



Inter-Firm Relations and Innovation in Global Production Networks: A Comparison of Turkish and Polish auto-components clusters

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CONTEXT AND AIM

- Reorganisation of production: disintegration of production and creation of innovative global production networks
- Peripheral locations becoming increasingly important in the reorganisation of production
- Transformation in peripheral locations: building new linkages to the emerging production networks
- Study the linkages peripheral nodes have built in global production networks and their performance (innovativeness)



Theoretical considerations (1)

- GSC/GPN literatures
 - Recognise the recent changes in production systems
 - Pay attention to the external linkages
 - Vertically integrated/hierarchical relations
 - Market relations
 - Networks
 - the ways in which peripheral locations are integrated in global production networks
- Focus on the role of external linkages in fostering innovation
- The nature of relationships: power determines the flow of different types of resources in the chain/network (Gereffi, 1999)



Theoretical considerations (2)

- Identification of different types of linkages with different degrees of power
 - Quasi-hierarchical relations (Humphrey and Schmitz, 2000, 2002): dominance of the leader firm by *specifying product characteristics*, doubts of the lead firm on the *competence of the supplier*
 - Captive relations (Sturgeon, 2000, 2002): production of standardised products (*degree of standardisation*) with machinery dedicated to customers (*degree of asset specificity in production equipment*)
 - Turn-key/Modular (Sturgeon, 2000, 2002, 2003): increased *supplier capability*, increased codification (*nature of information exchanged*)
 - Relational: Long-term relations built through social/spatial proximity; *Shared/complementary competences* between interacting firms, *equal exchange of information*
- Power relations may limit knowledge flows within the chain and inhibit certain activities which are part of leader firms' core competences (design, marketing and branding)



Research Questions

- What different types of linkages are peripheral locations building to integrate themselves to production systems created at the global scale? What different paths do they follow?
- In what ways is the innovativeness of these peripheral locations different?
 - are peripheral locations building different linkages different in terms the degree of their innovativeness?
 - are they different in terms of their innovative behaviour?



Methodology

- Case study of two auto-components clusters located at the periphery of auto-production: Bursa, Turkey and Upper-Silesia, Poland
 - Bursa: creation 1960s (with Karsan (Peugeot), Tofas (Fiat), Oyak-Renault (Renault)), 1970s development via import-substitution policies, export orientation after 1980s
 - Upper-Silesia: 1990s with global suppliers of Fiat and Opel (GM)
- Structured interviews with 103 firms in Bursa and 19 firms in Upper Silesia conducted in 2005-2006 (28% and 18% response rates respectively)
- Compare the two peripheral locations regarding
 - the types of inter-firm linkages they have built in GPNs
 - the degree of innovativeness
 - the innovative behaviour
- Analyse the significance of the different linkages they have built in explaining their innovativeness



Analysing inter-firm linkages: measurement

Based on:

- The extent to which and the type of information exchanged
- Supplier competence
 - a) the degree of business partners' involvement in specifying product and process characteristics and technical standards (codified transactions)
 - b) the degree of business partners' involvement in product development, upgrading technology and training (complex transactions)
 - c) the degree of local firms' involvement in the definition of product characteristics, in developing new products, processes and designs (supplier capabilities/competence)

Three degrees (no, to some extent, to a large extent), each given a value of 1. The value for each dimension is calculated as the sum of the value attributed to each variable under each dimension, divided by the possible maximum amount for each dimension.

Firms classified as their 'high' (coefficient between 1-0.67) and 'low' (coefficient less than 0.67) positions on each of the 3 dimensions, which are combined to develop a typology of six types of inter-firm relations

Analysing inter-firm linkages: Typology of inter-firm linkages

<i>Type of relationship</i>	<i>Client specification of product characteristics and standards/ transfer of codified knowledge from the client</i>	<i>Client engagement in complex transactions/ transfer of tacit knowledge from the client</i>	<i>Supplier engagement in complex transactions/ supplier capability on complex transactions</i>
Hierarchy	Low	High	Low
Market	High	Low	High
Relational	Low	High	High
Modular	High	High	High
Captive	High	High	Low
Exclusion/ locked in	High	Low	Low
Unlikely	Low	Low	High
Unlikely	Low	Low	Low

Source: Gereffi et al. (2005) and interviews

Comparing Bursa and Upper Silesia: type of inter-firm linkage established in global networks

			Type of inter-firm relation						Total
			modular	market	captive	relational	exclusion	hierarchy	
City	Bursa	Count	44	11	14	10	9	8	96
		% within city	45.83%	11.45%	14.58%	10.42%	9.37%	8.33%	100.0%
	Upper Silesia	Count	3		3	2	1	8	17
		% within city	17.65%		17.65%	11.76%	5.88%	47.06%	100.0%
Total		Count	47	11	17	12	10	16	113
		% within city	41.59%	9.73%	15.04%	10.62%	8.85%	14.16%	100.0%

Source: calculated from survey data



Innovation: measurement

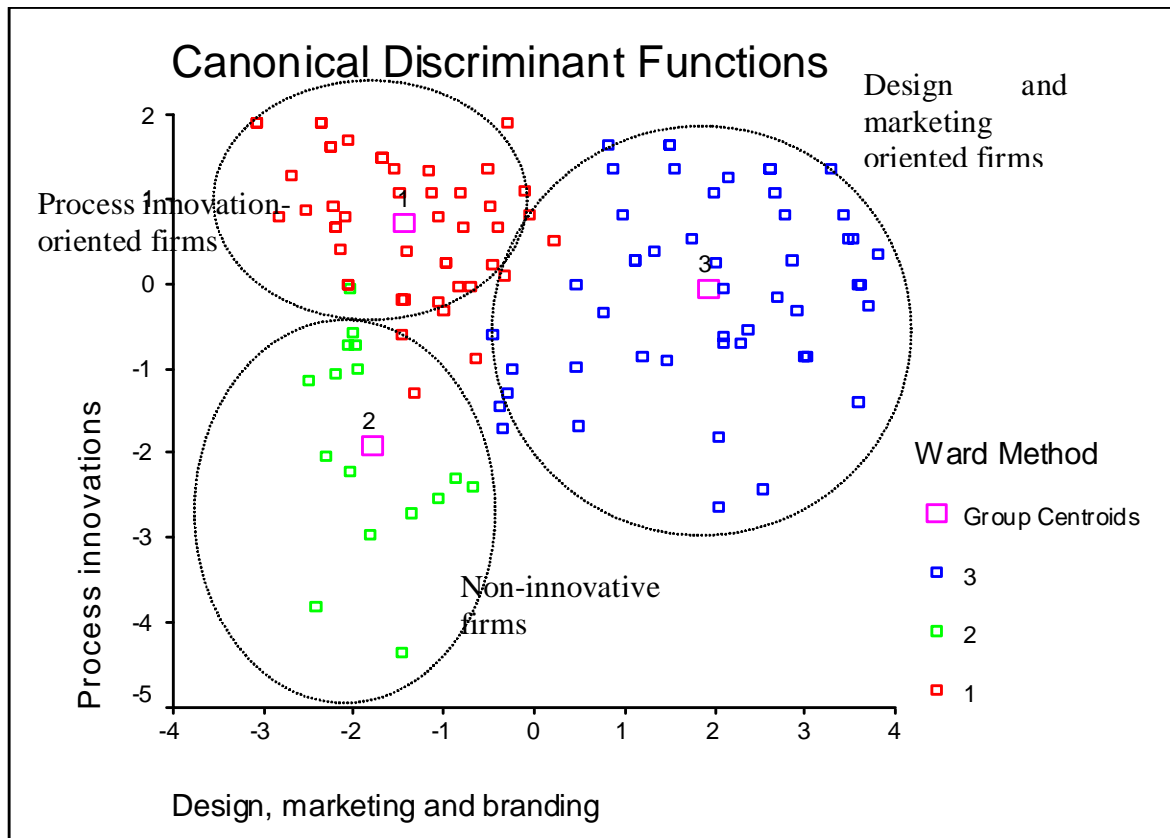
- Innovation activities performed
 - Improvement of production process
 - Development of new products, processes and designs
 - Marketing and branding
 - Innovation in work systems
 - Innovation in technology systems
 - Innovation in HRM/organisational systems
- I. Degree of innovativeness: innovativeness coefficient calculated as the sum of individual coefficients and categorised as low (0.33-3.34), medium (3.35-4.24) and high (4.25-5.54).

Comparing the innovativeness of Bursa and Upper Silesia

			Degree of innovativeness			Total
			low	medium	high	
City	Bursa	Count	23	39	41	103
		% within city	22.3%	37.9%	39.8%	100.0%
	Upper Silesia	Count	6	7	6	19
		% within city	31.6%	36.8%	31.6%	100.0%
Total		Count	29	46	47	122
		% within city	23.8%	37.7%	38.5%	100.0%

Source: calculated from survey data

Types of innovative behaviour



Source: calculated from survey data

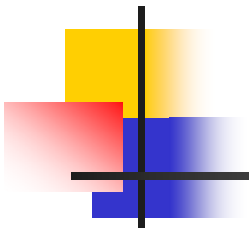
Comparing the innovative behaviour of Bursa and Upper Silesia

		Ward Method			Total	
			Process innovations oriented firms	Non-innovative firms	Design and marketing oriented firms	
City	Bursa	Count	43	11	42	96
		% within city	44.8%	11.5%	43.8%	100.0%
	Upper Silesia	Count	4	5	8	17
		% within city	23.5%	29.4%	47.1%	100.0%
Total		Count	47	16	50	113
		% within city	41.6%	14.2%	44.2%	100.0%

Source: calculated from survey data

Comparing Bursa and Upper Silesia

	DOMINANT TYPE OF INTER-FIRM RELATION	DEGREE OF INNOVATION	INNOVATIVE BEHAVIOUR
BURSA	MODULAR (46%) CAPTIVE (15%) MARKET (11%) RELATIONAL (10%)	MEDIUM AND HIGH (78%) LOW (22%)	DESIGN, MARKETING AND BRANDING (44%) PROCESS INNOVATIONS (45%) NON-INNOVATIVE (11%)
UPPER SILESIA	HIERARCHY (47%) MODULAR (18%) CAPTIVE (18%)	MEDIUM AND HIGH (69%) LOW (32%)	DESIGN, MARKETING AND BRANDING (47%) PROCESS INNOVATIONS (23%) NON-INNOVATIVE (30%)

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- Bursa and Upper Silesia are two peripheral nodes which are integrated in global networks of auto-production in different ways
 - Innovativeness is the characterising feature of the two nodes
 - But through different activities: different innovative behaviour-in Bursa innovations come through a range of activities (product and process as well as marketing and branding), while in Upper Silesia innovations come through one type of activity.

Associating inter-firm linkage and innovation: significance of the type of linkage in explaining innovativeness

Type of innovation/Type of inter-firm relation*	I. MODULAR	II. MARKET	III. CAPTIVE	IV. RELATIONAL	V. EXCLUSION	VI. HIERARCHY	ANOVA test (Sig.)	Post-hoc test**
Overall innovativeness	4.1980	3.5015	3.4189	3.8403	2.6895	3.6542	0.000	I>II,III,IV,VI I,II,III,IV,VI>V
Innovation in technology systems	0.8576	0.7483	0.7466	0.9167	0.5692	0.8462	0.004	I,IV,VI>V IV>III
Marketing and branding	0.5106	0.4545	0.3529	0.2500	0.2500	0.1563	0.017	I>IV,V,VI II>VI
Design, product and process development	0.6915	0.3636	0.3382	0.4167	0.1750	0.4375	0.000	I>II,III,IV,V,VI VI>V
Innovation in work systems	1.1277	0.9351	0.9664	1.1667	0.8286	1.0268	0.022	I,IV>V
Innovation in organisational systems	0.7305	0.6061	0.7647	1.0139	0.6000	0.8229	0.082	IV>I,II,V
Improvements in production process	0.9681	1.0000	0.9265	0.9792	0.8000	0.9063	0.006	I,II,III,IV>V

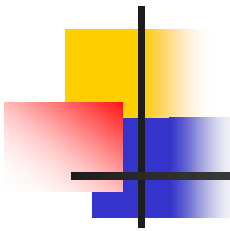
*Mean value per type of inter-firm relation

**The test identified pairs which differed significantly. Here, we provided the results of significant pairs relative to the type of inter-firm relation with the highest value



Synthesising the findings

TYPE OF RELATIONSHIP	NATURE OF THE RELATIONSHIP	DEGREE OF INNOVATION	INNOVATIVE BEHAVIOUR
Exclusion	Locked in the standardised information from the business partner	Low	Non-innovative
Market	Flow of price-based information	High	Cost-cutting and quality increase Marketing and branding
Captive	Dependence on the business partner on both tacit and codified transactions Low capability in complex activities Resistance to knowledge outside the established network	High	Cost-cutting and quality increase
Hierarchy	Tacit transactions from the corporate group	High	Cost-cutting and quality increase Technology Design, product and process development
Relational	Mutual dependency	High	Cost-cutting and quality increase Technology Work Organisational
Modular	Reduced mutual dependency	High	Innovative Except organisational

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- Innovation is a must for building linkages and maintaining established linkages in GPNs
 - Pervasiveness of innovation oriented to cut costs and increase quality
 - Rising quality and safety requirements, and technology orientation of new models
 - Increased responsibility of suppliers for the design of components and modules
 - Increasing demand on cutting costs while at the same time increasing quality
 - Tension on who gets the profits: unreported innovation
 - Type of linkage built in GPNs makes a difference in innovative behaviour:
 - firms which built modular relations are significantly more innovative and undertake a variety of innovation activities
 - Innovativeness of firms which built hierarchical relations is oriented towards design, marketing and branding



Concluding Remarks

- There is no one best way of being integrated in GPNs
- Bursa and Upper Silesia are taking advantage of the different dynamics characterising their industrial histories, the reorganisation of production and the linkages they built in global networks of production
 - Upper Silesia: hierarchical relations
 - Global corporate strategies
 - Changing role of global suppliers
 - Tacit knowledge from the corporate group
 - Bursa: modular relations
 - Local capabilities established before helped building linkages in GPNs
 - Taking advantage of the reduced mutual dependency