***	.634	-.562***	.570
<i>East of Canada (BINEAST)^c</i>	-.402**	.669	.133	1.142	.107	1.113	.559***	1.749	-.032	.969
<i>West of Canada (BINWEST)^d</i>	-.062	.940	-.400***	.670	-.338***	.713	-.272**	.762	-.027	.073
<i>N</i>	2450/1140		2450/1437		2450/2130		1140/2130		1437/2130	
<i>Chi-square (d.f.)</i>	393.68 (12)		341.10 (12)		1450.59 (12)		257.57 (12)		429.08 (12)	
<i>Nagelkerke R² (Pseudo R square)</i>	.165		.130		.399		.113		.165	
<i>Percentage of correct predictions</i>	69.6 %		67.3 %		75.3%		67.5 %		69.3 %	

^a Exp(β) is the factor of change in the odds of the dependant variable, due to a one unit increase in the specific independent variable.

^b Ontario is the reference category.

^c East of Canada : Nova Scotia, New Brunswick, Prince Edouard Island and New FoundLand.

^d West of Canada: Alberta, Manitoba and Saskatoon.

Figures between parentheses indicate p-value. *, ** and *** indicate that variable is significant at 10 %, 5 % and 1 % level respectively.

Means of the indices of **barriers to innovation** by industrial sector (Duncan's test)

Barriers index			
Industries	Number of observations	Subset for $\alpha = 0.05$	
		1	2
Wood products	242	34.39	
Auto	734		35.76
Food and beverage	506		35.98
Photonics et al ^a	276		36.38
Significance ^b		1.000	.164

^a Photonics, Wireless Telecom and Information technologies.

^b Duncan's test compares means for groups in homogenous subsets. When the significance test is above the threshold = 0.05, the null hypothesis (non differences of means) cannot be rejected.

Means of the indices of use of **Innovation radicalness** by industrial sector (Duncan's test)

Radicalness index				
Industries	Number of observations	Subset for $\alpha = 0.05$		
		1	2	3
Food and beverage	644	17.02		
Wood products	453		19.89	
Auto	216		21.28	21.28
Photonics et al ^a	248			22.96
Significance ^b		1.000	.261	.174

^a Photonics, Wireless Telecom and Information technologies.

^b Duncan's test compares means for groups in homogenous subsets. When the significance test is above the threshold = 0.05, the null hypothesis (non differences of means) cannot be rejected.

Estimated Logit models of factors affecting the milieu for manufacturing firms

LEARNING

		INTERACTIONS	
		Weak	Strong
LEARNING	Weak	2450 (34.2 %)	1140 (15.9 %)
	Strong	1437 (20.1 %)	2130 (29.8 %)



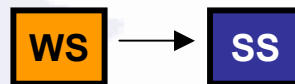
Competition (+) / Barriers (+) / R&D (+)
Collaboration (+) / Government support (+) /
High Tech sector (+) / Quebec (+) / East
Canada (-)



Barriers (+) / R&D (+) / Collaboration (+) /
Government support (+) / High Tech sector
(+) / Med Tech sector (-) / Québec (-) / West
Canada (-)



Competition (+) / Barriers (+) / R&D (+) /
Collaboration (+) / Government support (+) /
Med Tech sector (+) / Quebec (-) / British
Columbia (-) / West of Canada (-)



Competition (+) / Barriers (+) / R&D (+) /
Collaboration (+) / Government support (+) /
High Tech sector (-) / Med Tech sector (+) /
Quebec (-) / British Columbia (-) / East of
Canada (+) / West of Canada (-)



Competition (+) / R&D (+) / Collaboration (+)
/ Government support (+) / High Tech
sector (-) / Med Tech sector (+) / Quebec (+)
/ British Columbia (-)

- ***Technology intensiveness*** Binary variables indicating the degree of technology intensiveness of the firms (Appendix 1 shows the classification used by Industry Canada to categorize the different industries by level of technology intensiveness) ***High***: Binary variable coded 1 if the firm operates in a high technology sector and 0 otherwise; ***Medium***: Binary variable coded 1 if the firm operates in a medium technology sector and 0 otherwise; ***Low***: Binary variable coded 1 if the firm operates in a low technology sector and 0 otherwise.
- ***Collaborative arrangements*** Binary variable coded 1 if, between 1997 and 1999, the firms were involved in cooperative and collaborative arrangements with other firms or organizations to develop new or significantly improved products and 0 otherwise.