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Large Firms and Subcontracting Relations in Commercial Aircraft Industry:

A Case Study in a Region of Southern Italy

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1. Introduction

In the 1960s and 1970s, with the generous support of a scheme for fiscal and financial incentives, a number of large, state-owned and exogenous private firms played the role of undisputed protagonists in promoting the development of an industrial structure in the Mezzogiorno (South of Italy) i.e. the least developed area in the country. Subsequently, the propulsive force associated with that particular development model became progressively weaker: 1980s saw a drastic streamlining of large units of production caused to a large extent by restructuring processes, aggravated by decreasing interest in intervention policy and crisis in state-owned companies. In the meantime, the general consensus of Italian researchers and policy makers was increasingly mounting in favour of a growth process based on the development of small and medium sized local enterprises specialising in light industries. Since then the role performed by large and small enterprises in the Italian debate has been much like two players in a sort of zero-sum game, where success for the small firms means failure for the large ones and vice versa. As a consequence, the role large firms have to play in the Mezzogiorno has subsequently been underrated. Very few papers have dealt with the subject over the last fifteen years, and our knowledge of the situation has become decidedly patchy, while the stereotype image of the large firm working in the south hangs on. It is still seen as a predator, backward in organisational systems, devoid of any productive connections with the small firms in the area. However, the few studies that have been produced on the issue (Latella, 1996; Giunta, 1998) reveal a rather different picture.

While large firms are still receiving only scant attention in Italy, a number of economists in other countries point to the current organisation system adopted by large firms as a driving force for local economic development (Barquero et al., 1997; Gray et al., 1996; Harrison, 1994). It has been shown that when, for their own advantage, large firms, takes on responsibility for “care and cultivation” of

the local environment, such behaviour will eventually favour the development of local small firms via subcontracting relations.

Alenia, the Italian state-owned aeronautics company, is a paradigmatic example: in the 1980s, the golden period of the aeronautics industry, it promoted the development in Campania (a region in South Italy) of a local tissue of a small firms acting as a mean of transmission for entrepreneurial, organisational and technological know-how. The end of the cold war in 1989 had severe repercussions on Alenia's performance, forcing Italy's leading company into a complex process of reorganisation, above all in terms of subcontracting relations, whose impact on local supplier firms is totally unexplored.

This chapter thus intends: 1) to analyse the restructuring processes of the subcontracting system undertaken by Alenia; 2) to investigate its impact on subcontracting firms located in Campania where the production of aerostructures for civil aviation is concentrated. Combined analysis of these two aspects offers a number of pointers for re-assessment of the role a large firm can play as a catalyst for development of the less industrialised areas. Indeed, the fact that Alenia has adopted efficient systems of organisation involving the collaboration of local firms raises serious doubts about the stereotype of the large firm as predator devoid of roots in or connections with the surrounding productive structures.

The following sections of this chapter treat the issue as follows. In the second section we shall be reviewing the empirical research and theoretical studies carried out on the forms procurement can take in the aeronautic industry, highlighting the scarcity of such material. What is, nevertheless, emerging is a lean procurement mode showing many points in common with that in the automobile industry. In the third and fourth section we trace out a profile of Alenia and the role it played in Campania during the '70s and '80s. The fifth section goes on to analyse the procurement mode now obtaining at Alenia with the aim of assessing how close it comes to the prevalent organisational criteria. Section six brings

the focus to bear on the impact of procurement on small and medium-size enterprises at work in the Mezzogiorno; section seven analyses some of the problems regarding the future positioning of Alenia in the international alliance system and the role industrial policy may play in fostering its commitment to the less developed region. Section eight sets out our conclusions.

Our analysis is based on information from: a) various interviews with Alenia's procurement division managers; b) a survey of twenty subcontracting firms, located in Campania, which survived the selection.

2. Current procurement mode in the commercial aircraft industry

The commercial aircraft industry shows marked division of labour between firms operating at the international scale. With the high costs and risks involved in research and development and engineering, the complexity of the productive cycle and the application of extremely diverse technologies (aerodynamics, materials and structures, equipment and propulsors) a number of enterprises must be involved to play their various parts.

Notwithstanding, organisational mode and in particular subcontracting relationship among aircraft firms is a truly under researched area. One reason for this might be the understandable manager's concern about disclosing strategic information.

Yet, on the evidence of the few available studies, there seems to be growing awareness that the large aircraft firms are moving toward a lean organisational mode.¹ The latter, first adopted by Japanese firms in the automobile industry, is now widespread among firms world-wide as part of a more efficient economic strategy (Milgrom and Roberts, 1995). Some key features of the Japanese procurement system are long term commitments with few and selected suppliers, price premium, small lots, absence of inspections, risk sharing mechanism, single sourcing, system supply strategy (Aoki, 1984 and 1990; Asanuma, 1992; Sako, 1992; Okamuro, 1995).

The aim of this section is to provide a survey of the few recent studies with the aim of sizing up the prevalence of this lean organisational mode in the commercial aircraft industry (Bozdogan, 1998; Lefebvre and Lefebvre, 1998; Boyer, 1997; Giunta, 1997; Beckouche, 1996; Gray et al., 1996; Kechidi, 1996; Paliwoda and Bonaccorsi, 1994; Todd and Simpson, 1986). All the studies listed are empirical in approach.

On the basis of the empirical evidence gathered we cannot go as far as saying that the unified system of Japanese procurement style has been adopted in its entirety. However, researchers underline that quite a few features of that system are becoming popular in the commercial aircraft industry, as a result of an intensive restructuring process undertaken by major aircraft firms at the beginning of the 1990's. What follows is a concise description of the stylised facts of new procurement mode in aircraft industry.

Vertical Integration. Even though existing empirical studies do not rely upon commonly used indicators, such as added value on turnover (Adelman, 1955), it seems that, as in the automobile industry, the production process in aircraft industry is now characterised by a decreasing degree of vertical integration. Three major forces are at work in the process: 1) the various technologies, such as material, electronics, and avionics, embodied in the aircraft construction which call for an extensive participation by several specialised firms; 2) increased outsourcing is also due to lower cost and strategic realignment of production (Bozdogan, 1998); 3) offset agreements. Typically foreign governments - in the developing countries in particular - require the participation of their aircraft industry as a prerequisite for aeroplane's orders by the national carrier. It follows that offset agreements are usually part of an industrial policy aimed to develop a national aeronautics industry.²

Supply base. In aircraft industry the adoption of industry best practices invariably goes with the reduction in the supplier list. The subcontracting chain is organised according to a pyramid structure, the top of which is occupied by the leader firm. In the commercial aircraft industry are Boeing and

Airbus Consortium.³ On the "second level", one finds the preferred suppliers i.e. those firms that maintain privileged relationships with the leader firm and which share the industrial and financial risk of the project. Below come those suppliers that do not have direct links with the leader firm, and mainly work as a local subcontractors for the second level firms (Kechidi, 1996).⁴

The nature of the relationship and selection criteria. Long-term business agreement and subjective selection criteria prevail in the aircraft industry.⁵ According to Paliwoda and Bonaccorsi (1994), the formal vendor rating scheme is replaced by subjective judgements of people in the customer company. Subjective judgements are rooted in a long-term relationship, as it is shown by Gray et al. (1996) drawing on evidence from Boeing in Seattle and by Kechidi (1996) with reference to French Aerospatiale.

Supply policy. The establishment of preferred suppliers is also dictated by current organisational needs, which require the adoption of the "system supply strategy" as opposed to traditional commodity supplying policy (Basile and Giunta, 1993; Paliwoda and Bonaccorsi, 1994). In fact, aircraft companies are delegating part of the integration task to component suppliers through the purchase of complete systems. In comparison with the traditional supplier policy, the system supply guarantees product liability and reduces the costs of identifying the responsible party should the system prove defective after final assembly of the single components. The centralisation of liability in the hands of the preferred supplier, now providing a fully assembled system, is actually one of the ways of reducing these costs. Moreover, since system supply raises inspection costs, it constitutes one further reason for shifting toward new procurement strategy.⁶

Sourcing supply policy. Multiple sourcing is a specific supply policy (otherwise called overlapping supply policy) adopted when buyer firm make two or more subcontractors compete in order to obtain equilibrium prices near minimum long term average production costs. Therefore such a policy keeps market mechanism within the supply chain and as such acts as a complementary feature of the

American automobile procurement system. By contrast, single sourcing characterises the Japanese system. Such a policy is shown to be more efficient in an "environment where quality premium address the moral hazard problem" (Taylor and Wiggins, 1997, p. 612). As quality assurance is a must in the aircraft industry, it is plausible to infer the superiority of single sourcing policy. Even though investments are specific, in aircraft industry mutual trust appears to overcome bilateral monopoly problems, as envisaged in the transaction cost literature (Williamson, 1985).

Empirical evidence on the single sourcing procurement in aircraft industry comes from Paliwoda and Bonaccorsi (1994).⁷

Just in Time delivery. The system supply strategy goes along with the adoption of just in time delivery system, which was previously introduced in the automobile industry and is now becoming common practice in the aeronautical industry since airframe manufacturers are unwilling to plan all stocks in house.⁸

Geographical proximity. Very few studies raise the issue of geographical contiguity. According to Beckouche (1996), the French aircraft industry is characterised by the proximity of supplier firms: the high specificity of subcontracting firms coupled with production complexity require frequent exchange between the prime contractor – Aerospatiale - and supplier firms. Others (Bozdogan, 1998; Lefebvre and Lefebvre, 1998; Gray et al., 1996) argue that offset agreements might pit the viability of a local aircraft supplier base against the need of primes to exploit both foreign markets, especially in the Asian countries, and international industries' capabilities.

3. Alenia: a firm profile

Commercial aircraft industry has recently become a two-player game, in which Boeing-McDonnell Douglas (from now on Boeing) maintains a sixty percent market share and Airbus Consortium the remaining forty percent. As already mentioned, Boeing and Airbus develop the aircraft programme and organise the collaboration network at a global level with "second level firms". The latter, leader

firms in their own countries, are involved in the production of the aircraft through different collaborative methods that, indeed, go from international subcontracting to partnership. In their turn, these second level firms organise a local supply chain, mainly within their own country. It therefore follows that position reached in the international division of labour by second-level firms, like the Italian Alenia, has considerable effects on local development, through the involvement of local subcontracting firms in the supply chain.

Alenia is the leading state-owned company in Italian aerospace industry.⁹ It was formed in December 1990 from the fusion of aircraft manufacturer Aeritalia with high technology electronics specialist Selenia.¹⁰ Alenia has now been re-organised into five areas: aeronautics, space and communications, aeroengines and naval systems.

Alenia competes in the aerostructure segment where, following upon the entry of a number of Southeast Asian countries and the reconversion of some military firms into commercial industry, the number of participants has become considerable.¹¹

In the 1970s, by establishing subcontracting relationships with both McDonnell Douglas and Boeing, Alenia laid down the foundation for its position in the international division of labour. A significant upgrading of its role was reached in 1980 with the co-operation agreement with the French Aerospatiale for the joint production of the ATR42 commuter transport aircraft: this was the first time Alenia had entered into an international agreement as partner.

INSERT TABLE 1

Table 1 shows Alenia's current relationships with prime manufacturers. In spite of the long standing relationship with Boeing, Alenia still holds only a risk and revenue partnership, even though it has been granted the privileged status of "sole sourcer" for specific items.

Alenia also operates as a mere subcontractor for aircraft produced by the Airbus Consortium, while, as we have seen, participates in a joint venture with the French Aerospatiale in the ATR programme of commuter aircraft production.

4. Alenia`s role in Southern Italy

As in other countries, aeronautical production is highly concentrated. In Italy, there are two regional poles: in Piedmont, in Turin (in the North) and in Campania, in Pomigliano d'Arco, (in the South). Division of labour between the plants allocated the aircraft integration and tests to the North and the construction of structures for transport aircraft to the South.

INSERT FIGURE 1

The current productive structure is the outcome of a twenty year intervention policy in which the country's need of a competitive aeronautical industry has been associated with the objective of promoting the industrial development of the south; locations of plants in the south being favoured with financial and fiscal incentives.¹² In the early years an expansion of the productive base in the south was attained. A growth trend in profits characterised the whole of the 1980s, which could be defined as the decade of consolidation for the Italian company. The rise in commercial sales contributed to the positive results of the balance: it is enough to say that in 1971 it represented 12% of the total; whereas in 1988 it accounts for 42% of total turnover. Likewise an absolute and relative increase in the size of the workforce in the area of commercial aeronautics, especially in the southern plants was recorded.¹³

The growth in former Aeritalia's activity yielded immediate spin-off for local development. The whole experience stands as one of the successes of the "poles" development policy, adopted by the Italian government between the early 1960s and the mid-1970s. The development of the local productive network was the result of the "non-isolationist" behaviour of former Aeritalia, which acted as a transfer centre for entrepreneurial, technological and organisational skills. Indeed, by the 1980s the use of local firms to carry through stages of the manufacturing process become systematic, thus favouring spin-off

processes and enlarging the productive base through the creation of a network of local firms. Small and medium sized subcontracting firms did not enjoy an autonomous position on the international market; acting rather as "indirect exporters", in that they supplied forward users who in turn served the international market.

Moreover, in contrast with the normal practice in more evolved industrial contexts, these small and medium sized supplier firms operated in a monopsonistic system; thus saturating their productive capacity with the orders the leader firm, i. e. former Aeritalia.

Some details of the structural characteristics of small and medium-sized subcontracting firms in Campania can help fill out the cognitive picture. The data are drawn from field research carried out in 1993, i.e. right in the middle of the crisis period, on a representative sample of twenty-six small and medium-sized subcontracting firms located in Campania (Basile and Giunta, 1993).¹⁴

This empirical study confirms the positive correlation between the position hold by Alenia on the international division of labour and the thickening of the local supply network. In fact, less than half of the firms were created between the latter 1960s and the first half of the 1970s, the remainder starting up in the boom period of demand for commercial vehicles, which coincided with a substantial improvement in Alenia's position in the international division of labour.

Besides, there was a considerable spread of entrepreneurial spill-off processes, which confirms the role of the large firm as a transfer structure of know-how. Over half the entrepreneurs had worked for Alenia before starting-up their new firm. Almost all entrepreneurs were local; only 12% came from the centre-north of Italy. These were subcontractors for Alenia in Piedmont who were induced to transfer their production units to Campania. This indicates a "pulling effect" of suppliers, which, as we shall subsequently see in section 6, was to have important repercussions in the 1990s. A final point of interest here is the limited technical dimensions of the local firms: most were small and showed a very

poor division of functions, confined solely to manufacturing. The prevalent productive specialisation was machining.

The particularly positive results both in corporate terms and in terms of multiplicative local effects met with a serious and prolonged standstill on the "outbreak of peace" in 1989, aggravated by the unfavourable conjuncture of the global economy marking the early 1990s. It was in these years that a dramatic process of restructuring in the aeronautical industry got under way. The aim was to cope with the effects of a crisis in which changes of a structural nature - the process of political détente between East and West - combined with the slump in demand for air transport.

5. The restructuring process: a new subcontracting system for Alenia.

In the early 1990s the need to face up to the crisis drove Alenia to work out a complex restructuring plan, currently near to the completion.¹⁵ The plan involved changes in the internal organisational structure, rationalisation of operations, reduction in the workforce and finally the adoption of a new subcontracting system, also called "strategic sourcing". As other researchers have pointed out (Paliwoda and Bonaccorsi, 1994), this is one of the areas in which it is extremely difficult to obtain significant information. Our data originate both from a survey carried out by Alenia in 1995 among twenty subcontractors firms and from several interviews with managers of the procurement department we carried out in 1995, 1997 and 1998.

In this section we again take into consideration the main features of the procurement system discussed above (section two) in order to verify - on the evidence of the data we have access to - how closely Alenia cleaves to the prevailing procurement mode. As ascertained by other scholars (Paliwoda and Bonaccorsi, 1994; Kechidi, 1996), our information demonstrates that procurement reorganisation proceeded slowly and with difficulty, since 1992 it has been centralised on the purchase unit which supplies both Southern and Northern plants.

Vertical Integration. We were not provided data regarding the degree of vertical integration of Alenia's plants in selected years. However, our interviewees observe that a decreasing degree of vertical integration has been registered in recent years. The main reasons for externalisation were declared to be: a) economic. Some activities carried out externally present lower costs because they do not include overhead costs; b) financial. Manufacturing costs "weigh down" invested capital; c) operative flexibility. Within macro cycles there is periodical fluctuation in demand, the financial setbacks being off-loaded externally; d) of a contractual nature. Some work-sharing is an integral part of the agreement. In this case subcontracting does not generally regard local firms, but those located abroad.

Supply base. An acquired datum is the screening of the subcontractor list and the outlining of a pyramid-style organisational structure, according to the Japanese model, we have previously mentioned in section two. Supply base reduction went ahead in a piecemeal fashion, to be fully accomplished only in 1998. A major step was taken in 1994: twenty subcontractors firms survived the selection, accounting for a total of 1420 employees. Subcontracting firms were thus subdivided into two groups: "major" and "minor". There were four major firms, all with owners from the centre-north, with plants in both Piedmont (north) and in Campania (south). The sixteen minor firms include eleven Southern firms and five firms located in the centre-north of Italy.¹⁶ The selection thus rewarded firms with owners from outside Campania, promoting them to the status of major.

Nature of the relationship and selection criteria. As regards the nature of the relationship between preferred suppliers and Alenia, we were given very little information, and nothing can be inferred from the Alenia survey. Both major and minor firms enjoy a twenty-year long relationship with Alenia. Technical assistance is guaranteed by the leading firms with frequent visits to the plants of preferred suppliers.

As regards the type of contract, during the 80's Alenia operated in a monopsonistic environment, and the competitions for subcontracting contracts was regulated thus: Alenia established a must price, a price that could not be exceeded, on the basis of which a competition for the lowest price was launched. The fixed price contract, i.e. all the risk of cost fluctuation being taken by subcontractors, was then hegemonic, as one would have expected given the conditions of monopsony. Unfortunately, nothing can be said about current contracts. We might reasonably assume that change in the environment - the shift from a monopsony to bilateral monopoly- coupled with long term relationship and establishment of preferred suppliers would call for a cost plus contracts, i.e. the risk being partly absorbed by Alenia. In this light subcontracting relations would perform as an insurance mechanism, as explained by Aoki (1984) and tested by Okamuro (1995) in the automobile industry. We were also given very little information regarding the selection criteria. Some of them can however be inferred from the structural variables characterising preferred subcontracting firms.

First of all, the subdivision between major and minor firms clearly signals that a hierarchy system is at work, in accordance with the empirical findings of other researchers (Beckouche, 1996). Secondly, there is more than one layer in such a pyramidal structure, as can be seen by considering the incidence of purchases over turnover for each type of the selected firm. The percentage averages around 39% for major firms, 32% in centre-north minor firms and finally is 31% for southern minor firms. What these data show is that the preferred suppliers - both major and minor - are in turn externalising phases of production to other firms, which do not have direct relationship with the firm at the top of the pyramid, namely Alenia. In this way there exists a fragmentation of the production process with centralisation and liability for the final product, ordered by the top firm. The incidence of purchases over turnover can also be interpreted, and it will subsequently be used in section six, as a very crude proxy for managerial capacity, meaning the ability of the preferred supplier to organise the work of lower tier suppliers.

Thirdly, geographical proximity is relevant since 75% of the preferred suppliers are located in the south.

Finally, as figure 2 shows, the major firms evidently have a wider command of technology (such as sheet metals, machining, assembly, bonding, tools and composites), while the minor firms are predominantly mono-technological, as they are specialised in machining, although minor southern firms show a greater propensity toward multi-technology.¹⁷

INSERT FIGURE 2

Supply policy. Since technological capacity played a crucial role in the selection process, we can thus infer that Alenia has adopted the supply system policy. As previously mentioned in section two, aircraft companies are delegating part of the assembly task to suppliers through the purchase of complete systems. The ability to adhere to the supply system, or in other words to carry into effect the assembly of different components inside one's own plant, is to a greater extent a function of technological capacity.

Sourcing supply policy. At the time of Alenia's survey (in 1995) multiple sourcing was still prevailing. Rather than the outcome of a deliberate policy favouring competitive bidding system, it seemed to be a legacy from the past growth period and, as interviewees pointed out, doomed to be replaced in a near future. It has been declared that multiple sourcing is retained only when an offset agreement is stipulated: in this case the other supplier is obviously located abroad.

Just-in-time delivery. No information was forthcoming on the just in time system. While it does not seem to be a major concern for Alenia's procurement managers, the preference for geographical contiguity of subcontracting firms suggests that just-in-time can be easily adopted in the near future.

Customer portfolio. As we saw in section two, a diversified customer portfolio does not appear as a characterising feature of the new supplier system in the aircraft industry. Yet it does constitute a

specific requirement Alenia forwards to preferred suppliers, in order to reduce their dependence; a point that emerges explicitly from the interviews and from Alenia survey as well.

INSERT TABLE 2

Table 2 shows that all the firms maintain four customers, each accounting for substantial levels of sales. The capacity to diversify the customers portfolio and thus to reduce the risk connected with variation in demand appears high in the twenty firms, and greater than expected, since the technical possibilities of production diversification in the aeronautics sector are somewhat limited.¹⁸ Thus, the recession acted as a discipline mechanism for those who survived, subcontracting firms being forced to look for alternative outlets releasing them from the monopsonistic system in which they operated in throughout the 1980s.

To conclude this section, table 3 draws comparison between the modes of procurement adopted by the major firms operating in the sector of civil aviation (see section two) and the degree to which Alenia conforms to it. The first column shows the individual features of procurement, the second (Aircraft Industry) shows for each the specific organisational modes adopted by the major firms operating in the sector and the third the extent to which Alenia conforms. On the basis of this comparative analysis we may conclude that most of the features of the new style of procurement obtaining in the sector were adopted by Alenia subsequent to an intensive process of organisational restructuring.

INSERT TABLE 3

6. The new subcontracting system: the impact on local suppliers

In this section we shall be considering the impacts this mode of organisation has on the local subcontracting firms. A number of points are worth underlining here, beginning with the resulting closures of several firms. The fundamental change in supplier base has led to the closure of many southern subcontracting firms, which, as we saw in section four, were established during the 80's,

when a marked increase in demand for commercial aircraft came about. This increase meant that Alenia systematically turned to the market, with consequent spill-off effects. Nevertheless, as the crisis broke out, most of these firms were subsequently found to be marginal, unable to adapt to the stringent conditions imposed by the new procurement trend, incapable of finding alternative markets outlets and therefore forced out of the market.

The second point to consider here is how few firms managed to survive. Eleven subcontracting firms in the south actually did so, although positioned at a lower level of the subcontracting chain. In comparison with the minor northern firms, the minor southern firms appear to have on average an equal capacity for customer portfolio diversification (tab. 2), greater technological versatility (fig. 2) and, as we shall see, higher managerial expertise. In fact, we run a regression using the data from Alenia 1995 survey of twenty firms to investigate which are the explanatory variables of managerial expertise and the degree of comparative advantage shown by minor southern firms. We estimated the following regression equation:

$$PGS = a_0 + a_1LOC + a_2S94 + a_3WCE + a_4FI$$

Here, the dependent variable PGS is the purchase of goods and services by subcontracting firms in 1994. As mentioned above (section five), we use it as a very crude indicator of managerial ability, i.e. reference being to the management of the lower tier suppliers. LOC is a dummy variable for location, taking 1 if subcontracting firm is located in the centre-north and 0 otherwise. S94 is turnover in 1994. WCE is the proportion of white-collar employees out of the total, indicating the presence in the firms of function other than mere manufacturing. Finally, FI is the proportion of total sales accounted for by to the first customer, i.e. Alenia, to whole sales.

INSERT TABLE 4

Table 4 shows the estimation results of the regression equations. In our preferred equation (number 2), the explanatory variables show the expected signs and are statistically significant at a 5% level. The

southern firms evidently have a comparative advantage over their centre-northern counterpart; the sign of location variable being in fact negative. This result gives further support to the conclusion of our descriptive analysis. As expected, all the other variables are positively correlated with managerial capacity of subcontracting firms. More specifically, the positive and significant coefficient of sales in 1994 (S94) signals that a sustained level of sales improves managerial ability. Moreover, the sign of WCE indicates that the higher the number of white-collar employees, the higher is the managerial ability. It might also suggest that an externalisation process is under way, and that higher value added function are held inside the firms. Finally, the sign and the coefficient of FI (percentage of sales to the Alenia) suggest that the larger is their proportion of sales to Alenia, the greater the managerial ability of the subcontracting chain.

The third point worth to be underlined here concerns the hierarchy, which seems to work as a system for the transmission of know-how. As we have seen, the current procurement trend has led to a more markedly tiered supply structure. The selection process has rewarded firms with owners from outside the region of Campania, promoting them to the status of major. This "pulling effects" of suppliers should not be underestimated. Apart from the obvious multiplier effect of increasing local employment, one other aspect needs to be stressed. Moving to the South, these entrepreneurs act as a co-ordination structure for firms placed at a lower level of supply chain, favouring top-down transmission of entrepreneurial know-how, an asset in chronic short supply in southern Italy, as well as in other less favoured regions.

Furthermore, the established hierarchy among supplier firms is not a static equilibrium, since it offers each firms chances to move up to the higher levels of the supply chain. A process of upgrading is set in action, the outcome of which will depend on the ability of local firms to adopt the more highly developed organisational and productive typologies that are currently shaping local markets as well.

Finally, there are some observations to be made about medium term success. And here we need to go back to the demand side, because both the economic future of the region and the further development of Italian aircraft industry are highly dependent on the role of Alenia in the international division of labour.

7. Italian aircraft industry and local development in the near future: some issues.

As we showed in section four, there is an obvious positive correlation between the workshare Alenia gains on the international market and local multiplier effects. In fact, spin-off processes came into effect in Campania during the '80s, resulting from full partnership with French Aerospatiale to build regional aircraft together with an increased demand for commercial aircraft at the international level. In the '90s the scenario appears drastically changed on account of various factors, including: declining military demand, increasing concentration of European firms, privatisation processes in progress for a number of European firms and the slow recovery of international demand due to the Asian crisis. The close connection between local multiplier effects and Alenia's positioning in the international division of labour raise serious questions about Alenia's future role in the international system of alliances. Good positioning in the commercial aircraft industry is reached with a step-by-step process, which usually starts from international subcontracting, passing through a risk and revenue sharing partnership to full partnership. The question that arises is therefore: now that the commercial aircraft industry has become a two-player game, what role can Alenia play in co-operating with Boeing and/or Airbus Consortium? There seem to be two main issues, which are closely interlinked.

Firstly, at a distance of nearly thirty years from its establishment it would be a decidedly positive development if the Italian firm moved in the direction of partnership-based solutions. This would involve an upgrading of Alenia's relative position, shifting to relations characterised by high co-ordination and low dominance.

Secondly, which of the two players is more likely to be joined? On the one hand, the natural outcome of a long-standing relationship with Boeing would be the attainment of partnership, even though with a minority share at the outset. Such a partnership would guarantee a fixed participating share for Alenia in Boeing's programmes, thus protecting it from future competition from Asian firms, and particularly from Japan. A contractual agreement of the kind was tried in the recent past (in 1995, with former McDonnell Douglas) with no success. In fact, the failure has "crystallised" Alenia's position inside a risk and revenue partnership, even if, as we saw in table 1, it has been granted a considerable workshare and the privileged status of "sole sourcer" for specific items.

On the other hand, recent talk of a unified European aerospace and defence group seems to be pointing forcefully to a European solution to the matter. In fact, the so-called "E Company" or European Aerospace Defence Company, is said to be open to having other European companies, including Alenia, join in the restructuring. Yet, since the establishment of Airbus Consortium, the role of Alenia has been marginal and confined to mere subcontracting production. Moreover, the formation of the "E company", being a gradual process based on separate link-ups between operating companies, and raising the issue of converting Airbus into a proper company, seems to have a long way to go before it becomes reality.¹⁹ Last, but not least, the Italian company has played no significant role in recent international consolidation manoeuvring: British Aerospace is merging with Marconi, Spain's Casa is being bought by the German Dasa, and what is more important, the merger between Dasa and Aerospatiale Matra. Furthermore, while the Italian Company still remains under state-ownership, state-ownership itself is gradually disappearing in the European aircraft industry.²⁰

Analysis of the present situation shows Italy's leader firm indisputably lagging behind. It is therefore a matter of some urgency to launch an investment process to enhance the Italian leader, making it a valuable partner in future alliances. At the same time, and in close connection with this, it appears equally urgent to speed up the process of privatisation of the company, seen by European partners as a

necessary condition for Alenia's participation in future European programmes. However, while privatisation of the firm is included in the aims the new Italian government has set itself to be achieved by June 2000, as far as new investments are concerned, the tool for industrial policy described as "planning agreements" (*contratti di programma*) between Government and large firms appears particularly indicated both to relaunch the firm and foster development of the local supply chain. Together with the "territorial agreements" (*patti territoriali*) and "area contracts" (*contratti d'area*), these planning contracts form part of the packet of measures (law 662/1996) introduced to favour local development in Southern Italy. Unlike the territorial agreements and area contracts designed to promote local entrepreneurship, however, the planning contracts are intended to encourage the inflow of external resources into the area, thus reviving some features of the old (and, by some, heavily criticised) strategy of 'poles of development'. Financial incentives are accorded by the Government to large firms and/or consortiums of small and medium sized firms provided that they carry out industrial investment, research and staff training projects in the Mezzogiorno regions, and moreover commit themselves to favouring the development of local firms through subcontracting relations (Florio-Giunta, 1998). Appreciated as favouring a broader base for southern Italy's slender productive structure, this tool of industrial policy eases the way to technological re-equilibrium and the division of labour among firms, and is particularly opportune at the present moment with streamlined procedures applying to the transference of resources to firms. Drawing up a planning contract between Alenia and the Government would therefore be a desirable move to relaunch Alenia's investment activities and, by so doing, reinforce the firm's commitment to the objectives of industrial development in Campania.

8. Conclusions

The main aim of this chapter was twofold: 1) to investigate to what extent the efficient organisational mode prevailing in aircraft the industry has been adopted by a leading Italian firm; 2) to analyse the likely impact of new procurement trend on the local supply chain.

With regard to the first point, we began by arguing that there is a serious deficit of research. In the last fifteen years very few articles in Italy have been written; and even less empirical research going on. With its virtual disappearance from the research agenda, the outcome of restructuring process, and in particular, the current organisational mode of large firms located in southern Italy are largely unknown.

Nevertheless, existing studies prove that the large southern firms, although drastically reduced in number, have embarked on radical restructuring process involving profound transformation of their supplier relations, in line with large firms in industrialised countries. Alenia, a leading Italian firm in the aerospace industry, is a case in point. Our chapter underlines a major change in Alenia's subcontracting mode.

To pursue its lean strategy, Alenia followed the trend of increasing outsourcing, reduction of the vendor list, implementation of system supply policy and single sourcing. It also built up a hierarchical structure in the supply chain, driving supplier firms to find alternative markets outlets. The final configuration shows some resemblance to the core-ring system where supplier firms are organised by the "visible hand" of the prime manufacturer, Alenia.

As regards to the other main point of our chapter, i.e. the likely impact on local supplier firms, we underline that the outcome has been severe and profitable at the same time. Reduction in the workforce and the exit of several marginal firms have represented a loss in an area where the industrial structure is weak and the unemployment rate unbearably high. However such negative trends are common nowadays due to a structural crisis combined with the effects of the Asian recession.

The survival of eleven southern firms is a sign of their technical and managerial ability, now qualifying them to participate in the global supply chain and benefit from the transmission of entrepreneurial know-how flowing from the top of the hierarchy. In connection to this, the active role played by Alenia as a governance structure fostering and supporting the selected suppliers merits all due respect.

We have stressed the relevance of the present and future role of Alenia in the international division of labour since it has important repercussions on local development. While a joint-venture partnership is highly preferable to a risk and revenue partnership, in order to become a truly valuable partner Alenia needs to strengthen and upgrade its core competencies. The industrial policy tools available open the way for relaunch of the Italian firm's investment activities. It is suggested in this chapter that a viable solution may lie in drawing up a planning agreement between the Government and Alenia, thus speeding up the upgrading process of the firm and indirectly fostering Alenia's commitment to the development of a region in the South.

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Table 1 Alenia's Commercial Aircraft Products, Collaboration Agreement and Workshare in 1997

Company	Products	Collaboration Agreement	Workshare
Boeing Douglas	767 wide body jet	Risk sharing and single source supplier	Flaps, Slats, Ailerons, Spoilers, Elevators, Rudder, Vertical fin, Wing Tips, Radome
	777 wide body jet	Single source supplier	Outboard Flap, Radome
	717/200(ex MD95) 120 seats	Risk sharing and single source supplier	Forward, Center and After Fuselage Barrel
	MD80/90	Single source supplier	Fuselage Panels, Aileron, Rudder
	MD11	Single source supplier and risk sharing for the new parts	All fuselage panels, Vertical Stabilizer, Rudder, Winglets, Nose, After Fuselage Section
Airbus Industrie	A300/310 wide body	Subcontractor	Tail cone
	A321	Subcontractor	Fuselage section
Aerospatiale	ATR42 ATR72	Partner (50%)	Fully equipped fuselage, Vertical fin, Rudder, Horizontal empennages and related systems

Source: based on data from Alenia, 1998.

Table 2 Percentage of Turnover in 1994 according to Type of Supplier Firm and Customer Importance

	Major Firms	Minor southern	Centre-North Minor
First Customer	45.3	44.5	46.4
Second Customer	21.5	20.3	18
Third Customer	14.5	14	11.9
Other Customers	18.7	21.2	23.7
Total	100	100	100

Source: based on data from Alenia, 1995.

Table 3 Procurement Features both in the Aircraft Industry and in Alenia

Procurement's Features	Aircraft Industry	Alenia
<i>Vertical Integration</i>	Decreasing	Decreasing
<i>Supply Base</i>	Reduced	Reduced
<i>Nature of the Relationship and Selection Criteria</i>	Long-term relationship and subjective criteria	Long-term relationship Technology is relevant, as well as managerial ability.
<i>Supply Policy</i>	System Supply Policy	System Supply Policy
<i>Single Sourcing</i>	In use	About to be implemented
<i>JIT</i>	In use	No evidence
<i>Geographical Proximity</i>	Contrasting evidence	Relevant
<i>Customers Portfolio</i>	No evidence	Relevant

Table 4 Estimation Results on Purchase of Goods and Services of Alenia's Supplier Firms in 1994.

Dependent Variable	Independent Variables							R ²
	C	LOC	S94	WCE	FI	BE	BHE	
1) PGS	-0.028 (-0.027)	-0.08602 (-1.434)	0,0000082 (2.375)		0,46317 (2.107)	0,77934 (2.034)		0.25
2) PGS	0.00347 (-0.03)	-0.1144 (-2.177)	0,0000085 (2.813)	1.0472 (1.933)	0.50272 (2.446)			0.26
3) PGS	0.0519 (0.379)	-0.08944 (-1.260)	0.0000078 (2.200)		0.3989 (1.793)		0.15778 (0.703)	0.17

t-statistics in parentheses

Legend:

PGS= Purchase of goods and services by subcontracting firms in 1994;

C= Constant;

LOC= Dummy variable for location (1= Centre-North – 0=South);

S94= Turnover in 1994;

WCE= White-collar employees/ total employees;

FI= Proportion of sales to the first customer;

BE= Employees with a bachelor degree/ total employees;

BHE= Employees with a bachelor degree or a high school diploma/total employees.

¹ In the defence aerospace industry, lean has taken hold in the form of the Lean Aerospace Initiative (LAI). “LAI was launched in 1993 when leaders from the U.S. Air Force, the Massachusetts Institute of Technology, Labour Unions, and defence aerospace businesses began a trail blazing partnership to revolutionise the industry, reinvigorate the workplace, and reinvest in America”. See <http://web.mit.edu/lean/index.html>

² Offset are defined as mandates for technology transfer or incorporation of local production, or a variety of other performance requirements typically requested by the purchasing government (National Research Council, 1997:5). On the role of offset agreements as a common path for the development of a national aircraft industry, see Scott and Creighton (1994) who shed some light on the Asian aircraft industry. Offsets agreements also played a major role in the establishment

of the Italian aircraft industry see section 3 of this paper. Gray et al. (1965, p. 657) underline that only 15% of total Boeing's suppliers are local, due to the weight of offsets agreements acting as a bias against awarding contracts to local suppliers.

³ Airbus is a consortium of four European aircraft firms. It is one of the main examples of international collaboration in civil aeronautics. The principal partners are Dasa (Germany) 37.9%, Aerospatiale (France) 37.9%, British Aerospace (Britain) 20% and Casa (Spain) 4.2%. Because of the very recent merger of Dasa and Casa, the combined company will be in the near future the single largest member within Airbus consortium, once the deal is approved by the European Commission competition authorities. Unlike the Europeans, Boeing has not yet entered into any true joint ventures with an equal sharing of responsibility. Instead, the US airframe manufacturer has pursued risk sharing subcontract collaborative agreement in which the junior partner companies share launch costs, accept some of the commercial risk and provide market access in return for production work, potential profits and a development of national capacity (Aerospace, 1994, p. 17).

⁴ This highly structured hierarchy was created by the French Aerospatiale at the very beginning of the 1990s. It was inspired by the Japanese keiretsu, as reported by Kechidi, 1996.

⁵ "(...) Only 20% of the total of an airframe manufacturer is purchased through competitive procedure" (Paliwoda and Bonaccorsi, 1994, p.237). Contrasting findings are in Bozdogan (1998) although referring to the defence aircraft industry. He underlines that most firms in the industry have adopted formal supplier rating, certification, and selection system.

⁶ In their model, Taylor and Wiggins (1997) show that rising technological complexity in supplied products (complex subassemblies, as the ones we mention in the text) significantly raise the efficiency of the Japanese procurement style. The latter does not require inspection costs to ensure product liability; incentive for product quality being rooted rather in contract renewal.

⁷ Single sourcing also prevails in defence procurement system (De Fraja and Hartley, 1996).

⁸ Airframe manufacturing is less rigid than car manufacturing on the assembly line, but it is much more expensive in terms of working capital committed to production (inventory of raw material, subassemblies, components), see Paliwoda and Bonaccorsi, 1994, p. 238.

⁹ The entire Italian aerospace industry is grouped under Finmeccanica, the high technology branch of IRI, a vast state-owned conglomerate.

¹⁰ The merger was dictated mainly by the necessity to reach a competitive critical mass, which allowed Alenia to stand comparison with the most important European firms, as well as the need for managerial and commercial rationalisation.

¹¹ This is the case of the recent risk and revenue partnership stipulated by Boeing with Japan for the 777 aircraft (wide body jet), in which Japan was accredited a work share equivalent to 20% of the total cost of the aircraft. The Japanese government financed this venture with the objective of developing the local industry. A similar experience occurred in Italy in the 1970s: the Italian firm gained a 15% share in the development of the 767 aircraft (wide body jet).

¹² In France as well as in Spain the aeronautics industry has been created to promote the development of the South (Beckouche, 1996). In Italy, when it was established in 1969, the name of the company was Aeritalia. It was created with the joint participation of FIAT (a private group) and Finmeccanica (state-owned IRI group). In 1976 the IRI group bought Fiat's share, thus becoming the sole shareholder. On the Italian case and the attempt made by the Government to link the aerospace sector into its strategy for southern regional development, see also Todd and Simpson, 1986.

¹³ The number of people employed in southern plants increased from 12286 in 1983 to 13662 in 1987.

¹⁴ The universe consisted of 50 supplier firms.

¹⁵ The reduction in activity level caused a drastic reduction in employment level of the southern plants, which shrank from over 10500 in 1991 to 7585 units in 1995 (-27.7%). The restructuring process also implies a reorganisation of the mission of each plant. A plant in the north (in Turin) has been closed. Operating since 1996, two new plants with a high level of automation have been created in the south (called NOLA1 and NOLA2). Apart from company resources, the establishments of these two plants was brought into effects due to the financing from law 181 of 1989. The automation strategy pursued clearly aims at reducing labour costs in the attempt to compete with south-east Asian countries. For fuller details on the various aspects of Alenia's restructuring process, see Giunta, 1997.

¹⁶ Out of 1420 employees, 61.2% is in major firms, 28% in southern minor firms and 10.8% in center-north minor firms. The average size of the major firms is 271 employees, the minor southern firms averaging 36 and the minor centre-north firms 30.

¹⁷ Bonding is the preparation of parts in composites such as fibre glass and carbon fibre. Tools are needed to build single pieces and assemble them. An example of a tool is the jig, namely the slip for mounting panels. The importance of technological capacity is addressed and tested for 384 small and medium-sized subcontractors, operating in the USA, the UK and Canada by Lefebvre and Lefebvre, 1998.

¹⁸ In fact, the customers other than Alenia are all operating in the same industry and all belong to Finmeccanica conglomerate.

¹⁹ As a French *groupement d'interet economique*, Airbus consortium now enjoys a tax-free status. There are two more difficulties in converting Airbus into a proper company. One is agreeing the values of the assets to be pooled. A second is agreeing on the management structure and governance of the company (The Economist, 1999, p. 81).

²⁰ In the past February, in fact, the privatisation of French aerospace took a step forward. Lagardere Group will pay as much as \$343m for a 33% stake in the merger between its Matra defence arm and Aerospatiale. The French government will remain the largest shareholder with 47%, while 20% will be floated later this year, market conditions permitting.