Economic Geography, Clusters and the Economic Geography of the CAREC Countries, with Spatial Reference to Kazakhstan

"*The development of well-functioning clusters is one of the essential steps in moving to an advanced country"*

(Porter, 1998, p. 234).

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Objectives

The importance of space and density in economic growth

The concept of the Porter's Cluster

- What is it?
- What problems are there with it?
- What are the policy implications of cluster analysis?

How useful is it for the economic policy in the CAREC countries?

How do we identify clusters? Vague?

Are there international clusters? Energy and the Caspian basin?

Introduced in Kazakhstan; should it be introduced into other CAREC countries? Is there "cluster fatigue"?

- Azerbaijan, Kazakhstan, Tajikistan and Uzbekistan are dependent on energy production. This leads to the question…..

- Is a resource-based cluster development strategy optimal for these countries?

- What about the so-called resource curse and problems of an enclave economy?

- Other problems include the landlocked nature of the countries. If a cluster policy is introduced (e.g., for energy) should it be CAREC wide?

Are clusters really the way forward?

What is a Cluster?

"Clusters are *geographic* concentrations of interconnected companies, specialist suppliers and service providers, firms in related industries, and associated associations (e.g. universities, standards agencies and trade associations) in particular fields that compete but also cooperate." (Porter, 2000, p. 253)

(Too) many other definitions.

Benefits of density of production accruing through "agglomeration economies".

Cluster Analysis

- Widely used by USAID, World Bank, OECD. First studies, advanced countries. Now used in transition economies

- **Policy network for cluster analysis:** OECD Local Economic and Employment Development Program (LEED) in conjunction with Central European Initiative/European Bank for Reconstruction and Development.

- Kazakhstan has adopted cluster policy, following the advice of Porter. *Diversification of Kazakhstan's Economy through Cluster Development in the Non-extraction Sectors of the Economy* (2004). But also Kyrgyzstan.

- It is thus an important policy issue.

The Punctiform Nature of Production
The Importance of Space

- Top 20 nations with 15% of the world's population produce over half the world's output.
- But this concentration is also reflected at lower levels of spatial aggregation:
- For example, in the US west of the Mississippi, half of the country's output is produced on just 4% of the land.
- The location of manufacturing persists over long periods, e.g. the US manufacturing belt.

The Increasing Returns to Scale Revolution (Warsh, 2006)

- Constant returns to scale, “backyard capitalism” (Krugman).
- Would lead to production uniform across space.

  World Bank (2009) *Reshaping Economic Geography; the three D’s*

  - ***Density***
  - ***Distance***
  - ***Division***

- Adam Smith (1776): “The division of labour is limited by the extent of the market”.

The Kaldorian Model of Economic Growth

A Cumulative Causation Model of Economic Growth

With increasing returns to scale:

……⇒ faster growth of output ⇒ faster growth of productivity ⇒ price and **non-price** competitiveness improves ⇒ faster growth of exports ⇒ faster growth of output ⇒ ……..

`Importance of increasing returns to scale through the Verdoorn law

a faster growth of output growth *causes* a faster growth of productivity.

Dates back to Verdoorn (1949)

The Verdoorn Law

- A faster growth of output (*q)* causes a faster growth of (total factor) productivity *(tfp)*, through increasing returns to scale and induced technical change. Normally regional data.

$$tfp = a + bq$$

- b < 1, increasing returns

- Many empirical studies find b is about 0.5 (substantial returns to scale)

The Verdoorn Law

$$tfp_j = \frac{\beta\lambda'}{\nu} + \left(\frac{\nu - 1}{\nu}\right) q_j + \zeta_1 \ln D_j + \theta_1 \ln TFP_0$$

Verdoorn effect

Agglomeration economies from density

tech. diffusion

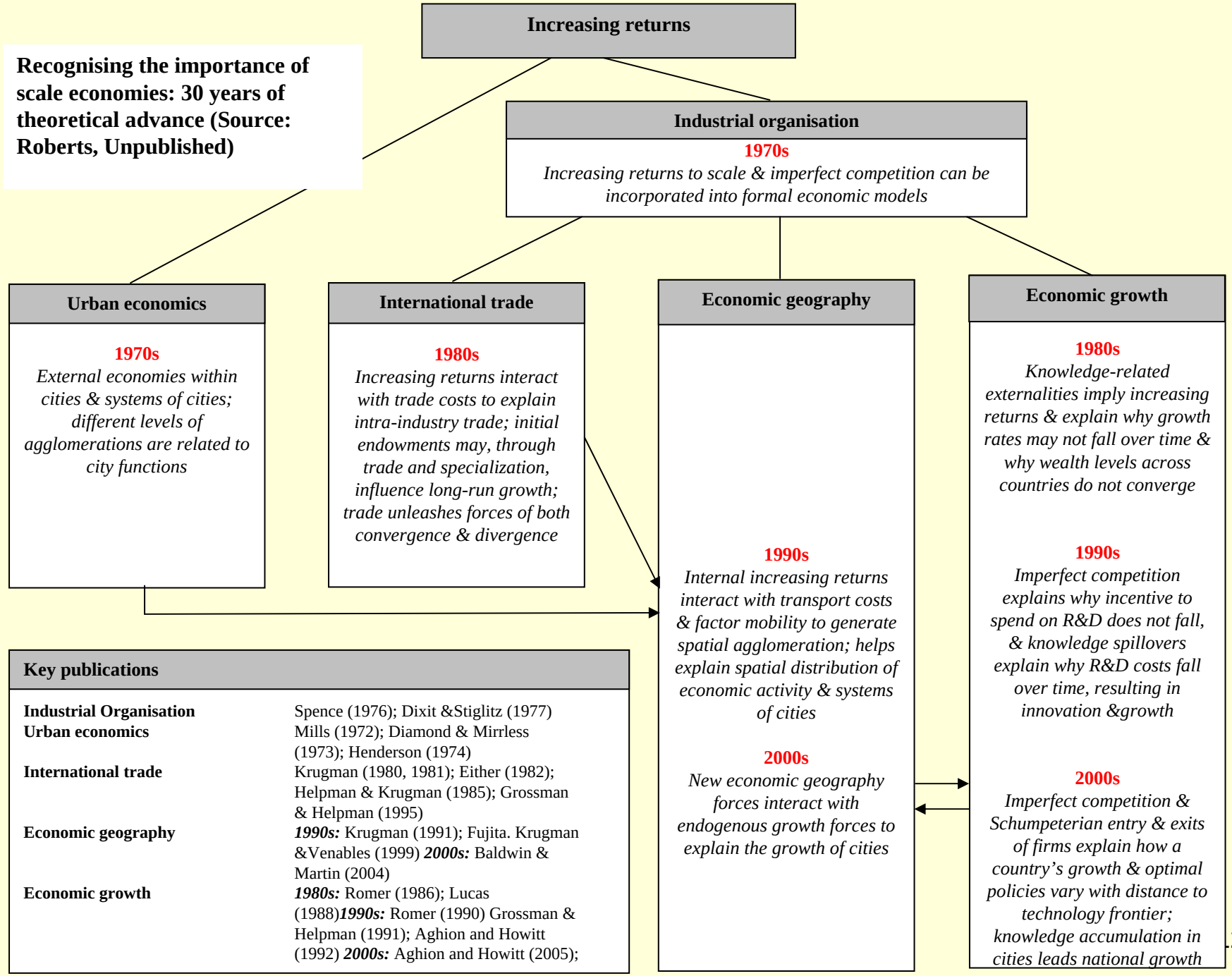
ν = composite measure of returns to scale (includes localised knowledge spillovers from, e.g., LBD processes), *tfp* = total factor productivity growth, *q* = manufacturing output growth

Introducing space

- Use a “lagged dependent variable” - $\boldsymbol{Wq}$ the weighted growth of surrounding regions.
- This proves statistically significant; the faster the growth of surrounding regions the faster the growth of the region under consideration.
- Evidence of spillover effects.

Microfoundations and the **New Economic Geography**

Recognising the importance of scale economies: 30 years of theoretical advance (Source: Roberts, Unpublished)



Key publications

Industrial Organisation	Spence (1976); Dixit &Stiglitz (1977)
Urban economics	Mills (1972); Diamond & Mirrless (1973); Henderson (1974)
International trade	Krugman (1980, 1981); Either (1982); Helpman & Krugman (1985); Grossman & Helpman (1995)
Economic geography	***1990s:*** Krugman (1991); Fujita. Krugman &Venables (1999) ***2000s:*** Baldwin & Martin (2004)
Economic growth	***1980s:*** Romer (1986); Lucas (1988)***1990s:*** Romer (1990) Grossman & Helpman (1991); Aghion and Howitt (1992) ***2000s:*** Aghion and Howitt (2005);

Evidence for Internal and External Increasing Returns to Scale

- Early regional or cross-sectional production function studies (Douglas and colleagues (1930s, 40s), Hildebrand and Liu (1957) Mooney, (1972) found constant returns to scale. Reason is *spatial aggregation bias* (McCombie and Roberts, *JRS*, 2007)

Surveys include:

- World Bank, *Reshaping Economic Geography* (2009), Chapter 4.
- Glaeser E.L. (2000) "The New Economics of Urban and Regional Growth", in Clark *et al. The Oxford Handbook of Economic Geography*
- Rosenthal, S. and Strange W.C. "Evidence on the Nature and Sources of Agglomeration Economies", *Handbook of Urban Regional Economics*, volume 4.

Types of Economies of Scale

(i) *Internal economies of scale*. Unit costs fall with the scale of output.

(ii) *Localization economies* clustering of firms in the same industry

Marshall-Arrow-Romer (MAR) knowledge spillovers.

(iii) *Urbanization economies* Due to different firms

The evidence suggests that scale economies increase productivity as density increases and increasing distance from a city centre lowers productivity. But “static” effects are small.

Economies of scale can be classified into a dozen types

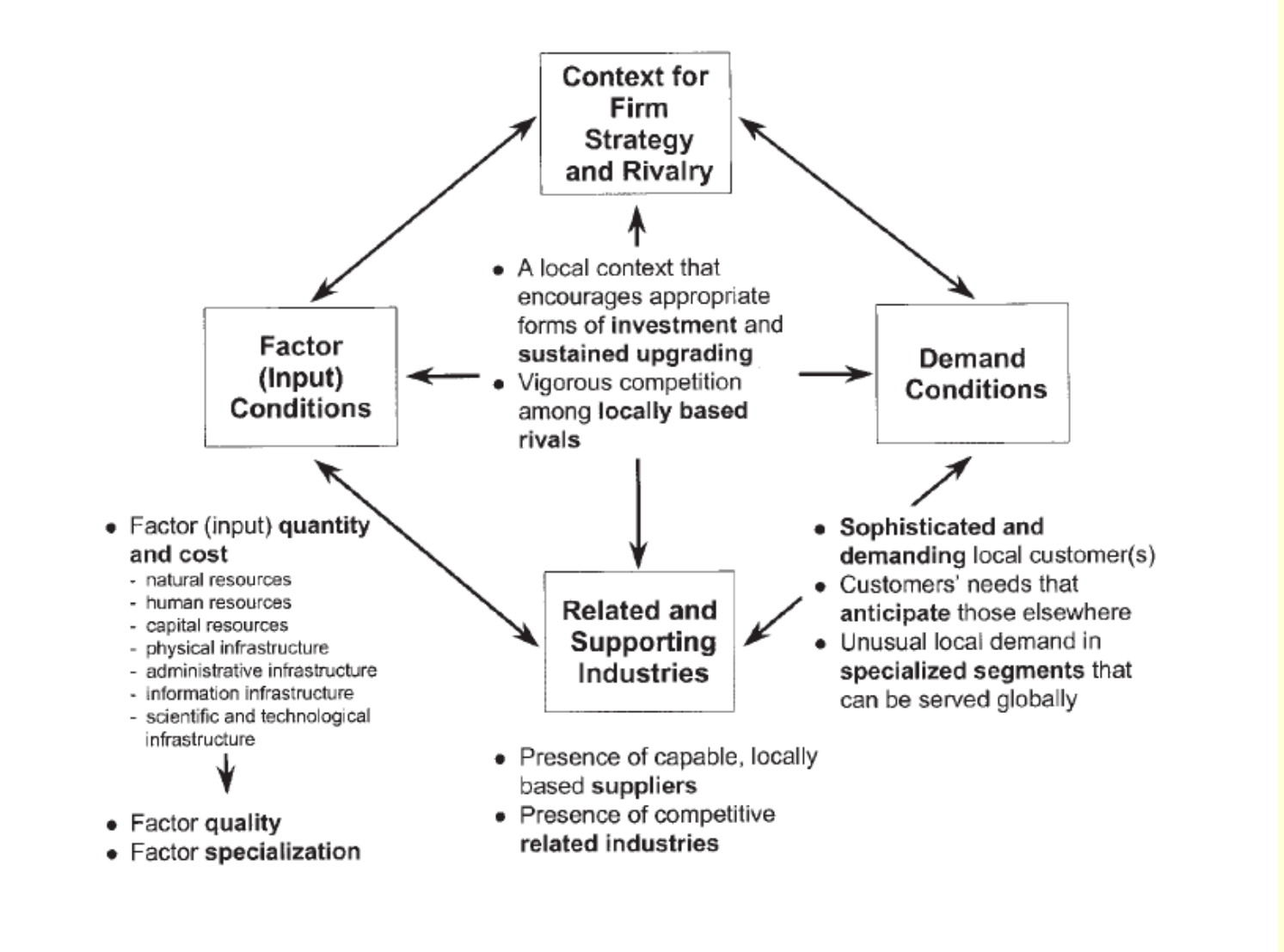
Type of economy of scale				Example
Internal	1. Pecuniary			Being able to purchase intermediate inputs at volume discounts
	Technological		2. Static technological	Falling average costs due to fixed costs of operating a plant
			3. Dynamic technological	Learning to operate a plant more efficiently over time
External, or Agglomeration	***Localization***	Static	4. "Shopping"	Shoppers are attracted to places where there are many sellers
			5. "Adam Smith" or Allwyn Young (EJ, 1928) specialization	Outsourcing allows both the upstream input suppliers and downstream firms to profit from productivity gains due to specialization
			6. "Marshall" labor pooling	Workers with industry-specific skills are attracted to a location where there is a greater concentration of the relevant industry. A worker is more likely to be able to find a new job in the same industry if their employer experiences a downturn of fortunes. An individual firm also benefits by being better able to hire labor when experiencing an upturn in fortunes, especially if it coincides with a downturn for other firms.
		Dynamic	7. "Marshall-Arrow-Romer" learning by doing	Reductions in costs that arise from repeated and continuous production activity over time and which spillover between firms in close proximity
	Urbanization	Static	8. "Jane Jacobs" innovation	The greater is the diversity of the local economy, the more opportunities there are for observing and adapting ideas from others
			9. "Marshall" labor pooling	Workers in an industry bring innovations to firms in other industries; similar to no. 6, but the benefit arises from the diversity of industries in one location.
			10. "Adam Smith" division of labor	Similar to no. 5 above, the main difference being that the division of labor upstream is made possible by the existence of many different downstream buying industries in the same place
		dynamic	11. "Romer" endogenous growth	The larger the market, the higher the profit, the more attractive the location to firms, the more jobs there are, the more labor pools there are, the larger the market—and so on
	12. "Pure" agglomeration			Spreading fixed costs of infrastructure over more taxpayers; diseconomies arise from congestion and pollution

Source: Adapted from Maureen Kilkenny (2006) from World Bank *Reshaping Economic Geography*

Porter's Cluster

- Porter developed the notion from his work on the *Competitive Advantage of Nations* (1990)
- "Specialization in clusters, not industries *per se*, should lead to higher performance"
- "The geographic scope of a cluster can range from a single city or state to a country *or even a group neighbouring countries"* .

Porter's Competitive Diamond



Operationalizing Porter's Notion of a cluster

Three types of cluster

(i) *local* or predominantly *service industries*

(ii) *resource dependent* industries (decline with development). But energy cluster important for Azerbaijan, Kazakhstan, Tajikistan and Uzbeckistan (AKTU countries)

(iii) *traded industries* These are calculated using the standard location quotients method.

How do we identify clusters?

Top-down and Bottom-up Methods in Cluster Analysis

Characteristic	Top-down	Bottom-up
Research Question	How Much?	How?
Approach	Quantitative	Qualitative
Principal Data	Secondary Data	Primary Data
Methodology	Statistical Modeling	Case Studies
Industrial Proximity	Classification System	Descriptive
Scope	Nationwide, Multi-Industry	Local, Single-Cluster
Dominant Logic	Deductive	Inductive
Measures	Employment, Patents, Wages, Output, Sales	Relationships, Institutions
Findings	Broadly Applicable	Narrowly Limited

Clusters and Economic Growth

(I) **Clusters and Export product spaces**

Individual clusters ⇒ productivity traded goods clusters ⇒ exports to regions/rest of world ⇒ goods with high income elasticity of demand

Gives a more solid foundation for the cluster initative.

(II) **Long-term development pattern**

Factor-driven economy ⇒(transition) ⇒ investment-driven economy
⇒ (transition) ⇒ innovation-driven economy

Criticisms of Cluster Analysis

- **Martin and Sunley (2003); Duranton (2009), McCombie (2009)**
- Vague concept. Any linked set of industries could be a cluster?
- The number of clusters identified for the *same* country or region can vary greatly depending upon methodology.
- Co-location and spatial concentration does not imply agglomeration economies. Very little, if any *direct* evidence of spillovers
- What is the role for policy if clusters cannot be created *ab initio? What exactly is the specific role of the government?*
- Clusters not "picking winners". But compare Woodward (2004) They are *de facto* the same. Clusters = industrial strategy.

Criticisms of Cluster Theory

- Duranton (2008). Lack of a specific model that captures both the benefits and costs of the cluster.

- *(i)* the cluster is likely to be too big and
- (*ii*) the negative externalities, such as rising land rents and congestion costs are likely to be important. More efficient to correct (*ii*), even though not as "sexy" as setting up a bio-cluster.

- Diffusion of technology not important; embodied in capital (cf IT revolution).

Resource-based Industrialization and Clusters

- The AKTU countries all have substantial energy resources. Porter has suggested the importance of generating energy clusters.

- But there is the “resource curse”:

- Why? Government appropriates energy rents; no incentive for reform.

  (i) Formal model of Dalmazzo and Blasio (2000)

  (ii) More qualitative model of Auty (2006)

Problems of energy production for economic development

- Very spatially concentrated
- High capital-labour ratios
- Small regional multiplier effects
- “Dutch disease” (Special fund to sterilize the foreign exchange earnings). (Evidence for Kazakhstan mixed.)

- But there are successful cases of resource–based clusters in developed countries. Finland Sweden, Canada; the Sudbury cluster.

- *However, these are countries with a transparent, objective legal system and a democratic government.*

Cluster Policy in the Post Communist Transition Economies OECD (2005)

Indentified the following problems:

- State property rights; private property rights are unclear.
- Planned economy; heavy industry at the expense of consumer industry. 1991dislocation of the value chain.
- Absence of horizontal networks, but informal contacts did arise to circumvent rigidities of the planning process.

Clusters in Transition Economies

- Some liberalisation of economic activity since 1960s, but lack of clear accounting standards etc.
- Lack of regard for entrepreneurial spirit
- Strong regional disparities with the influx of FDI
- Problems of red tape and lack of an independent judiciary
- Lack of coordination of the various ministries leading to contradictory policies.
- “Entrepreneurs are often hesitant to cooperate both with authorities and fellow business owners, preferring instead to go it alone. One reason for this could be lack of ***social capital*** with social networks in short supply

Cluster Policy In Kazakhstan

Clusters Policy in Kazakhstan

After problems in the 1990s, Kazakhstan has experienced rapid growth and is the largest recipient of FDI (although most into the energy sector). The CAREC success story:

Overdependence on minerals:

Mining 67% of industry total in 2007

Minerals 70% of total export revenues

Aim is to diversify the country and to turn it into one of the 50 top most competitive countries in the world. **Presently, 66th in *Global Competitiveness Index.***

Kazakhstan's Cluster Policy

Identified Clusters (Porter plus consultants). Little published information

1. Oil-and-gas machine building
2. Tourism
3. Agriculture and food processing
4. Cotton Based Textiles
5. Transportation and logistics
6. Construction
7. Minerals and Ore Clusters

In addition

8. Wine and fish clusters have been more recently identified

Three Clusters

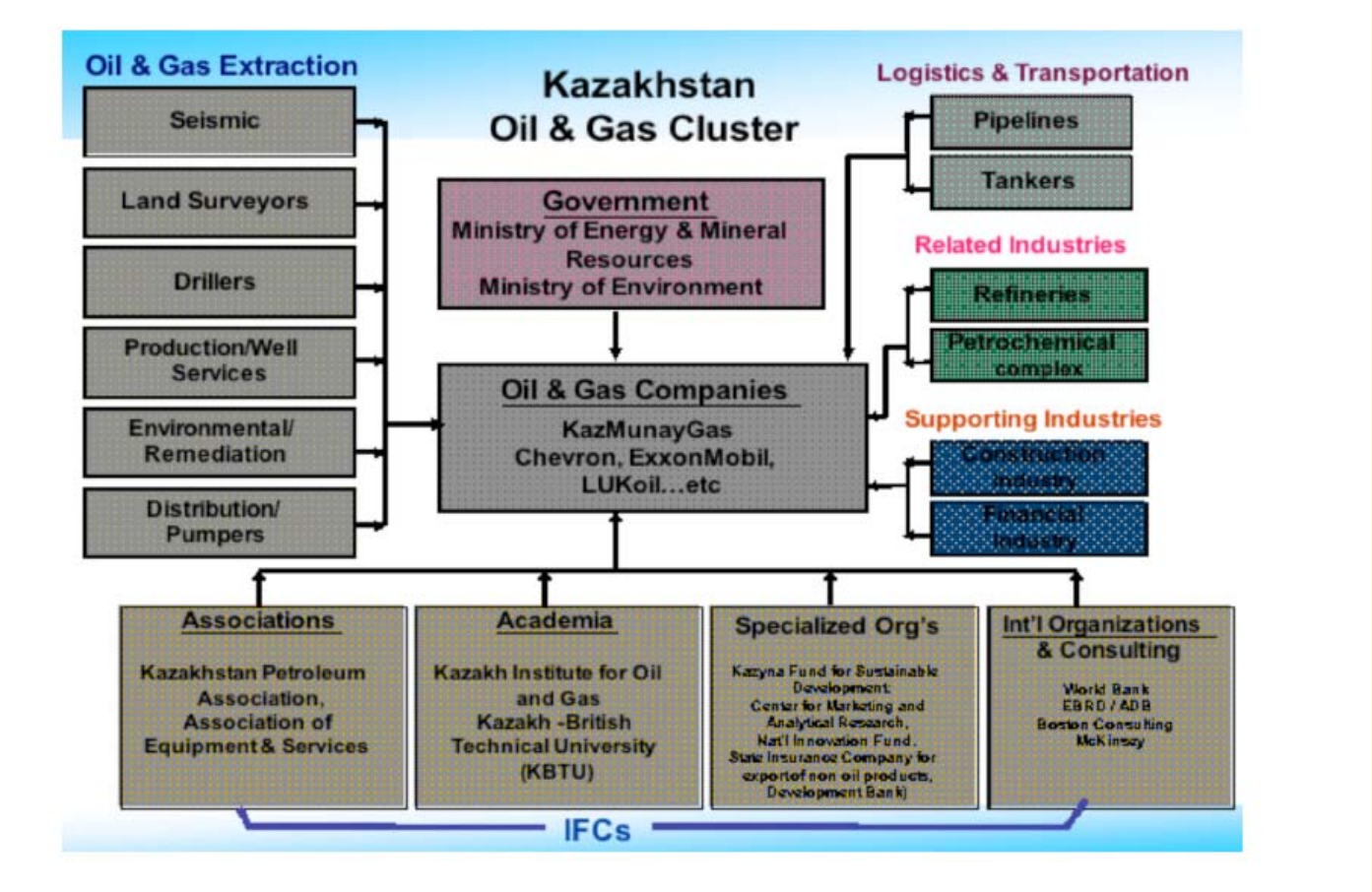
The following will be considered, but what is apparent is the lack of any detailed published studies of Kazakhstan clusters.

- Energy Cluster
- Agriculture and Food Processing Cluster (Agro-Food Cluster)
- Innovation Clusters and Technolparks (although not one of the official clusters)

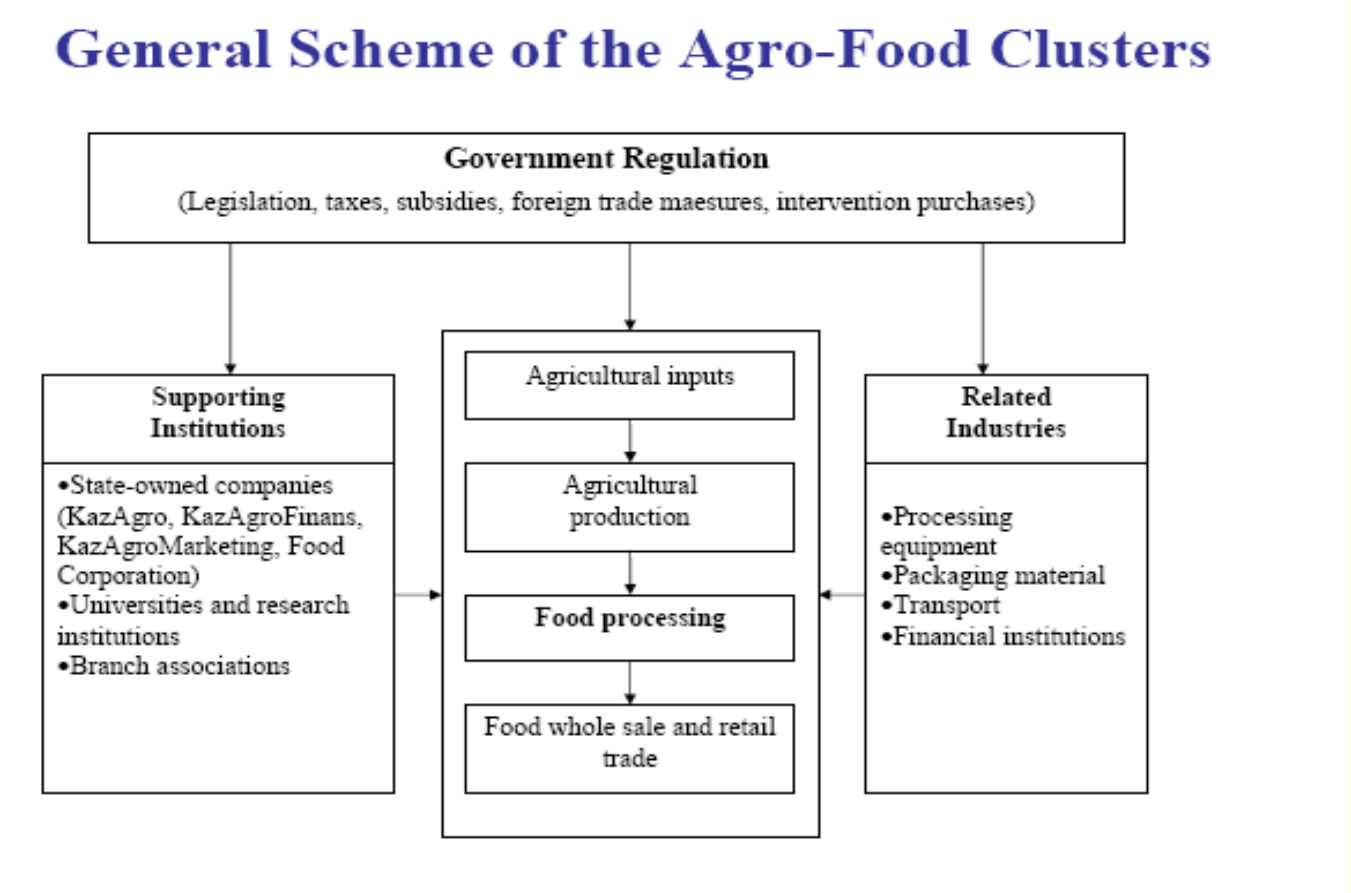
Building Efficient Natural Resource Clusters

Kazakhstan's Oil & Gas Equipment

Source: Viktoriya Tsay, Rauf Mammadov, Joo-Sueb Lee
Chin-ru Lo, Tigran Aloyan (2007) *Kaskhstan Energy Cluster*



Agro-food cluster



Agro-food Industries Cluster

- Will cluster policy make much of a difference given the high level of inefficiency?
- Government assistance has gone to the large corporate farms and not where it is most needed.
- Plagued by old and inefficiency machinery: 85% is at least 12 years old.
- “industrialization of agricultural production” can be done most efficiently through clusters.
- Lack of processing of agricultural products (low down in the value chain).

Agro-food Industries

- Wandel's criticism:

  "Essentially government driven with no reliance on market forces."

  Based on the old soviet mindset of the efficacy of state planning.

  Cluster policy based on vertical integration, suitable only for the agro-holdings that developed in the North. Not suitable for farming in the south.

Innovation Clusters and Technoparks in Kazakhstan

- The exemplar is Silicon Valley
- The evidence suggests that in spite of Silicon Valley, the technoparks have *not* been a great success. Wallsten (2004); Radosevic and Myrzakhmet (2006) for Kazakhstan.
- Resident companies use the technoparks for “storage” (National Research Council, 2007, p.81).
- Problems of R&D in Kazakhstan.

- The new Alatau Information Technology Park has attracted overseas companies such as Microsoft, Hewlett Packard, Siemens, Cisco Systems and the domestic firm, Kazkhtelecom. But the take-up by domestic firms has been disappointing. “The resident companies apparently are using the park for warehouse storage space, thereby taking advantage of the economic incentives, while contributing little to the economic development of the country” (National Research Council, 2007, p.81).

Conclusions

- On what spatial basis have the clusters been identified? Little published evidence.
- The clusters are sectoral classifications; is this just industry policy by another name?
- If they are clusters what are the policy implications? Porter argues that policy should attempt to improve *all* clusters – how is this to be achieved and is it optimal?
- Not through the use of subsidies, tariffs, exemption from competition laws or any other preferential treatment. Then how? Greater coordination within the cluster?
- What other measures?
- What are the implications from studies in other transition economies?
- Clusters could provide the micro-foundations for improving the **export product space?** *But the latter is the key.*