New Concepts and Trends in International R&D Organization, illustrated by the example of Nestlé

Based on the article:
New Concepts and Trends in International R&D Organization
By Oliver Gassman and Maximilian von Zedwitz

Legros Christopher
Herman Yannierumar

Research and development in Multinationals
Professor: Michele Cincera

Solvay Business School and Economics – Université Libre de Bruxelles
March 17, 2008.
Table of contents

Introduction

Part 1: Analysis of the article
1. Internationalization of industrial R&D
2. Trends and organizational concepts in international R&D
   2.1. Ethnocentric centralized R&D
   2.2. Geocentric centralized R&D
   2.3. Polycentric decentralized R&D
   2.4. R&D hub model
   2.5. Integrated R&D network

Part 2: The case company
1. Short History
2. Nestlé’s structure
3. Nestlé’s R&D
4. Nestlé’s Research Center
5. R&D INTEGRATED NETWORK

Conclusion

Bibliography

Annexes
Introduction

The international R&D organization of a company is subject to a continuous change with regards to the international environment. Technology-based companies have to continuously adjust their R&D organization in order to fit the international environment. Even if the literature has investigated the location decision in R&D organization, a practical guiding framework for organizing international R&D is still missing.

Although different taxonomies for international R&D units have been developed, a comprehensive model for organizational change has not been achieved by researchers of R&D management.

To address this issue, Gassman and von Zedwitz (1999) developed an evolutionary model of international R&D organization thanks to their study of a sample of 33 highly internationalized companies. They identify five types of structural and behavioral orientation in international R&D organization: the ethnocentric centralized R&D, the geocentric centralized R&D, the polycentric decentralized R&D, the R&D hub model and the integrated R&D network.

To illustrate concretely this last model, we will expose you the Nestlé Company which apply the integrated R&D network. Nestlé has 16 R&D Centers with equivalent competences everywhere in the world.

Gassman and von Zedwitz (1999) also identify five major trends of organizational change with regards to the companies’ sample: (1) Orientation of R&D processes towards international markets and knowledge centers, (2) Establishment of tightly coordinated technology listening posts, (3) Increase of autonomy and authority of foreign R&D sites, (4) Tighter integration of decentralized R&D units, (5) Increased coordination and re-centralization of R&D activities in fewer leading centers in order to improve global efficiency.

This report is divided in two parts: the first part contains a summary of the article “New Concepts and Trends in International R&D Organization” written by O. Gassman and M. von Zedwitz (1999) in the Research Policy in 1999, in which their taxonomy and trends of organizational change are exposed. The second part examines the Nestlé Company, which actually presents the characteristics of the integrated R&D network.

---

1 See Annexes.
**Part 1: Analysis of the article**

1. **Internationalization of industrial R&D**

There is available evidence of R&D internationalization in the 1970s but the trend towards internationalization become really global as recently as in the late 1980s² ³.

Multinational enterprises (MNEs) have a singular ability to transfer knowledge across countries and therefore are unique knowledge-creating organizations⁴. In order to enlarge the knowledge base of the company, MNEs tend to extend the R&D internationalization on a global scale and this trend is increasing. Technology-based companies in particular try to locate their R&D activities in places rich in knowledge sources, technological capabilities and which are characterized by a “high rate of new technology output”⁵ in order to exploit the innovative richness arising of the local learning⁶.

The first companies that internationalized their R&D are high-tech companies operating in countries characterized by the scarcity of R&D resources and the littleness of their respective home market (i.e. ABB, Novartis and Hoffmann-La Roche (Switzerland), Philips (Netherlands) or Ericsson (Sweden))⁷.

Still, companies and countries present significant differences in the degree of R&D internationalization. Small open countries like Belgium, Luxembourg or Ireland are highly internationalized. Criscuolo and Patel (2003) show that multinationals enterprises based in small European countries are more internationalized than their counterparts in larger ones.

In the late 1980s, Belgian, Swiss and Dutch companies performed more than 50 % of their R&D abroad and the trend is increasing. Since 1986, the two latter had more foreign

---

laboratories than within the country\(^8\). Another way to see it is to consider the percentage of resident’s inventions made abroad, which attained 47% for Switzerland, 36% for Ireland and 32% for the Nederland’s in 2000\(^9\).

On the contrary, companies based in large home markets and which have a sizeable domestic R&D base “had less pressure to internationalize their R&D activities”\(^10\), as it is the case for General Motors in USA, Toyota and Fujitsu in Japan, and Daimler-Benz in Germany. The analysis of Guellec and Pottelsbergh (2001, 2004) shows that bigger countries intensive in R&D are relatively less internationalized. However, the increase in competition within and outside their industries forced them to source technological knowledge on a global scale\(^11\). For example, the ratio of overseas R&D expenses relative to total R&D investment of US firms rise from 6% in 1985 up to 10% in 1993. European companies carried out about 30% of their R&D abroad (and only 5% for Japanese MNEs)\(^12\).

Traditionally, the phenomenon of internationalization of R&D is generated by firms from advanced countries and especially from/between the triad nations\(^13\) (for example, most of laboratories have been established in these countries). In order to take into account the magnitude of R&D activities of MNEs, Gassmann and von Zedwitz (1999) weigh up the share of total input of the 50 largest multinational enterprises in these countries (see table 1).

<table>
<thead>
<tr>
<th>Nation</th>
<th>R&amp;D share as of total R&amp;D in that country</th>
<th>Total R&amp;D expenditures in 1993 (US$ billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>33%</td>
<td>55</td>
</tr>
<tr>
<td>Western Europe</td>
<td>42%</td>
<td>50</td>
</tr>
<tr>
<td>Japan</td>
<td>57%</td>
<td>43</td>
</tr>
</tbody>
</table>


However, the emerging markets are now attracting an increasing share of international investments by multinational enterprises. A study of investors’ intensions\(^14\) stresses the increasing importance of developing and transition countries investment plans in order to obtain a strong position in strategic markets (particularly in the four tiger’s countries and China).

\(^9\) Background report, Internationalization of R&D : trends, Issues and Implications of S&T policies” (2005), op. cit., p. 7.
\(^11\) *Ibid*.
\(^13\) USA, Western Europe and Japan.
\(^14\) UNCTAD (2004).
In the research sample, Gassman and von Zedwitz (1999) found an increased dispersion of R&D activities, particularly pronounced for companies based in small industrialized countries. For them, this increased dispersion is mostly the result not of R&D decisions but for other decisions (i.e., M&As\textsuperscript{15} with market-driven rationales in order to gain access to new technologies, political pressures, tax considerations).

However, the balance between the high costs generated by the international coordination and the necessity of attaining a synergy between the acquired and the acquiring companies is quite a challenge\textsuperscript{16} for the corporate managers and is highly complex.

2. Trends and organizational concepts in international R&D

Oliver Gassman and Maximilian von Zedwitz (1999) performed 195 personal interviews of R&D directors and managers of 33 large and highly internationalized MNEs\textsuperscript{17} based in Europe (17), USA (5) and Japan (11), which continue to intensify their overseas R&D activities in the 1990s; many of them intend to raise their number of international R&D sites in the next 5 to 10 years\textsuperscript{18}. Their data cover the 1994-1998 period. This study has been completed by the examination of internal reports and communications.

Based on taxonomies of both Bartlett (1986) and Perlmutter, the authors have developed an evolutionary model of international R&D organization, based on a typology of five categories of international R&D organization according to two key parameters: “the dispersion of R&D activities and the degree of cooperation between individual R&D units”\textsuperscript{19}. Furthermore, the authors identified five principal trends on the evolution of international R&D organizations.

The following table shows the five types of international R&D organizations identified by the authors to accommodate their observations in the research sample and their basic behavioral orientations.

\textsuperscript{15} For example, the volume of M&As worldwide passed on from US$ 369 billion in 1992 to US$ 1630 billion.

\textsuperscript{16} The synergy effects are such as a decreased time-to-market, improved effectiveness and enhanced learning capabilities (Gassmann, O & M. von Zedwitz (1999), op. cit., p. 233).

\textsuperscript{17} See Annexe 1

\textsuperscript{18} Gassmann, O. & von Zedwitz (1999), op. cit., p. 232.

### Table 2 - Five typical forms of international R&D organization

<table>
<thead>
<tr>
<th>Type of R&amp;D organization</th>
<th>Organizational structure</th>
<th>Behavioral orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnocentric centralized R&amp;D</td>
<td>Centralized R&amp;D</td>
<td>National inward orientation</td>
</tr>
<tr>
<td>Geocentric centralized R&amp;D</td>
<td>Centralized R&amp;D</td>
<td>International cooperation</td>
</tr>
<tr>
<td>Polycentric decentralized R&amp;D</td>
<td>Highly dispersed R&amp;D, weak center</td>
<td>Competition among independent R&amp;D units</td>
</tr>
<tr>
<td>R&amp;D hub model</td>
<td>Dispersed R&amp;D, strong center</td>
<td>Supportive role of foreign R&amp;D units</td>
</tr>
<tr>
<td>Integrated R&amp;D network</td>
<td>Highly dispersed R&amp;D, several competence centers</td>
<td>Synergetic integration of international R&amp;D units</td>
</tr>
</tbody>
</table>


#### 2.1. Ethnocentric centralized R&D

In the ethnocentric centralized R&D organization, all R&D activities are concentrated in the home country. In this type of international R&D organization, there is a dominant R&D center that serves far-away markets, creates new products and keeps for itself the core technologies.

The ethnocentric centralized R&D allows the control on the technology transfer, high efficiency due to scale and specialization effects, lower R&D costs and reduces overall development times.

However, in this type of organization the company is not sufficiently sensitive to signals from foreign markets and doesn’t sufficiently account for local market demands. Moreover, the organizational structure is not flexible.

#### 2.2. Geocentric centralized R&D

This configuration prevails on the precedent if the company becomes more dependent on foreign markets and local competencies. In this configuration, R&D is still centralized in the home country but with external orientation and unrestricted flow of information. R&D employees are regularly sent abroad to co-operate with local manufacturing, suppliers and lead customers. Foreign employees are also hired to increase sensitivity to external clients.

---

This is an easy way to internationalize the R&D and, by doing this, the R&D center keeps the efficiency advantage of being physically centralized and gathers knowledge on available worldwide technologies.

Many companies who realized the necessity of being more receptive to local market needs can move from an ethnocentric to a geocentric centralized model. The cooperation involved in the latter allows them to become more open and therefore overcome ethnocentrism for the benefit of a more geocentric outlook. The key factors in this transition are “the degree of product differentiation demanded by different regional markets and the availability of all necessary technology in-house” (Rao P.M., 2001; p 582).

2.3. Polycentric decentralized R&D

The polycentric decentralized is an extreme form of decentralization of R&D units with very little global coordination by the corporate R&D center and no supervision. This kind of configuration has been adopted by companies with strong orientation towards regional markets (like many European MNCs in the 1970s and 1980s) and/or MNEs formed through M&A activities, for which the potential synergy has not been exploited.

Companies that have adopted this configuration have a strong sensitivity for local markets and adapt to the local environment. However, the high autonomy of R&D units and the absence of communication between them could lead to inefficiency on a corporate level and to a parallel development of R&D activities (especially if the different R&D units try to preserve their autonomy and national identity).

The lack of synergy, the pressure to diminish R&D costs and the necessity to conduct a proactive coordination of R&D units have led many companies to abandon the polycentric decentralized model (this is the “dying model” among the five forms) in favor of the hub or the network model (i.e., Nestlé and Philips).

2.4. R&D hub model

In the R&D hub model, the home-based center tightly coordinates and controls smaller foreign labs. The R&D center (which is the main laboratory) serves as the central information and decision-making platform for all foreign R&D units, which focused their activities on predefined technological areas. The coordination (however highly costly) of R&D activities allows a high efficiency, an efficient technology transfer and avoids the redundancy of R&D

activities. On the other hand, the center’s directives may reduce the creativity and initiative of R&D sites.

The size of foreign R&D units determines the success of the hub model: they have to be sufficiently large to ensure a critical mass of operations but they can’t exceed a level that increases the danger of redundant activities.

The information and communications technology reduces the high costs generated by the center’s tight coordination and control, and facilitate the information flow between the center and the foreign R&D units.

When product adaptation through the geocentric centralized model can’t sufficiently fulfill local market requirements or when foreign technology becomes too important, MNCs can tap on foreign technology and knowledge bases by establishing listening posts abroad (and thus move toward R&D hub model).

2.5. Integrated R&D network

In the R&D hub model, the high control exerted by the R&D center is inappropriate in an environment of increasing competencies and technological strengths of R&D units, and gives way to the integrated R&D network model. In the integrated R&D network model, the central R&D department evolves into a competency center among interdependent R&D units, which are closely connected by flexible and diverse coordination mechanisms.

R&D units undertake strategic roles affecting the entire company, on the contrary of companies that have adopted a R&D hub model. The integrated R&D network has the capacity to leverage the competencies of each unit (R&D units carry out a specific role in knowledge creation through their extensive external networks) for the benefit of all, and therefore the whole company. These corporations have multiple centers of learning in different locations and manage cross-functional learning from different sites.

Different companies, and among them Nestlé, moved from a polycentric decentralized (or hub) organization towards an integrated R&D network, thus increasing global efficiency of R&D. Therefore, the authors state that there is an evolution towards integrated R&D network, which is seen as the most advanced form of R&D organization.

23 Each unit specializes on a particular product, component or technology area and, by this way, assumes a leading role as a competency leader.
24 The focus is on specialization, synergy effects and organizational learning.
This switch requires a complex set of coordination structures, in which all R&D units are equal partners and information\(^{25}\) and decision-making is freely shared. Furthermore, the pressure to decrease the R&D costs (by reducing duplicate R&D) and the will to exploit scale economies coerce firms to adopt an integrated network with lesser leading research centers.

**Part 2: The case company**

Every day of the year, over one billion consumers choose to buy a Nestlé product. With more than 265,000 employees, Nestlé is the biggest companies of beverage and food. As we can see on the graph Nestlé’s sales are 3 times bigger than Coca-Cola’s sales for example. Last year Nestlé made more than 107,000 million CHF in Sales and a net profit of 106,49 million CHF which is a real augmentation versus 2006.

Nestlé base its management on different Business Principles: The main objective is to create sustainable value for everyone: shareholders, employees, consumers, business partners etc. BUT create value in long term business development and not in short term profit. They have the feeling that the customers give a big importance to the behavior of the Company behind the brands in which they place their trust. Another important point is the Non-discrimination politics on the basis of origin, nationality or religion. Nestlé positions itself as a Social Company.

\(^{25}\) The global information and communication: success of that model.
Nestlé have an important R&D strategy under an INTEGRATED R&D NETWORK. The following graph shows that they invest more and more every year to reach $1837.5 million in 2007. We will see how they invest this money and in particular in the Nestlé Research Center.

One important notification to precise is that Nestlé has a relatively low R&D Intensity: 6%. Which is, more or less, the same in comparison with other R&D Integrated Network Companies like IBM.

![Sales by region graph](source: please credit graph with the data of [Investing Businessweek.com](http://investing.businessweek.com))

Nestlé is present everywhere in the world but the biggest amount of sales are made in the Americas with more than 42% of the total sales versus 38% in Europe and 19% in the rest of the world.

1. Short History

The beginning of this company is due to Henry Nestlé, a pharmacist who developed in 1860 a food, a milk, for babies unable to be breastfed. This milk has to replace mother’s milk of the usual substitutes for children who couldn’t tolerate these milks. A lot of people recognize the quality and the useful of this product and soon, Farine Lactée Henri Nestlé was being sold a big part of Europe.

By the early 1900’s the company was active in the US, Britain, Germany and Spain. Nestlé decided to merge with the Anglo-Swiss Condensed Milk Company. The First World War creates a new demand in the form of government contracts which permitted Nestlé to double its production within 4 years.

But the end of the War means the end of the government contracts. Moreover, people switched to fresh milk. However, the response of the management arrived quickly by streamlining operations and reducing debts. The 1920s
saw Nestlé become the second more important food activity after chocolate.

The Second World War affected directly Nestlé with a drop of the profits of 14 million between 1938 and 1939. Ironically, the war helped Nestlé to introduce a new product: Nescafe which was a staple drink of the US military. This product permitted Nestlé to raise its production and sales in the wartime economy.

The end of the Second World War coincided with a phase of growth and acquisitions for the company: a merger with Maggi in 1947 followed by Crosse & Blackwell in 1960, Findus in 1963, Libby’s and Stouffer’s in the early 1970s. A diversification came with a shareholding in L’Oreal in 1974. The close of World War II marked the beginning of the most dynamic phase of Nestlé’s history.

Nestlé made its second venture outside the food industry with the acquisition of Alcon Laboratories Inc in 1977 to react to a radically changed marketplace due to augmentation of the cocoa and coffee beans but also because of the deterioration of the dollar and pound sterling versus Swiss Franc.

Nestlé approached the 80s with the same strategy of acquisitions and improvement of its financial situation. That’s why the company decided to give up some unprofitable businesses. On the other hand, the debate over the marketing of infant formula in the Third World led to a boycott of Nestlé by certain religious organizations. This issue is still alive but we can say that there isn’t any boycott activity anymore. The largest takeover in the history of the food industry was made in 1984 by Nestlé by a public offer of 3$ billion for the American food giant Carnation.

The first half of the 1990s was a favorable time for Nestlé with the opening of new markets like China and with the liberalization of direct foreign investment. Others acquisitions were once again made with Dreyers for example.

Nowadays, the Company's strategy will continue to be guided by several fundamental principles. Nestlé’s existing products will grow through innovation and renovation while maintaining a balance in geographic activities and product lines. Long-term potential will never be sacrificed for short-term performance. The Company's priority will be to bring the best and most relevant products to people, wherever they are, whatever their needs, throughout their lives.
2. Nestlé’s structure.

Nestlé's structure has evolved from a classic multinational, laden by its size, to a grouping of agile, focused businesses able to respond rapidly to their own individual opportunities and challenges, whilst also to widen the scale of the group for efficiencies.

Nestlé today, with the right portfolio and the structure, is unique in its industry, differentiated from and competitively advantaged over its peers.

Nestlé is divided in several departments which have their own businesses. These departments are:

- Nestlé Waters
- Nestlé Nutrition
- Nestlé Professional
- Operations
- Innovation, Technology and R&D

The Nestlé Group is geographically managed (Zones Europe, Americas and Asia/Oceania/Africa) for most of the food business, with the exceptions of Nestlé Waters and Nestlé Nutrition which are managed on a global basis.

We can see the different details of activities / responsibilities which are included in the different departments in the next chart. We can see that the different departments like Nestlé Waters, Nestlé Nutrition, Nestlé Professional, R&D and Operations are on the same level. All the departments are working together and have the same responsibility.
3. Nestlé’s R&D

Nestlé continues to be a global leader in R&D, with approximately 5,000 people from more than 50 countries actively involved in research, development and product testing. In 2007, Nestlé invested $1.837 millions in R&D, this figure having more than doubled in the past eight years. The company focuses the R&D on products that provide specific health and nutritional benefits.

Nestlé have 16 R&D centers around the world, in 10 different countries, which are specialized in specific products categories and technologies like “PetCare” in France. These centers are linked to 275 others groups in the different markets which take care about local adaptations.
The worldwide Nestlé R&D Centers work both globally and locally to adapt products and processes to local tastes and needs. Tastes are not the same in each country and region. So Nestlé R&D gives attention to this important point during product development.


The center of Nestlé’s R&D is based in Lausanne: The Nestlé Research Center (NRC). This center is composed by 700 permanent staff including over that 300 Scientists. The NRC combines a global scale with local relevance. It engages more than 200 scientific partnerships and university collaborations each year. The goal of all this is to build a knowledge base to respond to the needs of the customers.

It also helps Nestlé having a vision of making “GOOD FOOD FOR GOOD LIFE”. The NRC conducts research on nutrition, health and wellness to generate new product concepts. These concepts will be transformed into products applications and processes by Product Technology Centers (PTCs) and R&D centers.

The worldwide network of PTCs and R&D Centers function closely with NRC and with Nestlé Strategic Business Units to give the results of the researches for all the Nestlé’s products. This leads to products with added taste, convenience and nutrition adapted to
customers’ needs. All this organization shows that the center of Nestlé network is well the CONSUMER.

Of course, every scientific discipline has its department into the NRC:

- BioAnalytical Science
- Food Science
- Food/Consumer Interaction
- Plant Science
- Nutrition and Health
- Consumer Trust
- Pet Basic Research
- Scientific and Nutrition Support
5. R&D INTEGRATED NETWORK.

As we show in the previous pages, Nestlé spent a lot of money into R&D: more than $1800 million in 2007. How does Nestlé’s R&D Network work? The answer is: like an INTEGRATED NETWORK! But the real question is: what is an integrated network?!

The Domestic R&D doesn’t control anymore all the other centers. All R&D Centers are independents and have their own orientation. Every Center is specialized on a particular product, component or technology area. With this quantity information and knowledge the R&D center accumulate, the unit assume a leading role and becomes responsible for the entire value generation of the company. Knowing best about potential market, the center is in charge of the entire world-wide market introduction and not only for the place where it is. It carries out all the necessary R&D activities.

Each unit in an integrated R&D network assumes strategic roles not only for the center but for the entire company. The perspective for this kind of center is to define appropriate strategies and new business for itself but overall for the Company in general.

However a lot of means of flexible and diverse coordination mechanisms coordinate the centers closely. That’s the necessary condition to have a good integrated R&D network. But, of course, it implies a lot of money to coordinate all the centers together.

An integrated R&D network requires a change of structure: moving from a simple control to a set of complex coordination structures. The main change is the role of the central R&D site which becomes a center like another with equal rights and duties.

Flexible connections and relation between the sites permit a better use of available skills, lead to scale effect and reduce the risk of working on the same projects in different sites.

After this little explanation about “Integrated R&D Network”, we are going to analyze the R&D network of Nestlé.

Nestlé is composed by 1 Research Centers and 16 R&D centers in 10 countries. The market-oriented expansion of the company allows acquiring these different sites. Each Center is specialized into a particular technology area.

The legally independent R&D Company NESTEC is responsible for the coordination of worldwide activities and the identification and exploitation of synergies. Less than 20 people manage the identification and the exploitation of synergies. These people are responsible for the transfer of technologies and know-how for the globally dispersed production sites. Each site has a license contract with Nestec for the services described above and for the usage of the Nestlé trademarks.

A technical assistance agreement with group companies allows the Nestec’s partners to have access to R&D results, norms and quality standards including R&D support for the introduction of the product into the market.
Conclusion

The internationalization of industrial R&D has become a widespread phenomenon in the 1980s and 1990s, however restricted to large MNEs. These companies, and particularly technology-based MNEs, have to adjust their R&D organization given the globalization of markets and the quick change of technologies.

Thanks to their study of 33 highly internationalized MNEs, for the 1994-1998 period, the authors edified an evolutionary model of international R&D organization. They identify five types of international R&D organization which differ in organizational structure and behavioral orientation: the ethnocentric centralized R&D, the geocentric centralized R&D, the polycentric decentralized R&D, the R&D hub model and the integrated R&D network.

As we saw in the case study, Nestlé successfully moved from a Central R&D network toward an integrated R&D network, in which every center is specialized in one field but is also involved in the all company’s strategy and not only in its market.

Gassman and von Zedwitz (1999) also identified five major trends among the companies sample:

1. Orientation of R&D processes towards international markets and knowledge centers;
2. Establishment of tightly coordinated technology listening posts;
3. Increase of autonomy and authority of foreign R&D sites;
4. Tighter integration of decentralized R&D units;
5. Increased coordination and re-centralization of R&D activities in fewer leading centers in order to improve global efficiency.

The authors’ evolutionary model involved an evolution towards integrated R&D network, which is seen as the most advanced form of R&D organization. In order to coordinate globally their R&D activities, many MNEs have moved toward this type of organization by distributing both research and development worldwide (research is located in regions characterized by their high-quality of scientific input). Gassman and von Zedwitz explain this trend by the pressure to diminish the R&D costs that these companies face. The focus is also on diminishing costs by reducing duplicate R&D, on specialization and on enhanced exploitation of synergy effects.
Bibliography


von Zedtwitz, M (2005), “International R&D Strategies in Companies from Developing Countries – the Case of China”, UNCTAD.

**Nestlé’s Website:**

  ⇒ [http://www.nestle.com/Resource.axd?id=7242D1D8-7FE2-4AF6-A4E4-E4E068CF35E3](http://www.nestle.com/Resource.axd?id=7242D1D8-7FE2-4AF6-A4E4-E4E068CF35E3)


- Nestlé R&D Network.  
  ⇒ [http://www.nestle.com/SharedValueCSR/ProductsAndConsumers/NutritionHealthandWellness/ResearchandDevelopment.htm](http://www.nestle.com/SharedValueCSR/ProductsAndConsumers/NutritionHealthandWellness/ResearchandDevelopment.htm)  
  ⇒ [http://www.nestle.com/SharedValueCSR/ProductsAndConsumers/NutritionHealthandWellness/RDNetwork.htm](http://www.nestle.com/SharedValueCSR/ProductsAndConsumers/NutritionHealthandWellness/RDNetwork.htm)

- Nestlé Research Center.  
Annexes

The figure below shows the 33 companies investigated by Gassman and von Zedwitz (1999). Each company of the authors’ sample is located according to its:

- R&D intensity, that is, the R&D expenditures to sales ratio (horizontal axis);
- R&D internationalization, that is, the ratio of foreign to overall R&D expenditures (vertical axis).

The size of the circles indicates the extent of absolute R&D expenditures.