New Concepts and Trends in International R&D Organisation

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Abstract

The globalization of markets, the regionalization of technical and scientific expertise, and the rapid change in technologies are forcing technology-based companies to continuously adjust their R&D organization.
Five trends of Organizational Change

- Stronger orientation of R&D activities towards international markets and knowledge centres
- Establishment of tightly coordinated listening posts
- Strengthening and reinforcement of foreign R&D sites
- Increased integration of decentralized R&D units
- Tighter coordination and recentralization of R&D activities at fewer know-how centres
Internationalization of Industrial R&D

• Technology-based companies strive to locate their R&D activities at centres of technological excellence

• Companies which have large home markets and a substantial domestic R&D base had less pressure to internationalize their R&D activities

• The increased competition from within and outside their industries forced these companies to source technological knowledge on a global scale
Internationalization of Industrial R&D

• The significance of international R&D activities is even larger when indirect influence of these companies on small and medium-sized enterprises is taken into account.

• The acquisition of innovative firms has become a strategy for gaining quick access to new technologies,

• The management of cross-border R&D activities is characterized by a significantly higher degree of complexity than local R&D management.
Internationalization of Industrial R&D

Fig. 2. R&D internationalization and R&D intensity of technology-based companies (1994–1998).
How R&D organizations is classified

• the dispersion of R&D activities

• the degree of cooperation between individual R&D units
Research Methodology

• Based on 195 semi-structured research interviews in 33 technology-based companies between 1994 and 1998

• Highly internationalized in terms of sales and operations in the electrical/electronics, automotive/turbines/heavy machinery, and chemicals/pharmaceuticals industries

• Focused specifically on the management and organization of international R&D and its evolution over time
Types of R&D organizations identified

- Ethnocentric Centralized R&D
- Geocentric Centralized R&D
- Polycentric Decentralized R&D
- R&D Hub
- Integrated R&D Network Organization
## R&D organizations

### Five typical forms of international R&D organization

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<th>Type of R&amp;D organization</th>
<th>Organizational structure</th>
<th>Behavioral orientation</th>
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<td>National inward orientation</td>
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<td>Centralized R&amp;D</td>
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Ethnocentric Centralized R&D

• All R&D activities are concentrated in the home country.

• It assumed that the home country is technologically superior to subsidiaries and affiliated companies in other countries.

• Core technologies, which ensure long-term competitiveness of the company, are retained as a ‘national treasure’ in the home.

• Typical for smaller MNCs because of specialization advantages, scope and scale effects, and limited resources.
Ethnocentric Centralized R&D

• **Strength**
  
  − demonstrates high efficiency due to scale and specialization effects, which results in lower R&D costs and reduced overall development times

• **Weaknesses**
  
  − lack of sensitivity for signals from foreign markets
  − insufficient consideration of local market demands
  − Not-Invented-Here syndrome occurs frequently, and the organizational structure tends to be very rigid
Ethnocentric Centralized R&D

**Microsoft**

- Centralized R&D can be highly competitive and successful both at home and abroad
  - when competencies and resources are abundant at the home country and product adaptation to local needs is minor
Ethnocentric Centralized R&D (Nippon Steel)

- Company in the heavy industry under enormous competitive pressure from economies with low labor costs

- Four corporate research laboratories near Tokyo (about 1000 researchers) and process development units in seven steelworks (about 150 engineers) supporting the factories and performing customer-related development tasks
Ethnocentric Centralized R&D (Nippon Steel)

- Process development units
  - serve as interfaces between the steelwork sites and the central R&D laboratories

- Centralized corporate R&D helps to improve communication and share the use of costly facilities
Ethnocentric Centralized R&D
(Nippon Steel)

- Steel making is a highly complex undertaking requiring process and handling know-how
  - difficult to establish a new plant abroad: Large plant investments are needed, and local competition can be very strong

- Protectionism is high in developing countries because their first steps into industrialization usually begin with heavy industries
Ethnocentric Centralized R&D (Nippon Steel)

• **Solutions**

  – engages in business partnerships through technical and financial cooperation, conducting all R&D centrally

  – branches out into other domains of research, such as information technology, life sciences, and chemicals
Ethnocentric Centralized R&D

Fig. 3. Ethnocentric centralized R&D is characterized by a lack of transnational R&D processes as all R&D activities are concentrated at the home base.
Geocentric Centralised R&D

- **Geocentric centralized** organization **overcomes** the ethnocentric home-base orientation while **retaining** the efficiency advantage of centralization.
- Extra investments in R&D personnel is required in order to increase their international awareness.
- At the central R&D site, knowledge of worldwide and external available technologies is accumulated.
- R&D employees’ sensitivity for international markets increases.
- This can be achieved by sending R&D employees abroad to collaborate and intensively communicate with local manufacturing, suppliers and lead customers.
### Geocentric Centralised R&D

R&D employees sent overseas to gather knowledge and info and send these info back to central R&D base.

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<th>Central R&amp;D</th>
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<td>International Manufacturing</td>
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<td>Technology Parks</td>
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<td>Local Logistics</td>
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<td>Global Sourcing</td>
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<td>Strategic Alliances</td>
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<td>Cooperation / Lead Users</td>
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#### Behavioral Orientation
- Geocentric external orientation
- Close cooperation with other sites
- Unrestricted information flow
- Change agents enable internationalization

#### Configuration
- Central R&D in home country
- Close contact with international sites
- International secondments and recruiting

#### Examples
- ATR
- ETL
- Hilti
- Kubota
- MTU
- Nissan

Eg: Feedback on local requirements
Geocentric Centralised R&D

• **Strengths**
  – Offers a quick and inexpensive way to internationalise R&D without giving up the advantage of physically centralised R&D
  – Efficiency due to centralisation
  – High sensitivity for local markets and technological trends

• **Weaknesses**
  – If R&D internationalisation is not systematically ensured, crucial local market requirements such as taste, trends and standards will be insufficiently considered.
Polycentric Decentralised R&D

- Local R&D laboratories have been established by local distribution and manufacturing units, mainly in order to respond to customer product adaptation requests.
Polycentric Decentralised R&D

• **Strengths**
  – Optimal for local market sensitivity and the exploitation of local resources.

• **Weaknesses**
  – Info flow between foreign sites and home base is limited with reports on current R&D activities often being late
  – High autonomy and little incentive to share info with other R&D units
  – Inefficiency on a corporate level and redundant R&D activities
  – Lose focus on technology and technology convergence is difficult to achieve
R&D Hub Model

Main laboratory for all research and advanced development activities, retaining a worldwide lead in relevant technological fields.

Focus their activities on predefined technological areas.

Behavioral Orientation
- Decentralized R&D tightly controlled by center
- R&D center has technology lead
- Global coordination of R&D direction and budget

Configuration
- Ethno- or geocentric orientation
- Node structure with clear dominance of center
- Cooperation of units centrally controlled

Examples
- BASF, Boehringer Ingelh., Bosch
- Daimler
- Eisai, Fujitsu
- Kao, Matsushita
- Mitsubishi, NEC
- Sharp
- Siemens, Sony
- United Technologies
- Zeneca
R&D Hub Model

- **Strengths**
  - Quick recognition of local demands and the sustained integration of global R&D activities.
  - Innovativeness of the company is reinforced by the exploitation of dispersed competencies and the variety of their input.

- **Weaknesses**
  - High coordination costs
  - Danger of suppressing creativity, initiative and flexibility in decentralised R&D sites by central directives
R&D Hub Model

• Critical Success Factors:
  – Each unit must be large enough to ensure a critical mass of operation and must not exceed a level where the risk of redundant activities is too large.
  – Management systems of all R&D sites must be compatible, as intensive information flow between the center and the decentralized R&D units is to be ensured.
  – The center has to hold sufficient competency to fulfill its technology leader role and to coordinate all worldwide activities effectively.
Integrated R&D Network

• The classical dyadic center-subsidiary relation loses its significance in the integrated R&D network model.

• Domestic R&D is no longer the center of control for all R&D activities.

• Central R&D evolves into a competency center among many interdependent R&D units which are closely interconnected by means of flexible and diverse coordination mechanisms.
Integrated R&D Network

The role of the central R&D site changes from a control center to an R&D unit with equal rights and duties.

Flexible connections and relations between network partners enable better utilization of available competencies, contribute to the realization of specialization and scale effects, and reduce the risk of duplicate development.

- Foreign R&D units in the integrated R&D network:
  - Assume strategic roles affecting the entire company
  - Specialises on a particular product, component or technology area

**Behavioral Orientation**
- Geocentric orientation, lead-country concept
- Partnership among all competency centers
- Unrestricted flow of information

**Configuration**
- Highly internationalized R&D
- Global responsibility of competency centers for technologies or products
- Multi-dimensional coordination and information

**Examples**
- ABB
- Canon
- Hoechst
- IBM
- Novartis
- Philips
- Roche
- Schering
- Schindler
Integrated R&D Network

• **Strengths**
  – Skills and knowledge are best leveraged for the benefit of all R&D units
  – Organisational learning across many locations
  – Exploitation and refining of local strengths

• **Weaknesses**
  – High coordination costs
  – Complexity of institutional rules and decision processes
Trends in Organising International R&D

Fig. 13. Five major trends drive the evolution of international R&D organizations.
Trends in Organising International R&D

• Trend 1:
  – Many companies with centralised R&D realised that their R&D processes have to be aligned better with international market needs
  – R&D center opened to external info and feedback

• Trend 2:
  – Companies establish listening posts in areas of technological expertise around the world.
  – Tapping of foreign technology and knowledge bases becomes the main source of know-how
Trends in Organising International R&D

• Trend 3:
  – R&D sites are granted with more autonomy and empowerment.
  – They are assigned a strategic role in the R&D network.

• Trend 4:
  – Company growth based on M&A and strong local R&D capabilities often result in relatively autonomous R&D units
    • centers of expertise are created and mechanisms for international R&D coordination are introduced

• Trend 5:
  – Trend towards the integrated R&D network
Why the trends toward the integrated R&D network?

Because….

- Total organisational costs are lowest in the integrated R&D network which is characterised by balanced coordination and global efficiency with leveraged competencies.
Conclusions

• The trends of R&D internationalization further increase the significance of transnational R&D projects.

• The importance of R&D internationalization and global knowledge creation processes for competitive advantage will further increase for technology intensive multinationals.