

## The role of Nokia in the Finnish Economy

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*During the past few years, Nokia has grown very rapidly, reflecting also the economic development of Finland. In addition to its own growth, Nokia has also impacted the development of hundreds of its partners and subcontractors.*

### Development of Nokia

During the last few decades, Nokia has gone through comprehensive metamorphoses. The history of the company is full of different kinds of acquisitions, divestments and joint ventures. The example of Nokia shows how the focus of a company may change drastically over time. During the 1990s, in order to focus on telecommunications, Nokia divested all of its previous core competence businesses.

Up till 1980, Nokia sold approximately half of its products to the domestic market and the rest was exported. In the early 1980s, however, Nokia started to strengthen its international operations by acquiring several electronics

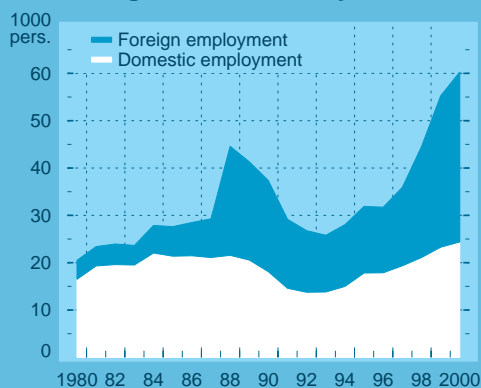
companies including Luxor, Salora and Standard Elektrik Lorenz's consumer electronics industry. The aim was to grow rapidly and expand operations to new lines of business. Due to acquisitions, more and more people worked in business units outside Finland.

The acquired units operated mostly in the electronics industry, and many of these new subsidiaries manufactured products (televisions, monitors and videos) directed to consumers. Thanks to acquired units, Nokia became the second biggest electronics company in the Nordic countries. The acquired companies were mostly located in Europe. However, Nokia's mobile phone unit, called Mobira at that time, expanded by making more global alliances. Together with Tandy Corporation, Nokia established a joint venture in Korea. Tandy had experience in Asian operations, but more importantly, it had an extensive distribution network in the United States.

However, in the early 1990s Nokia ran into a crisis. It had just invested heavily in new businesses when the Finnish economy went into a severe recession. Nokia started streamlining its activities towards the electronics industry. Due to heavy losses and the decreased strategic significance of some business lines, the company decided to sell a number of business groups. The business lines to be sold included, for example, the forest industry, distribution of electricity and the rubber industry businesses. The heavy divestment program was also reflected in the number of employees which decreased by 15 000 between 1989 and 1993.

Thus, the 1980s were a decade of internationalisation for Nokia. International activities of

### The Number of Nokia's Personnel during the Past Twenty Years



Source: Ali-Yrkkö (2001), updated.

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Nokia continued to expand in the 1990s. The bigger and bigger share of the company's sales came abroad. While in 1990 the share of foreign sales was 70 per cent, in 2000 the corresponding value was more than 98 per cent. However, in addition to the rapid expansion of foreign production, Nokia has increased its exports from Finland, as well. Therefore, Finland remains an important place for Nokia to create value-added.

### *Nokia – A Big Company in a Small Country*

Nowadays, turnover of Nokia Corporation is almost as high as the budget of the Finnish State. Of course, this key ratio does not have practical importance but it gives a good overview about the relative size of Nokia. In this chapter, we consider how the rapid growth of Nokia has also reflected on the development of main economic indicators of the national economy namely exports, GDP and total R&D expenditure.

The most visible impact of Nokia on the Finnish economy is through its contribution to growth. Over the last five years, Nokia's exports have increased at an average rate of 35 percent a year. This is far faster than any other sector of the economy. In 2000, Nokia accounted for 3.3 per cent of the value of Finnish GDP (5 per cent in relation to the volume of GDP)

and 24 per cent of total value of Finnish exports (32 per cent in relation to the volume of exports).

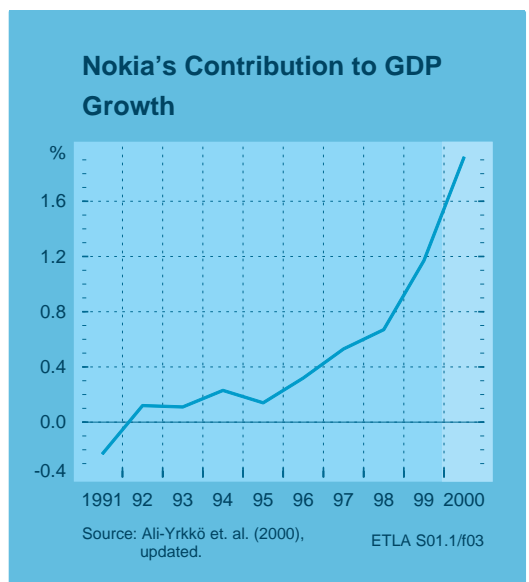
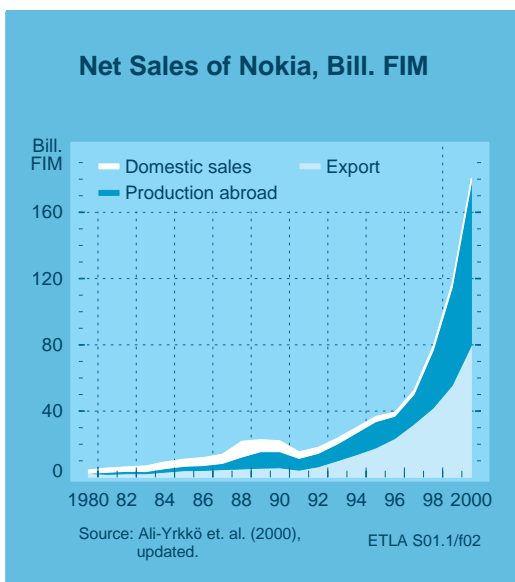
As a result, Nokia has contributed significantly to total GDP growth. In 2000, Nokia's contribution to GDP growth was 1.9 percentage points. Although Nokia's growth in Finland is likely to slow over the next few years, the contribution to growth will remain rather stable because its share of output has risen steadily.

### *The Impact of Nokia on R&D and Employment*

Nokia invests heavily in R&D and conducts a large share of its research in Finland. We have estimated that in 2000 roughly 54 per cent of Nokia's R&D expenditure takes place in Finland. This percentage has fallen over time, as over the last few years Nokia has expanded more rapidly abroad than in Finland.

In 2000, Nokia accounted for approximately 43-47 per cent of all R&D expenditure carried out by private enterprise. This implies that Nokia's share of total R&D expenditure (including the public sector) was more than 30 per cent.

This calculation captures only Nokia's direct R&D expenditure and does not include suppliers. R&D outlays by suppliers are only included if Nokia finances them directly. If the suppliers



themselves invest in R&D to develop products for sale to Nokia this comes under other business investment. The total amount of R&D that Nokia generates therefore probably exceeds these figures somewhat.

Nokia's direct impact on employment is actually relatively small. Nokia has roughly 24 500 employees in Finland. This implies that Nokia accounts for 1.1 percent of total employment in Finland. However, due to the network of Nokia, the company's impact on overall employment is clearly larger. In 1998, Nokia employed more than 14,000 employees in its Finnish first-tier subcontractor and partner companies. This did not account for the total employment of these companies, but only those employees who are working with products which are delivered to Nokia. In the year 2000, the corresponding number of people was roughly 18,000 - 20,000. However, because the network was composed of several tiers and there was a substantial impact on other industries (e.g., transportation, construction, etc.), Nokia's total effect on the national economy is difficult to quantify accurately.

### *The Web of Nokia*

Nokia is a good example of a company whose operation is more and more based on co-operation with other organisations. Rather than aim

to do everything itself, the company is increasingly turning to outside organisations. The alliance palette includes 'horizontal' alliances between competitors, 'diagonal' alliances between companies in different industries and 'vertical' alliances between buyers and suppliers. One driving force behind this phenomenon is a widely accepted core competence paradigm according to which a company must focus on its core competence and outsource other activities. In this article, instead of trying to cover the entire field, this chapter concentrates on vertical relationships

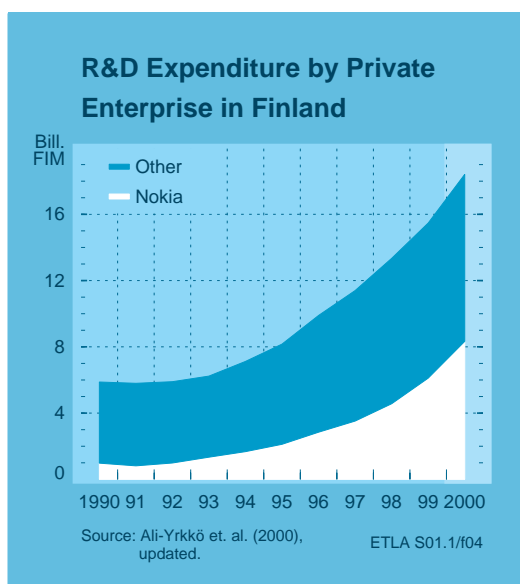
### *History of Outsourcing and Subcontracting in Nokia*

The width and depth of Nokia's co-operation with other companies have changed remarkably during the past twenty years. From pure subcontracting, co-operation has now moved toward partnerships.

The development of Nokia's co-operation with supplier companies can be categorised into four steps (see figure on the next page). It is noteworthy that different phases do not fully exclude one another. Hence, co-operation takes place in different phases and forms at the same time.

In the 1980s, co-operation with other companies was mostly traditional subcontracting (Phase 1). With the exception of a few companies very close co-operation did not exist. Nokia used subcontractors mainly as buffers to stabilise its manufacturing capacity. At the time, the amount of subcontracting depended on business cycles with no systematic co-operation strategy.

The 1990s marked profound changes. The global telecommunications market exploded and also Nokia benefited from this growth. Volumes of telecommunications products rose strongly and Nokia started to ponder new manufacturing strategies. This development also had an impact on the co-operation with other companies as outsourcing was now seen as an alternative to in-house manufacturing. In a larger scale, this option was first used in the manufacturing of accessories (Phase 2). At the same time, Nokia started a search for long-term co-operation partners. Consequently, subcontracting and co-operation became more systematic when sub-



contracting and outsourcing were seen as a permanent mode of manufacturing operation instead of a way to stabilise the utilisation rate of capacity.

In the latter part of the 1990s, co-operation was gradually expanded from accessories to other areas. Nokia started to use more and more component providers and manufacturers. Due to high demand, shorter life-cycles of products and increased weight of foreign sales, Nokia had to place more emphasis on logistics. Moreover, as described earlier, there was an acute need to distinguish product life-cycles from production-equipment life-cycles. As a consequence, Nokia among other telecommunications vendors, reorganised its supply chain and started to use assembler services more than before. Electronic manufacturing service (EMS) providers base their business idea on serving a large number of customers in varying industries and phases of technology, applying the most advanced technology first in forerunner sectors and then gradually in other sectors.

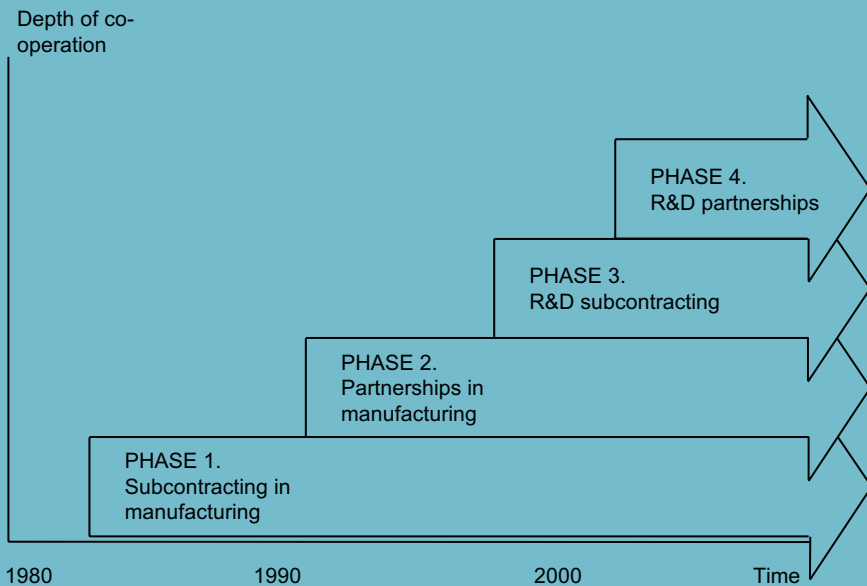
Thus, by pooling the products from different generations of technology, EMS providers are able to prolong the service life of production facilities. In this way they have resolved the vendors' original problem which is related to the mismatch life spans of product and production technologies.

### *Impacts and Challenges of Networking on Suppliers*

In this chapter we start to look networking from the point of view of Nokia's suppliers. Results are based on a wide questionnaire conducted and interviews.

The key customer relationship has helped many companies develop their technology. In order to understand the channels through which technological know-how is shared, it is necessary to consider co-operation at the practical level.

## The Development of Nokia's Co-operation with its Suppliers



Usually suppliers and key customers have common teams which meet frequently. These teams work together in order to solve different kinds of problems. Furthermore, some companies lend their employees to their partners. As one director said:

*“In fact, we may soon reach a situation where it is impossible to distinguish between the two organisations. Instead, the activities of the organisations will become overlapping.”*

The long-term relationship along with positive common experiences gradually generates trust between the partners. In particular, partnership requires deep trust between the partners, for in these relationships the companies may exchange highly confidential information about, e.g., strategies, future technologies and products. The essential feature of successful co-operation is that partners are able to trust that no information leakages will occur and that their partner has the ability to put into practise the issues agreed upon. Trust is also required in the situation where the client serves not only as a customer, but also as a pilot for new technology. In this kind of a relationship, the supplier may deliver products which are not fully finished. Arrangements like this are one manifestation of early-stage involvement where key suppliers are involved in the very early phase of the production or planning process. Such a practise brings considerable benefits to the companies. First, partners' ability to introduce new models and products frequently to the market may improve when their key suppliers have the possibility to suggest improvements already at a very early phase. Second, suppliers obtain more time to adjust their capacity and technology for future needs.

In the long run, knowledge accumulation and changes in operation practises should at least somehow reflect in the outcomes of the companies. The most visible part of the effects is that companies grow fast. In the heels of Nokia, a number of its partners and subcontractors have indeed grown rapidly. Turnover has risen and they have also increased capacity and personnel.

The growth rates of the companies have been very rapid. In terms of net sales, as much as three out of four companies have grown faster than 20 per cent a year. Furthermore, there are many companies whose growth rate has

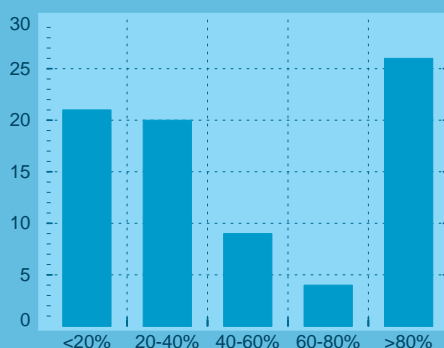
been clearly faster exceeding 80 per cent. Most of these companies are rather small but there are also some bigger ones.

For many small and medium-sized companies, this growth is the most important goal. There are several reasons for this. First, key customers in the telecommunications industry, often grow very rapidly and require that their suppliers are able to grow with them. Second, in order to get a key-supplier status, the companies have to be large enough. There seems to be a tendency that customers are decreasing the number of direct suppliers. Thus, customers would like to reorganise their network by selecting key suppliers which, in turn, build their own sub-network. The driving force behind this development is a willingness to decrease the number of direct contacts. Managing relationships with a large number of suppliers is very time-consuming and takes a lot of effort.

In addition to growing with the key customer, the key customer has often affected on supplier's growth via an indirect way.

Figure below shows that key customer relationships have contributed to a widening of suppliers' customer base of. Most of the companies have obtained new customers through their key customer. For some companies the reference list has served as a quality certificate, while some companies report that their customer base has widened as the key customer

**The Growth Rate of the Supplier Companies (number of companies by growth group), 1996-1998**



Source: Ali-Yrkkö (2001).

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has recommended them to other suppliers. In these cases, the customer’s motive may be that the entire supply chain would work better if components and systems were identical. As one manager said:

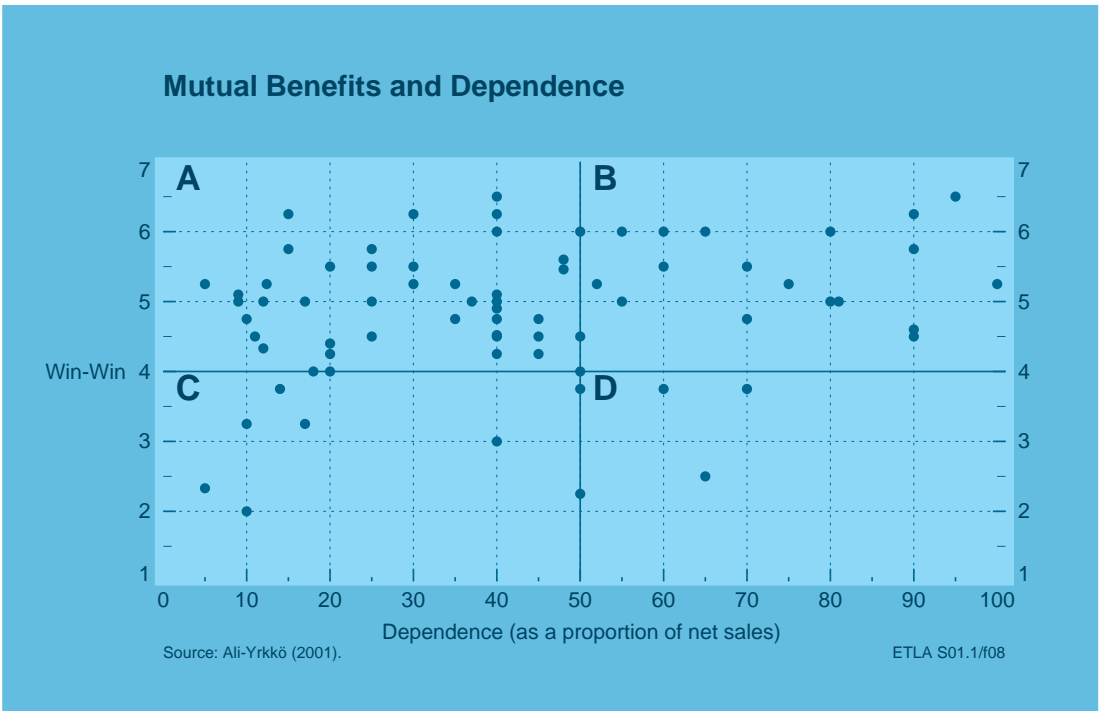
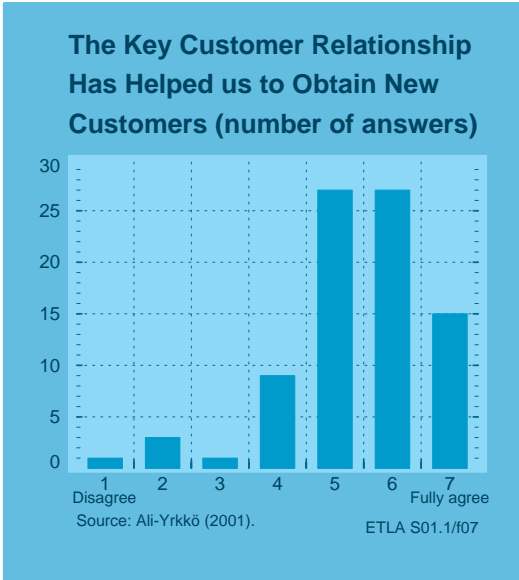
“Nokia has recommended our software to their other subcontractors and partners in order to avoid conversions in data transfer. This way, we have got new customers”.

*Risk and Profit Sharing in a Relationship*

We continue by considering the most important aspects of any business relationship namely risks and rewards. First, we will study risk and common benefits of the key customer relationship from the supplier’s point of view. The figure below describes risks (dependence) and rewards (win-win) in the key customer relationship. It should be noted that our data does not only cover Nokia’s first-tier network, but also a wider perspective of the whole network.

Figure below describes risk and reward in the key-customer relationship. The vertical axis of the figure describes common benefits (win-win) and the horizontal axis shows dependence (as a proportion of net sales) on the key customer.

Common benefits of the relationship have been measured by a variable describing the win-win aspect of the relationship. Thus, the win-win variable measures the supplier’s perception of



the quality of the relationship. The interpretation of the scale is the following: the bigger the better. If the value is above four, the company views the relationship as a true partnership with reciprocal benefits. If the value is below four, the company feels that the relationship is not a partnership type and the companies do not share profits and goals.

**Type A relationship.** Type A relationship characterises the fact that the relationship yields benefits to both partners. However, the company is not too dependent on one customer. Consequently, the relationship yields benefits but it does not inflict high dependence or risk for the company.

**Type B relationship.** In a type B relationship, the benefits remain reciprocal. In contrast to a type A relationship, the company is highly dependent on its key customer. A large share of net sales comes from one customer which means a high risk to the company. As a temporary solution, type B relationship may be a good strategy for young companies or companies who try to grow rapidly. The company increases sales to one customer in order to grow fast and obtain a critical mass. However, in the long run, the key challenge for companies belonging to this group is to widen their customer base.

**Type C relationship.** Type C relationship is a traditional business relationship without true partnership. Companies do not share their goals or profits. Instead of aiming for common benefits, buyer and seller companies pursue their own interests. On the other hand, this relationship does not typically represent a substantial share of the supplier's turnover.

**Type D relationship.** This type of a relationship includes high risk with rather low benefits. Thus, the company's strategy should be either to decrease dependence or to change the relationship in order to obtain more benefits from it. An example of a company operating in a type D relationship is a firm which has a standard product but only one big customer.

Most of the companies in our data feel that their relationship with their key customers is of the win-win type. In other words, the relationship is a true partnership with the partners sharing their goals and benefits. Partners are not only looking out for their own interests, but also offering their partners a possibility of

making money even at a slight cost to themselves. Only a few companies report their dissatisfaction with their key customers.

As shown in Figure 8, a majority of the companies in our data belongs to group A. Hence, the relationship is a true partnership with reasonable risk. The second largest group is type of B. At least in the long run, these companies should focus on widening their customer base. An interesting result was that in terms of win-win there were not big differences between different type of suppliers. The only significant difference was between software companies and EMS companies. Software companies' key customer relationship was more win-win type than in EMS companies. However, the difference was only weakly significant indicating that also the EMS group included many companies with win-win relationships.

In addition to the dependence in terms of net sales, another risk element is composed of customer-specific investments. At least in the short run, this customer-specific capacity can hardly be used with other customers. Of the companies whose dependence on one customer is at least 50 per cent (groups B and D) more than four out of five have made big customer specific investments, while of companies with smaller dependence only one out of two has made such investments. Companies were also asked for their outlook on the development of their dependence during the next three years. Interestingly, one-half of the companies with high dependence are going to decrease their dependence. Hence, there is a small group of companies with a very high risk profile.

### *Challenges of Networking*

In some cases, close co-operation has also brought difficulties to suppliers. First, the lack of real-time information has caused great capacity fluctuations. Typically, a demand-pull sourcing agreement is based on the demand forecasts of the customer. Suppliers have to reserve capacity also for the optimistic forecasts but the company's real sales are dependent on actual demand. Consequently, updated demand information is crucial in fast-changing industries such as the ICT industry. Any distortion in information is a potential source of instability in the supply chain causing great fluctuations in the utilisation rate of capacity (see Ranta et al.



al. 1999). Due to lack of information, the companies are not able to adjust their operations smoothly. As the network consists of a large number of companies, it is important to ascertain that the entire chain has real-time information about expected demand and in it changes.

Second, dependence on a single customer may constitute a high risk for companies. While our analysis shows that the majority of companies in our data is not too dependent on their key customer (in terms of net sales), there does exist a group of companies with relatively high dependence. In some circumstances, high dependence is a good growth strategy for the company but in the long run the risk becomes too high. Therefore, in order to diminish the risk, these companies should actively attempt to widen their customer base or to increase sales to other customers.

The third possible drawback of networking is related in issues related to IPRs (Intellectual Property Rights). If all the fruits of R&D co-operation, such as patents, copyrights and trademarks, are left to the partner, a company's possibility to utilise the results of co-operation is very limited.

From the point of view of the Finnish national economy, one threat of increased networking is the difference in size between suppliers and customers. The needs of the key customer are so great that the ability of small or medium-sized companies to deliver such volumes is limited. As a consequence, big companies seek suppliers and partners capable of delivering big volumes. At the moment, it seems that in particular component manufacturers and EMS companies may suffer from this development. But small size may be a problem for software companies, too. Another threat concerns the changes in the telecommunications market. Ericsson's decision to outsource all manufacturing operations to Flextronics will likely lead to a shift of at least a part of its manufacturing operations to low cost countries. Lower production costs will probably lower prices of end product. Hence, in order to maintain high margins, Nokia will also have to lower production costs. Therefore it is possible that a part of Nokia's manufacturing operations will be shifted to low cost countries.

### *Conclusion and Discussion*

Nokia is by far the most important single company contributing to the development of the Finnish economy. In 2000, its share in the total value of Finnish GDP was 3.3 per cent, and it contributed 1.9 percentage points to GDP growth. Moreover, it accounted for as much as 45 per cent of business sector R&D.

The dominant position of one company and a single sector boom raise questions about their impacts. A key question is: whether the booming sector is crowding out other potential growth sectors by attracting too many resources. There is no clear evidence of that so far. However, the ICT sector attracts young people in particular, while the traditional manufacturing industry has partly lost its attractiveness as an employer. If a large share of the best and the most dynamic employees become concentrated in the ICT sector, there is a risk that in the long run the growth possibilities of other sectors will decrease.

One may also ask, what will happen if the growth of Nokia slows down. In the first half of 2001, there have been signs that the growth prospects of the ICT sector have weakened. Some suppliers of Nokia have announced that at least in the short run their production growth will slow down. Due to the JOT (Just-on-time) strategy, aiming at minimising inventories, fluctuations in demand cause immediate impacts at the beginning of the production chain. If Nokia were to grow at a slower pace, then this would have an immediate impact on total Finnish exports and, consequently, on GDP growth.

The biggest challenge for Nokia and the whole Finnish ICT industry is the third generation (3G) mobile communication system. Competition in the market for mobile phones is becoming keener. In the near future, in addition to Japanese providers and i-mode technology, manufacturers of handheld computers will also enter the market for mobile terminals.

The challenge of 3G relates to networks at least as much as to hand sets. Operators have paid enormous amounts for UMTS-licences (Universal Mobile Telecommunications System), and therefore want to build new networks as soon as possible because before that investment in licences does not bring any cash flow.



Many of the operators are struggling with high debt. Their difficulties may also have a bearing on manufacturers of telecommunications equipment. It is possible that manufacturers of telecommunications equipment will have to finance at least part of the operators' network investment. In that case, the manufacturers would have to bear more of the risk associated with building the 3G networks.

The future will show how Nokia responds to these and other challenges. The company's history shows that Nokia has been able to transform itself. In fact, Nokia has reinvented itself so many times that it seems almost impossible to forecast what kind of structure or core competences the company will have in five to ten years' time.

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