European Systemics Seminars

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The complex system of knowledge economy and the quest of governance for stakeholders’ networks

The post-industrial societies dealing with complexity: knowledge to manage the knowledge society

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Stakeholders and networks are shaping the boundaries of enterprises, and managerial literature is analyzing these changes through the tools provided by transaction costs economics and resource-based theory.

We analyse the relation between firms and economic environment, drawing a model of the knowledge network that constitutes the “social capital” of the firm, looking not at the quantity of connections (network’s dimension) but at their quality (network’s value) and dynamic development.

Systemic view: the firm is more than the sum of its parts.
Research Questions: Selection and Governance

- Resources and knowledge: which kind of knowledge can be useful and what are the costs?
- How firms collect and utilize information about a stakeholder’s utility function to create new sources of value?

We attempt to draw a “schema” to help understanding some complex strategic settings, analyzing if and how some network ties can create value or chaos, producing or dissipating resources.
Methodology

Resource-based theory
(firm-specific assets, competences, knowledge management to develop new unique resources)

Evolutionary economics
(routines, dynamic capabilities, combination of competences)

Stakeholder management
(importance of stakeholder for competitive advantage)

Networks
(transaction cost efficiency, hold-ups, organisational boundaries)

Value Creation
Firm as a complex system: a model

Transaction costs vs. Dynamic capabilities
Internal organization vs Stakeholders’ network
Costs of internal learning processes

Governance Problem
• Openness (dissipative)
• Difficulty of coordination

Network:
transactions’ specific knowledge assets
vs customers’ absorptive capacity with complex and tailored products

1. Knowledge complementarities
2. Interdependence of expectations
Model (1): connections and complementarities

- **Connections** are specific direct relationships between elements in the economic system: in the structure of interdependencies and interactions between agents, in technology, organisations and competence (Afuah and Tucci, 2012).

- **Complementarities** exist when various activities reinforce each other (Peirone, 2007).

- **Random Boolean Network**: a set of $n$ elements on a lattice with the state of each element is specified by a Boolean logical operation on a random set of $k$ other elements ($nk$ family of functions dependent from the macrostates of the system (order, complexity, and chaos)).
Potential complementarities come from \textit{signals} from the various actors in the network.

Agents use internal models to process environmental signals into expectations. The expectation of some variable $X$, denoted $E(X)$, is a weighted average of $n$ possible states of $X$ with probabilities $P_i$ used as weights, such that:

$$E(X) = \sum_{i=1}^{n} P_i X_i$$

Three operations: agents must construct a list space $(X)$, with an imagination/search operator, of the set of all possibilities; each possibility must be weighted ($P$) through a rational/mathematical operator; the array $E = P(X)$ must then be interpreted by means of a cognitive/heuristic operator that translates $(E)$ into the space of behaviour (Potts, 2003).
The Endogenous Selection Process

- Network structures of interaction will emerge, composed by the signals on her expertise that each agent is transmitting to others. Mass expectations flow over the network.

- Allowing agents’ different internal models, there will be diverse expectations irrespective of whether they have different input data or not (Crilly and Sloan, 2012).

- When the plans of individual agents are stable and widely known (or not), it follows that expectations will also be stable (or not).

- When firms need to maintain control over their strategic assets there will be less interactions in the network. When firms need more independence and allow for knowledge heterogeneity, network interactions will increase.
Conclusions

- Value creation through a “network of expectations”.

- Coherence/Consonance

- Many different business models

- Not efficient selection *ex ante*, but fast reaction *ex post*

- These are critical conditions for firm’s survival: the impossibility to form suitable expectations of other agents’ behaviours takes to a restrictions of planning horizons as a means of protection. This will increase instability through the interdependence of expectations. The increased density of feedback loops will result in a network structure with more chaotic dynamics.
Research Questions: Selection and Governance

- How (and when) firms collect and utilize information about a stakeholder’s utility function to create new sources of value?

- Resources and knowledge: which kind of knowledge can be useful and what are the costs?

  Deliberate resources selection, accumulation, and recombination through a network of expectations based on coherence, targeted to optimize the total value produced by the available resources, regulated by dynamic feedbacks. The selection is linked to:
  1. the productive and organisational architecture,
  2. the phase of development,
  3. the need for the firm to control strategic resources or allowing knowledge heterogeneity.
Thank you!