

Marco Cocito, Raffaele Gatta,
Antonio Majocchi, Alberto Onetti

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Subsidiaries within a High-Tech MNC. A reappraisal of the Role of Functions

Marco Cocito^(^o)
Raffaele Gatta^([^])
Antonio Majocchi^([#])
Alberto Onetti^(^{*})

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Abstract

The recent management literature on multinational corporations (MNCs) has mainly focused on the new role played by subsidiaries within the international firms. Many scholars have underlined that MNCs tend to organise themselves along a differentiated network approach, where subsidiaries play a very different role according to their internal resources and the significance of the local environment. This strategic and organisational model dates back to the pioneering work of Bartlett and Ghosal, who called this new international strategy “Transnational” so as to differentiate it from the classical Multidomestic and Global strategies. Along with the different roles played by the subsidiaries, this model is characterised by the simultaneous existence of cooperation and competition within the multinational corporations.

The present work focuses on the role of the Italian subsidiary of Agilent Technologies, a multinational firm with around 36,000 employees that is active in more than 40 countries in high-tech sectors such as electronics, telecommunications and life science.

The case study brought new light to the usual distinction that is commonly made with regard to the role of a subsidiary. When we try to apply the Transnational model to Agilent we realise that neither this model nor the traditional typologies (Multidomestic, Global) apply to the case we have studied. The role of the subsidiary changes

^(^o) Manager, Turin Technology Center, Agilent Technology, Via Guglielmo Reiss Romoli, 274, 10148 Torino (TO), Italy

email: marco_cocito@agilent.com
Tel + 39 011 2292311; Fax +39 011 2292434

^([^]) CEO, Agilent Technology Italia, via Piero Gobetti 2/c, 20063 Cernusco sul Naviglio (MI), Italy

email: raffaele_gatta@agilent.com
Tel + 39 02 926081; Fax +39 02 92101 838

^([#]) Associate Professor of International Business, Facoltà di Economia, Insubria University, via Ravasi 2, 2100 Varese, Italy

email: amajocchi@eco.uninsubria.it
Tel +39 0332 215265; Fax 0332 215509

^(^{*}) Associate Professor of International Business, Facoltà di Economia, Insubria University, via Ravasi 2, 2100 Varese, Italy

e-mail: aonetti@eco.uninsubria.it
Tel +39 0332 215265; Fax 0332 215509

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significantly according to the function being considered. Therefore, we conclude that the role of function should be re-evaluated when the strategy and the structure of an MNC is defined. Not only does the classification of subsidiaries change according to the function in question, but the strategic posture and the organisational structure of MNCs should also be re-evaluated in light of the function under consideration. Our study shows how activities such as R&D, where cooptation represents a strategic source of advantage, seem to follow the Transnational scheme, while others such as sales are mainly globally managed.

1. Introduction

Since the pioneering works by Hedlund (1986) and Bartlett and Ghoshal (1989), a growing stream of literature has been devoted to the analysis of the different organisational approaches taken by multinational corporations (MNC). Most of these studies (Harzing, 2000) have taken for granted that multinationals mainly follow three different strategic approaches that have been defined along two different criteria. One variable (Prahalad and Doz, 1987) is integration/coordination, which measures the level of integration among the different worldwide activities of the MNCs. The second variable concerns product/service development and involves the choice between standardization and adaptation to local needs.

On the basis of these variables three different models have emerged in the literature as the typical ideal models (Harzing, 2000). Scholars who have studied the strategy and structure of the MNCs in the last twenty years have put forward a wide range of different definitions. Using Porter's (1986) terminology, we can define the models in the following way. The first model is the so-called Multidomestic, which combines a low degree of integration and a high degree of local adaptation. On the opposite end is the Global firm characterised by high integration and low local responsiveness, while the in-between model, the Transnational solution, combines local adaptation with a high level of integration.

In recent times, the Transnational model has attracted much attention due to its ability to conciliate the need for high economies of scale with the marketing requirement to follow the needs of different clients according to their geographical position. This model seems to effectively respond to the different competing needs that firms face in many industries (Makhija, Kim and Williamson, 1997). Pressures such as common needs or economies of scale force corporations to reinforce global integration. On the other hand, geographic dispersion is needed in order to respond to different customer needs, the requests by local governments, and to exploit assets that are location-specific.

The study of the Transnational model raises many interesting questions in terms of organisational design. Transnational corporations typically operate in a large number of countries. This dispersion raises two different and related questions. The first concerns control methodology and the second the role of subsidiaries in these kinds of MNCs. Many authors (White and Poynter, 1990, Prahalad and Doz, 1981) underline that with dispersed activities the usual hierarchical methods of controls were ineffective and the network configuration requires new methods of control based on informal systems and mechanisms. This leads to the overlapping of formal and informal methods of control and to the development of intense relationships among subsidiaries. The second aspect regards the differentiation of the role played by subsidiaries, which leads

to different specialisations. According to Bartlett and Ghoshal (1989) the Transnational model can be described as an integrated network where the knots of the network can play different roles.

This differentiation of the role of subsidiaries has led to numerous studies (Jarillo and Martinez 1990, Birkinshaw, 1997; Frattocchi and Holm 1998, Frost, Birkinshaw and Ensign, 2002) that have focused on the role of these subsidiaries in the network and highlighted the strategic role of the subsidiaries and the development of new relationships between headquarter and subsidiaries as well as between subsidiaries. The present work presents a case study approach to the problem of the subsidiary's role in a high-tech MNC.

In our study, we have tested the robustness of the Transnational model from the point of view of the subsidiaries. In so doing, we realise that previous papers, with some exceptions (Malnight, 1995, and Kim, Park and Prescott, 2003) severely underestimate the role of functions when testing the model. In analysing the case we jump to the conclusion that the role of subsidiaries radically changes according to the kind of function involved.

The paper is organised in the following way. The first part presents an overview of the literature on the role of subsidiaries in MNCs. The subsequent sections describe the methodology and present the case. A discussion and conclusion then follow.

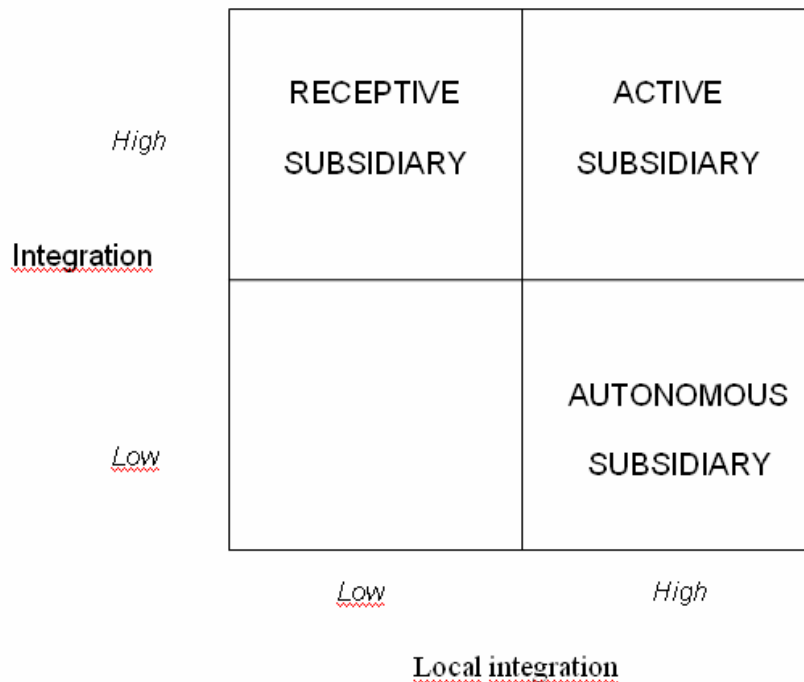
2. The Role of Subsidiaries in Modern MNCs

The idea that subsidiaries can have different strategies within the same MNC is at the heart of the Transnational model. Once again a decisive contribution has been made by scholars such as Prahalad and Doz (1981), Bartlett (1986), and Ghoshal and Noria (1989), who were among the first to identify a new role for subsidiaries within the multinational corporation. Bartlett (1986) criticizes the doctrine of "symmetrical treatment" of subsidiaries. Implicitly highlighting the negative aspects of the multidomestic model, he states that (pg. 89): "International subsidiaries shouldn't just be pipelines to move products. Their own special strengths can help build competitive advantage". The idea he consequently supports is that subsidiaries should be differentiated along two different lines: the competences that reside in the subsidiary and the strategic importance of the local environment. The resulting classification of subsidiaries was as follows: Strategic Leaders, which are important units in important locations; Contributors, which are subsidiaries with distinctive capabilities but in a trivial environment; Implementers, which are national entities in a limited market with resources that reflect the role of the market; and Black Holes, i.e. foreign units with scarce resources but in a relevant location.

Gupta and Govindarajan (1991, 2000) follow a similar approach by classifying subsidiaries not according to resources but to the flow of knowledge attracted and dispersed by the units.

A different but similar approach has been proposed by Jarillo and Martinez (1990) and by Roth and Morrison (1992), who classified subsidiary strategy using the configuration and coordination variables, thus mirroring Porter's (1986) classification of international strategies (see Figure 1).

Figure 1. Subsidiaries' Classification



Source Martinez: and Jarillo (1991, pg.434)

The idea put forward by many scholars (Birkinshaw and Hood, 1998, and Taggart, 1998) that, within the network, there are subsidiaries with a strategic role, has been particularly successful and has led to an intense analysis of what has been called the “centre of excellence”. Frost, Birkinshaw and Ensign (2002) define these units as those centres recognised within the MNCs as important sources of value creation. The authors emphasize that the role of the subsidiary is defined, not only by the resources embodied in the organisational units and by the linkages with important external entities, but also by the recognition of the subsidiary’s importance by other units within the MNCs. Significantly, the authors find that the relative importance of these factors changes according to the function in question. More recently, Rugman and Verbeke (2001) have questioned the idea that a subsidiary can be categorized in a simple way based on a few variables. They accept the idea that an MNC can be viewed as a differentiated network of dispersed activities, but at the same time they refuse the idea that (p. 239): “each subsidiary perform a single well -defined role within the MNC”. In their paper the authors define different patterns of subsidiary competence building within MNCs, starting from the definition of country-specific advantages and firm-specific advantages. The geographical sources of the firm’s specific advantages and the distinction between location-bound and non-location bound defines ten different patterns of competence building within international firms and a quite large set of roles played by subsidiaries. One of their main conclusions is that any attempt to classify a subsidiary’s role is becoming less and less relevant.

3. Methodology and Case Study

The Transnational model has had a significant impact on the management literature: in fact, this organizational model is indicated as the solution for the various organizational problems of the multinational corporation. Despite the theoretical success of the model there is still scant empirical support for it (Hedlund and Ridderstrale, 1997). Apart from the authors who first contributed to developing the model (Prahalad and Doz, 1987; Bartlett and Goshal, 1989; Bartlett and Goshal, 1993, White and Poynter, 1990; Maljeris, 1992), most of the literature has focused on the use of quantitative analysis methodologies based on questionnaires (Leong and Tang, 1993; Harzing, 2000). The value of these analyses is that they take into consideration a large number of corporations and thus offer a solid empirical base. Nevertheless, the need to translate complex concepts into quantitative terms necessarily results in a simplification of the detailed organizational model that the Transnational corporation represents. Thus, we believe that in addition to these quantitative analyses an in-depth analysis, such as the one offered is required of cases that allow us to evaluate if and how this organizational model has been implemented in practice. This study of the Agilent Technologies group is an attempt to achieve this goal.

The present study differs from most of the others in one further way. We do not adopt the headquarters point of view but instead that of the subsidiary, in particular that of the Italian subsidiary of a high-tech firm. This approach, as other authors has already underlined (Birkinshaw and Morrison 1995), has limits as well as advantages. The limit is that by taking the point of view of the subsidiary's management our analysis does not consider, or does so only partially, the strategic choices made at the corporate level. Nevertheless, it is at the subsidiary level that the Transnational model produces its most important effects by emphasizing the role of some subsidiaries – that end up in the role of true centres of excellence (Frost, Birkinshaw and Ensign, 2002) – and assigning them tasks that go beyond narrow local limits and belong to the corporate level (functions, specific activities or products). The subsidiary point of view has in fact been analysed by some authors (Martinez and Jarillo, 1991; Andresson, Forsgren and Holm, 2002; Frost, Birkinshaw and Ensign, 2002) by means of quantitative analyses. These authors have pointed out that greater autonomy for the subsidiaries leads to a greater role within the MNC and a higher level of embeddedness between the subsidiary and the local companies.

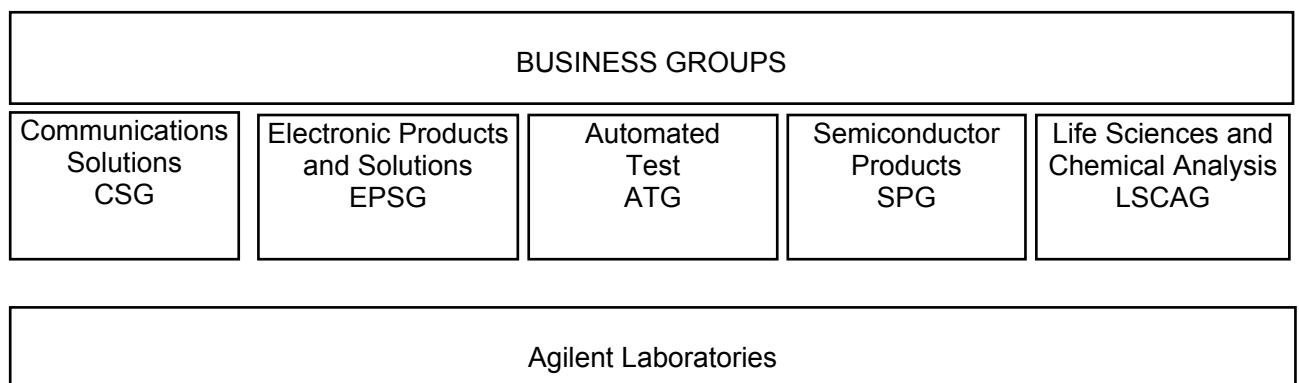
4. The business case: Agilent Technologies

Agilent Technologies is a multinational corporation that operates in various technological sectors in rapidly developing markets, such as communications, electronics, chemical analyses and life sciences. Once a part of Hewlett-Packard, on November 18, 1999, it was spun off and became an independent joint-stock company listed on the New York Standard Exchange. Today Agilent Technologies has a global reach with factories in over 40 countries employing 28,000 persons, and with a sales network operating in 110 countries. Agilent net revenue amounts to more than 6 billion US dollars.

Agilent Technologies is composed of five business units internally defined as groups, which are listed below:

- Electronic Products Solutions Group (EPSG): this business unit deals with electronic apparatus;
- Semiconductor Products Group (SPG): this business unit produces semiconductor components. Its products are directed mainly at the Networking market, where it produces fiber optic devices and high-speed integrated circuits, as well as the Personal Systems market, where the devices are used for applications such as mobile phones, PC peripherals, printers and, more generally, consumer electronic goods;
- Automated Test Group (ATG): test system solutions for speeding up and improving the production of semiconductor devices and printed circuit cards;
- Communications Solutions Group (CSG): products for telecommunications firms (wireless communication instruments, products for testing wireline devices, solutions for photon measurement), systems for monitoring, managing and optimizing communications networks, and software design instruments;
- Life Sciences and Chemical Analysis Group (LSCAG): this unit produces both classic products (instruments, software and applications for identifying, quantifying and analysing the physical and chemical characteristics of substances and products) and biotechnology products.

Figure 2. Agilent Organisational Chart



Source: Internal reworking of Agilent Technologies Data

5. The International Configuration of Agilent Technologies

Agilent Technologies has a complex organizational structure which at first glance shows a divisional arrangement. As mentioned above, Agilent is composed of five business units identified by product type, or technological base. Consistent with its high-tech nature, Agilent's business units are grouped mainly along technological lines: this is shown by the fact that several of the business units serve the same clients by satisfying different use functions with different technologies. For example, IBM and Ericsson are clients of three business units (EPSG, SPG and ATG), and Cisco of four (EPSG, ATG, SPG and CSG). The firm has a certain degree of diversification: while strongly focused on electronics and communications – which are managed by four business units that generate over 80% of total sales revenue – it also has a business unit in the biotechnology and chemical analysis sector.

The business units have a high degree of strategic autonomy. To begin with, they are distinct centres of profit and thus are responsible for the profits and losses of the unit. Moreover, and it is this criterion that best supports the above thesis, the business units are responsible for the vast majority of the primary activities in the value chain: strategic marketing, applied research, and production and sales are all autonomously managed by each business unit. When we refer to the control of the value chain we mean that the business units autonomously decide on both the product-market combinations (which markets and clients to serve, and with which products) and where the various activities will be located. An example of this is the acquisition in 2000 of part of the Telecom Italia laboratories in Turin. This operation was decided on and managed by the Semiconductor Products Group (SPG) business unit; the headquarter only intervened to authorize the acquisition.

The basic research is instead managed at the corporate level by a structure (Agilent Labs) that is transversely linked to the five business units. The Labs are located in Palo Alto, California, at the headquarter compound, even though there are other smaller-sized auxiliary structures (with around twenty employees each) in China, Japan and Scotland. Our study does not deal with the reasons for delocalizing part of the activity of the Labs, which can be explained by the concept of Metanational innovation (Doz, Santos and Williamson, 2001; Schillaci, 2003). We limit ourselves to pointing out how the geographic distribution of the labs reflects the objective of having centres present in areas where certain competences are available (software modelling for China, miniaturization for Japan, optics for Scotland), in order to acquire these and make them available to the entire corporation.

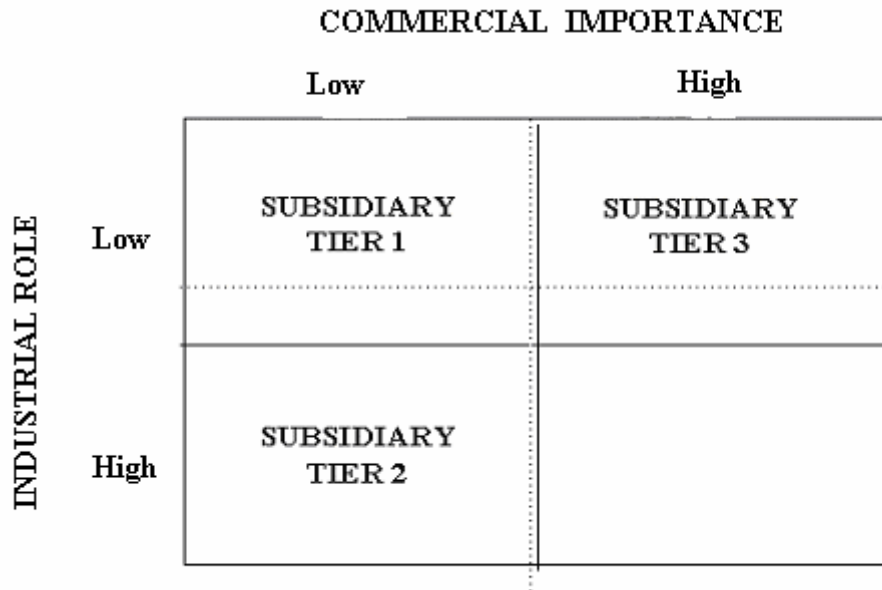
In addition to the business units there are also support activities: at the corporate level there is an organizational unit (GIO, General Infrastructure Organization) that runs the finance functions, human and legal resources, physical infrastructure (the so called WPS: Work-Place-Services) and information systems for the entire corporation.

After the business axis aspect of the firm we must also consider the geographical axis. Agilent has 29 domestic subsidiaries with specific competences. We should note that the role of the subsidiaries varies according to country. Within the firm the subsidiaries are classified by activity. The subsidiaries internally classified as “Tier 1” (for example, Germany, Japan, the United Kingdom) carry out important industrial functions and are located in major economic countries (both in terms of sales volume – sales revenue, the presence of all the business units – and the proximity to headquarters of key clients). The “Tier 2” countries (for example, Singapore, Italy and France) instead play a business and/or industrial role of medium importance. The “Tier 3” countries (for example, Australia, Brazil, Finland and Israel) play only a modest business role. It should be noted that this classification is neither rigid nor overly formalized. Nevertheless, the supply of human resources is modified depending on the subsidiary’s role: for example, while the Tier 1 subsidiaries have a dedicated Country Manager, in the Tier 2 countries the Country Manager generally also has responsibilities at the business unit level: for example, the Country Manager of the Italian subsidiary is also the European General Manager of the EMT (Electronic Manufacturing Test) sub-business unit of the ATB business unit.

This classification scheme for the subsidiaries is basically in line with that proposed by Bartlett and Goshal (1989), which was further developed by Rugman and Verbeke (1992). But, contrary to these schemes, Agilent classification focuses more on

the business importance of the country the subsidiary is located in and the mainly industrial functions of that country. Bartlett and Goshal (1989) instead use as parameters the competences of the subsidiary and the importance of the local context, while Rugman and Verbeke (1992) identify the presence of firm-specific assets as the distinctive criterion: that is, factors enabling the subsidiary to contribute to the development of firm-specific competitive advantages and country-specific assets (locational advantages).

Figure 3. Classification Scheme of the Agilent Technologies Subsidiaries



Source: Internal reworking of Agilent Technologies data

Our analysis shows the vertical-divisional organizational structure to be the prevalent one, while the geographical structure appears at a later time (“first business dominates, then comes geography”). In this respect, technology is a key factor and influences the organizational structure: the choice of location and structure (business unit) are technology pushed. Nevertheless, the geographical arrangement has a horizontal function and aims to coordinate different businesses when these operate within the same territory.

However, despite common organizational structures there are important differences associated with different functions. For some, such as the marketing function, there is a strongly global management approach (decision-making starts with the Group Manager and reaches the Region and the Country Manager in a unidirectional manner) while for others, such as R&D, there is a more decentralized decision-making process even involving, in line with Transnational principles, centres of competence outside of headquarters. In other words, the design and development is managed by some subsidiaries, though following headquarter guidelines. The criterion for this autonomy is the availability of specialized expertise and know-how, the presence of other research centres and universities, the proximity of important clients, etc.

In this regard, and in order to support these claims, we have examined, in the case of Agilent Technology Italia, the distribution of competences, for the two functions

under consideration, between the Group Manager (the head of the business unit), on the one hand, and the Country Manager (the head of the subsidiary) and Technology Centre Manager (the head of the research centre) on the other.

6. The Role of the Functions

The two main functions played by the Italian subsidiary concern sales and research and development, therefore we mainly focus on these two activities.

Marketing and Sales. The Group Manager has complete autonomy in deciding on the commercial strategies and how to carry these out within a given country, while the Country Manager is responsible for the overall commercial position of Agilent within the country. Thus, the Country Manager in this case plays a supporting role, coordinating the sales forces of the various business units, developing a synergy between them and ensuring that the choices of a business unit do not conflict with the objectives of the others (for example, the choice of a particular distributor by a business unit some of whose products compete with those of other business units). Thus the main role of the Country Manager is to manage the support activities at the national level: in addition to the commercial activities already mentioned (Customer Satisfaction) he manages problems involving legal compliance and communications, both internal and external (People Communication and Business Assistance). These activities are his main responsibility, and he is judged and motivated by them.

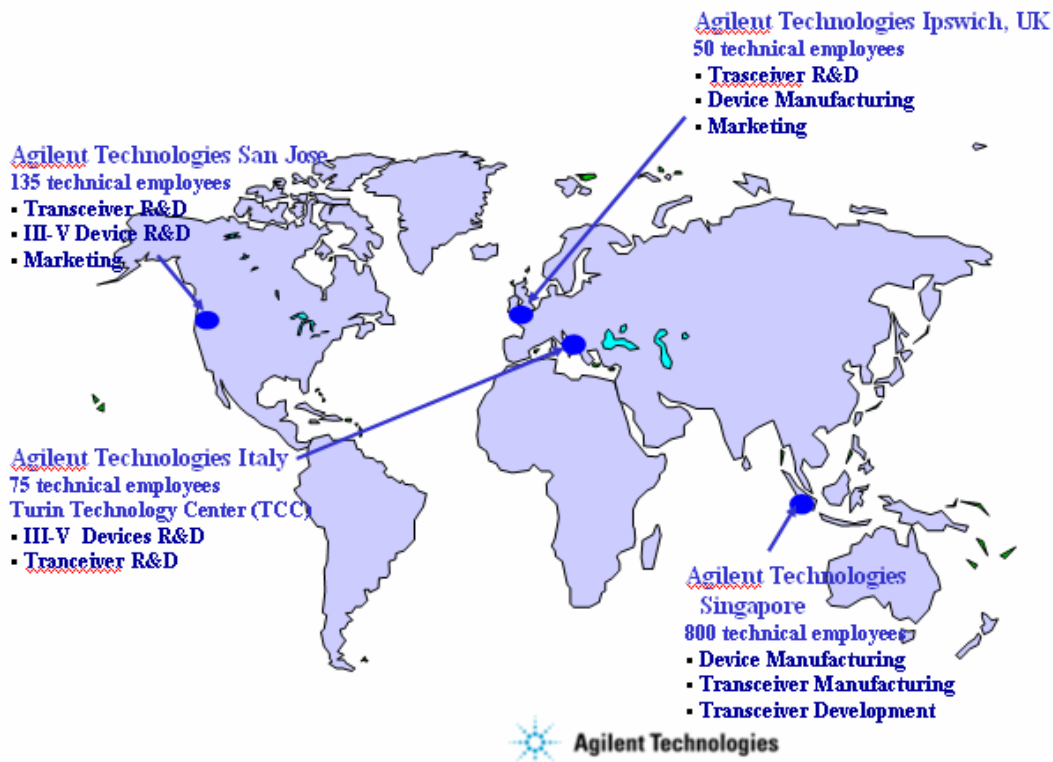
The development of marketing and commercial policies are instead managed at higher levels, with differences according to the business in question. For some units, such as TMG and LSCA, sales activities are managed mainly at the national level; for others (SPG, ATG, CSG) the national level is less relevant, since the commercial strategy is aimed at a limited number of important global clients (in the case of ATG and CSG) or distributors (SPG). Nevertheless, it should be pointed out that the presence of important clients in certain areas (for example, Telco in Europe) can give the region or country a leading role in defining the overall commercial strategy.

R&D. Slightly different considerations can be developed about the role of research and development. Referring to the present case study, the Turin Technology Center (TTC), a structure of the SPG business unit, carries out optoelectronics research and development. Though this centre is formally part of the Agilent Italia subsidiary, it depends on the business unit it belongs to. In this instance, the business link is stronger and more important than the geographical one.

As a result TTC has close and stable relations with other structures, in particular those outside its subsidiary. There is often an exchange of knowledge and competences (both technological as well as market-related - for example, regarding the choice of suppliers) with the other research structures of the SPG business unit, which is located in Ipswich and San Jose (which are formally part of the Agilent UK and U.S. subsidiaries, respectively). These exchanges occur in a wide variety of ways: audioconferences, videoconferences, visits over several days, transfers (typically from 3 to 36 months). There are also close relations with the Agilent Labs, an external structure, as well as the subsidiary and the business unit. Various types of synergies can be exploited in this case, since the two structures work on different phases of the research and development process: the Labs undertake basic research, which is not

aimed at any particular business unit (common needs for various products and clients) and have a medium-to-long run time frame. Research centres such as TTC undertake research focused on the needs of the clients of their own business unit and over shorter time frames.

Figure 4.: Worldwide Distribution of Optics Technology and Operations Centres (SPG Group)



Source: Agilent Technologies

However, in the case of Research and Development, the competition between the different centres is also fierce. The ability of the different centres in developing new and successful products influence the level of investment that the centres and the subsidiary they belong to obtain from the Headquarter. Along this function cooperation and competition successfully coexist as in the classical model of Transnational corporation.

7. Investigating the Role of the Agilent Italia Subsidiary

In the introduction we presented different criteria for identifying the Transnational model. As we have emphasized, a key factor here is the role the subsidiary plays within the multinational corporation. Of particular importance is the existence of elements in some subsidiaries that make these centres of excellence for the

entire firm. The rest of this paper will examine whether these elements exist, based on empirical analyses involving the Agilent Italia subsidiary.

The criterion that is important for a subsidiary to be considered a “centre of excellence” is that it develops activities and functions in a way that makes it significant for the entire group. In order to do this the subsidiaries must have:

- a high internal competence that is recognized within the firm;
- autonomy
- integration.

For the purposes of our analysis we feel, as mentioned in the introduction, that we must distinguish between functions, since functions can follow a different logic. In the present case we distinguish between commercial and R&D activities. Both these functions exist within the Agilent Italia subsidiary. Nevertheless in order to identify a structure as a centre of excellence it is not necessary for all the above-mentioned characteristics (competence, autonomy, integration) to be present over the whole range of activities carried out by the subsidiary. As Frost, Birkinshaw and Ensign (2002, p. 1000) have pointed out: “It is a mistake to equate centres of excellence with subsidiaries on a one-for-one basis”. In fact the excellence could be limited to a specific activity within the subsidiary. For this reason we prepared a questionnaire for the Country Manager as well as the Turin Technology Center Manager. The objective was to verify whether elements exist that qualify the structure as a centre of excellence in terms of the two functions under consideration.

The first condition for determining that a structure is a centre of excellence is that it possesses competences, and that these are recognized by the headquarters. In turn, the competences can be subsidiary-specific, or unique to the subsidiary, or country-specific (Rugman and Verbeke, 1992), that is deriving from being part of a particular local context (embedded local competences, borrowing Dunning’s terminology).

In particular, to determine whether Agilent Italia possesses the necessary competences we have used the following criteria:

- the amount of investment by the headquarters in the Italian subsidiary over the last three years;
- the introduction of patents and new products;
- availability of specialized workers;
- relations with research centers and universities;
- proximity of important clients;
- presence of key suppliers;
- granting of special charters to the subsidiary.

Our findings show a large investment by the headquarters in the Italian subsidiary and a better-than-average trend in employment with respect to the other subsidiaries. This can be interpreted as a recognition by the headquarter of the importance of the Italian location (KPMG, 2004). In this regard Agilent Italia has made a strong contribution (thanks in particular to TTC) to the development of new patents and products that have had success at the international level. We can thus state that at least the R&D role has had an impact that goes beyond the domestic market. Among the country-specific reasons for locating in Italy are the availability of skilled workers and the existence of research centres and universities. Factors that were not considered

important were the presence of important clients and, even more so, strategic suppliers. It's important stressing out how with regard to important clients the situation is varied. There are some business units with important clients, such as CSG, whose clients include TIM, Telecom Italia, Vodafone-Omnitel, Wind, etc., and SPG, with STMicroelectronics as a client. On the other hand, in the field of research and electronic manufacturing (board/appliances) there are no significant customers.

The second factor we have investigated is the degree of autonomy. By this we mean that strategic decisions are made directly by the subsidiary and not at higher levels. In this regard, in order to determine whether a subsidiary is autonomous it is more important to consider how strategic decisions are reached and to evaluate them than their mere approval. We believe it is more important that the choice be identified, evaluated and made by the subsidiary than the fact that headquarters approval is necessary to carry them out.

In the present case the acquisition by Agilent Technology of Silicon Micro Systems – a subsidiary of Gefran Sensori, a group that operates in the field of applied research regarding the automation of industrial processes – provides an indication of autonomy. The acquisition, which occurred in April 2001 and involved an overall investment of \$40 million (which included taking on 15 employees from the Provaglio d'Iseo centre), was proposed by the Turin Technology Center. The latter was aware of the specialized activities of the Provaglio firm, and saw its inclusion in the Semiconductor Products Group Business Unit as a way to consolidate the leadership of Agilent in the field of optical communication components. The acquisition by Agilent Technologies of Silicon Micro Systems (renamed Silicon Optics Operation – SOO) made it possible, among other things, for the company to broaden its product range, thanks to SOO's technological contribution. In this way the local subsidiary, in accordance with the Transnational approach, played a contributing role in the company's internationalization by incorporating local expertise¹.

In order to judge more precisely the effective degree of autonomy we have referred to several criteria taken from the conceptual approach of Frost, Birkinshaw and Ensign (2002), which we have appropriately added to and modified. More specifically, we have tried to determine at what level the following decisions were made:

- hiring of the subsidiary's management;
- internal organizational changes;
- starting up of new businesses within the country;
- direct investment (FDI) in the country;
- entry into foreign markets;
- introduction of new products.

With reference to our parameters the answers show that, as a rule, the decisions are taken at headquarters (in the sense of the headquarters of the specific business) autonomously (especially regarding the launch of new products or the entry into outside markets), or in some cases after consulting with the subsidiary (in the case of the start up of new businesses within the country the subsidiary is located in). On the other hand, decisions regarding the hiring of personnel (even in non-managerial positions) and

¹ In December 2003 the investment in SOO was discontinued due to the fall in the market for telecommunications components and the continuing pessimistic forecasts for this sector.

internal organizational decisions are left to the subsidiary, though these require the final approval of the headquarters.

The third important variable for classifying a subsidiary as a centre of excellence is the degree of integration of the subsidiary within the multinational as well as the local context it operates in (Martinez and Jarillo, 1991). In other words, whether or not the subsidiary carries out functions not limited to the local market (the so-called Multidomestic logic) but instead contributes to defining and implementing the overall strategy of the multinational. For this to occur there must be organizational routines and mechanisms by which information and knowledge can be transferred between subsidiaries as well as between the subsidiary and headquarters. To this end, we believe that formal as well as informal mechanisms are necessary. These are important not only as means for the transfer and sharing of knowledge but also as mechanisms of control.

We have identified in particular the following criteria:

- Meetings within the subsidiary;
- Meetings between the subsidiaries and headquarters;
- Exchange of knowledge among the various subsidiaries;
- The taking on of various responsibilities by the personnel of the subsidiary;
- Exchanges of management, number of managers expatriates;
- Control mechanisms.

With regard to the degree of integration, we found that at the subsidiary level a series of meetings are organized with different frequencies and involving different personnel. These meetings represent a formal occasion for the discussion, evaluation and exchange of ideas by personnel from different functions or groups within the subsidiary. The objective, within a multidivisional organizational structure, is to achieve coordination at the local level where the various business units are in contact with each other and need to share resources and strategies. The Country Management Council, which meets on average twice a month, is made up of the Country Manager, the local sales managers of the various business units, and the local managers of the support functions. The objectives of these meetings are: 1) to look into the opportunities and problems arising from the coexistence of the various business units that, because of their size, often have to share support activities and space; 2) develop and manage initiatives which aim at strengthening the sense of belonging and the cohesion in the business units. The Management Meeting meets once or twice a year and is open to all managers from the area the subsidiary operates in; the objective of the meeting is to present the situation of the firm and discuss important and topical issues.

In addition to coordinating mechanisms within the subsidiaries, there is also coordination among the subsidiaries as well as between the latter and the headquarter. The most important of these is the global meeting among the Country Managers and the Top Management, whose purpose is to present and discuss the group's strategy.

While there are no significant differences in the answers from the Country Manager and the TTC Manager with regard to the mechanisms of integration, this is not the case regarding control mechanisms. We can observe that the informal mechanisms (HQ-subsidiary meetings) do not play a key role. The controls are instead focused on the activities carried on by each function.

The control of the R&D function concentrates on assessing the capacity for innovation, examining the results achieved not only in terms of new products but also

the number of patents and research projects, and the ability to shift easily from one type of production to another. We see from this that the assessment not only has short-term objectives (product development) but also medium-to-long term ones (patents/research projects), and even takes in aspects which cannot be expressed strictly in quantitative terms: for example, in the case of the TTC the “capacity to teach” is considered: that is, the ability to advance knowledge within the company over time (the “learning and growth perspective”, using Kaplan and Norton’s (1996) terminology).

In terms of the country manager’s activity, the control mechanisms mainly concern costs and not sales: this confirms that the country level does not have any autonomous marketing functions (which are directly run by the headquarter of the business units) but primarily a role in managing the support activities.

8. Discussion and conclusion

We started our investigation with two interconnected research questions. The first aimed at identifying what kind of subsidiary Agilent Technologies Italy is, while the second focused more on what we can understand about the overall strategy and structure of the firms by analysing a national subunit.

The analysis shows that Agilent Technologies does not match any of the models proposed in the literature. In fact, we can view the structure of Agilent from three different and complementary perspectives:

- first, by business type (business axis), which views the firm as a group of five business units;
- second, by geographical type (geographical axis), where the firm is seen as a set of 29 national subsidiaries;
- third, in terms of a functional axis, which considers the set of activities/phases of Agilent’s value chain.

The first interpretation has the most explanatory value, since, as previously noted, in a highly-diversified high-tech firm such as Agilent the business axis tends to play a dominant role: the decision where to locate the various activities is made mainly on the basis of business needs.

Nevertheless, the business axis alone cannot completely explain the organizational structure and processes. From this perspective a consideration of the functional axis can help to explain the organizational makeup of Agilent.

Our research showed that the only way to answer the research questions was to divide these questions among the different functions. Answers differed according to the different function we considered.

In terms of manufacturing, Agilent appears to be a global firm with homogeneous products and high economies of scales, while in terms of marketing the Multidomestic approach seems more appropriate for some products, and the Global, or Regional approach for others. Nonetheless, the intense exchange of personnel is typical of the informal mode of control that characterises the Transnational model.

In terms of R&D we have a centralisation of basic research (as stated by Casson and Singh, 1993), while business units and subsidiaries tend to focus on development. Informal factors play a key role here (see Kim, Park and Prescott 2003).

This comes as no surprise. As Malnight (1995) has already demonstrated, globalisation is a multi-stage process where functions show different levels of

internationalisation. What is a surprise is that this concept has not been developed for a long time; only recently scholars (Kim, Park and Prescott, 2003, and Rugman and Verbeke, 2001) have recognised that along with horizontal differences (between subsidiaries) vertical differences (by business and function) are also important.

We therefore conclude that a clear-cut distinction between different kinds of subsidiaries seems very difficult to make and is scarcely relevant. Methods of control and centralisation typical of global firms exist side-by-side with control devices and horizontal links typical of the Transnational organisation.

The limitations of the study are those typical of case study research (only one case, problem of generalisation): in particular we focus on only one subsidiary in one specific country.

Despite these limitations our work, at a theoretical as well as practical level, shows some interesting results.

In terms of theory, the role of function is restated and future research along these lines could be promising. How different modes of control and strategy setting can be combined within the same firms with both vertical and horizontal differentiation (between business and functions)?

From the practical point of view, our results seem to confirm that managers could and sometimes should have a differentiated approach to subsidiaries; but they should also try to differentiate according to the different functions. The final result of this process combined with globalisation could result in an organisational structure and a strategic approach that could be even more complex and differentiated than in the Transnational model.

Bibliography

Andresson U., Forsgren M. and Holm U. (2002), The Strategic Impact of External Networks: Subsidiary Performance and Competence Development in the Multinational Corporation, *Strategic Management Journal*, Vol. 23(11), pp. 979- 996.

Bartlett C.A. (1986), Building and managing the Transnational: the New Organizational challenge, in M.E. Porter (ed. by), *Competition in global industries*, Boston MA, Harvard Business Scholl Press.

Bartlett C.A. e Goshal S. (1989), *Managing across borders. The Transnational solution*, Harvard Business School Press, Boston.

Bartlett C.A. e Goshal S. (1993), Beyond the M-Form. Toward a Managerial Theory of the Firm, *Strategic Management Journal*, Vol. 14, pp. 23-46.

Birkinshaw J.M. (1997), Entrepreneurship in multinational corporations: the characteristics of subsidiary initiatives, *Strategic Management Journal*, Vol. 18 (2), pp. 207-230.

Birkinshaw J.M. and Hood N., (1998), Multinational subsidiary development: capability evolution and charter change in foreign-owned subsidiary companies, *Academy of management Review*, Vol. 23(4), pp. 773 - 796

Birkinshaw J.M. and Morrison A.J.(1995), Configurations of Strategy and Structure in Subsidiaries of Multinational Structure, *Journal of International Business Studies*, Vol. 26(4), pp. 700-729.

Doz Y.L., Santos J. and Williamson P. (2001), *From Global to Metanational: How Companies Win in the Knowledge Economy*, Harvard Business School Press.

Dunning J.H. (1988), The eclectic paradigm of international production: a restatement and some possible extension, *Journal of International Business Studies*, Vol. 19(1), pp. 1-32.

Frost T.S., Birkinshaw J. and Ensign P.C. (2002), Centers of Excellence in Multinational Corporations, *Strategic Management Journal*, Vol. 23(11), pp. 997- 1018.

Fratocchi L. and Holm U. (1998), Centre of Excellence in International Firms, in: Birkinshaw J. M and Hood N. (ed. by), *Multinational Corporate Evolution and Subsidiary Development*, MacMillan Basingstoke, Hampshire.

Frost T.S. (2001), The geographic sources of foreign subsidiaries innovations', *Strategic Management Journal*, Vol. 22(2), pp. 101-123.

Gupta A.K. and Govindarajan V. (1991), Knowledge Flows and the Structure of Control within Multinational Corporation, *Academy of management Review*, Vol. 29(4), pp.695-714.

Gupta A.K. and Govindarajan V. (2000), Knowledge Flows within Multinational Corporation, *Strategic Management Journal*, Vol. 21(4), pp. 473-496.

Goshal S. and Nohria N. (1989), Internal differentiation within multinational corporations, *Strategic Management Journal*, Vol. 10(4), pp. 323-337.

Harzing A.W. (2000), An Empirical Analysis and Extension of the Bartlett and Goshal Typology of Multinational Companies, *Journal of International Business Studies*, Volume 31(1), pp. 101-119.

Hedlund G. (1986), The Hypermodern MNC - A Heterarchy?, *Human Resource Management*, Vol. 25, Spring, pp. 9-35.

Hedlund G. and Ridderstrale J. (1997), Toward a Theory of the Self-renewing MNC, *International Business: An Emerging Vision*, (ed. By Toyne B. e Nigh D.), University of South California Press, Columbia.

Jarillo J.C. and Martinez J. I. (1990), Different Roles for Subsidiaries: the Case of Multinational Corporations, *Strategic Management Journal*, Vol. 11(7), pp. 501- 512.

Kaplan R.S. and Norton D.P. (1996), *The Balanced Scorecard: Translating Strategy into Action*, Harvard Business School Press, Boston MA.

Kim K., Park J-H and Prescott J.E. (2003), The global integration of business functions: a study of multinational businesses in integrated global industries, *Journal of International Business Studies*, Vol. 34(4), pp. 327-344.

KPMG (2004), *Competitive Alternatives. The CEO's Guide to International Business Costs*, G-7 2004 Edition, KPMG LLP.

Leong S.M. and Tang C.T. (1993), Managing across borders: an empirical test of Bartlett and Goshal (1989) organizational typology, *Journal of International Business Studies*, Vol. 24(3), pp. 449-464.

Makhija M.V., Kwangsoo K. and Williamson S.D. (1997), Measuring Globalization of Industries Using a National Industry Approach: Empirical Evidence Across Five Countries and over Time, *Journal of International Business Studies*, Vol. 28(4), pp. 679-710.

Maljeris F.A. (1992), Inside Unilever: The Evolving Transnational Company, *Harvard Business Review*, September-October, pp. 46-51.

Malmight T. (1995), Globalisation of an ethnocentric firm: an evolutionary perspective, *Strategic Management Journal*, Vol. 16(2), pp. 119-141.

Martinez J.I. e Jarillo C. (1991), Coordination Demands of International Strategies, *Journal of International Business Studies*, Vol. 22(3), pp. 429-444.

Porter M.E. (1986), Competition in global industries: a conceptual framework, in Porter M.E. (ed. by), *Competition in global industries*, Boston MA, Harvard Business Scholl Press.

Prahalad C.K. and Doz Y.L. (1981), An Approach to Strategic Control in MNEs, *Sloan Management Review*, Vol. 22, n. 4, pp. 5-14.

Prahalad C.K. and Doz Y.L. (1987), *The multinational mission: Balancing local demands and global vision*, The Free Press, New York.

Roth K. and Morrison A. (1992), Implementing Global Strategy: Characteristics of Global Subsidiaries Mandates, *Journal of International Business Studies* Vol. 23(4): pp. 715-736.

Rugman A.M. and Verbeke A., (1992), A Note on the Transnational Solution and the Transaction Cost Theory of Multinational Strategic Management, *Journal of International Business Studies* Vol. 23 (4), pp. 761-771.

Rugman A.M. and Verbeke A., 2001, Subsidiary-specific advantages in multinational enterprises, *Strategic Management Journal*, Vol. 22(3), pp. 237-250.

Schillaci C.E. (2003), Radicamento delle multinazionali e impatto sulle imprese locali, *Sinergie*, n. 60, pp. 129-142.

Taggart J.H. (1988), Strategic Shift in MNC Subsidiaries, *Strategic Management Journal*, Vol. 19(7), pp. 663-681.

White R. E. and Poynter T.A., (1990), Organising for Worldwide Advantage, in: Bartlett C.A., Doz Y.L. and Hedlund G. (eds. by), *Managing the global firm*, Routledge, London.