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**IMPROVING PERFORMANCES AT THE SECOND TIER OF THE AUTOMOTIVE  
SUPPLY CHAIN: FIAT'S "GUIDED IMPROVEMENT" PROGRAMME IN  
COMPARATIVE PERSPECTIVE**

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## **INTRODUCTION**

Over the past two decades, there has been a seismic shift in the organization of automobile production across firms in the automobile industry, a shift that has dramatically increased the role and importance of supplier firms. In this paper, we will for the most part treat as parametric the changes in assembler strategy, focusing our attention instead on their repercussions in the automotive components sector and on the ensuing implications for regional industrial policy. The rationalization at lower levels of the supply chain required many firms to meet new standards of product quality, service and cost reduction, forcing them to develop managerial and perhaps basic design capacities that go beyond the solely technical production knowledge required in the past.

Our main interest is in Italian automotive components sector. There, the evolving organization of automobile production presents not only a significant challenge for an industry with a relative dominance of small and medium sized firms, but is also an opportunity for firms historically too dependent on Fiat Auto to upgrade their skills and perhaps to expand and diversify into more markets (not solely automotive). We argue that the particular structure of this important industrial cluster in northwestern Italy presents a significant opportunity and perhaps a natural laboratory for regional industry policy initiatives. The firms in need are relatively circumscribed geographically and there is a substantial "horizontal" commonality of need. However, the vertical positioning of these firms as suppliers to large well-structured "first tier" component suppliers and automobile assemblers raises two questions: (1) who should pay for and organize the training actions required at lower tiers of the supply chain (given that the benefits will be relatively diffuse) and; (2) how should such services best be delivered.

To begin to answer these two questions, we describe and critically assess a private initiative promoted by Fiat auto and about 100 of its direct ("first-tier") suppliers to improve product quality, and suggest that it may provide a model for future industrial policy initiatives in

the region. Although the primary focus of this paper is the automobile industry with a focus on the Italian case, we also briefly provide for purposes of comparison an interesting example of inter-firm cooperation and state involvement in supplier training and upgrading in the American state of Wisconsin. The Wisconsin example shows: (1) that many of the problems occurring in the organization of automobile production, especially in the relationship between first and second tier suppliers, may represent a secular trend across multiple industries; and (2) that there are multiple institutional solutions to these problems.

## THE GLOBAL CONTEXT AND ASSEMBLER STRATEGY<sup>1</sup>

The automobile assemblers have adjusted their strategies in the face of flat but increasingly diverse demand for cars in the developed world coupled with sales growth in the developing nations. They produce a wider variety of models, each sold (on average) in smaller volumes than in the past. At the same time, the technological content of cars has increased, pushed in part by new regulations in environmental and safety standards, as well as by the relative increase in the use of electronics in modern cars (Veloso 2000). This has all happened in a context of increased competition, so that, despite the increased diversity of models and technological advances, “the industry focus on lowering costs has never been as acute” (Veloso 2000: 6).

All major assemblers have “gone global,” seeking to produce cars in the markets where they are sold. They are replicating their supply chains in each market, often asking their first tier suppliers to follow them around the globe. Production is organized around “platforms” to generate economies of scale in design and manufacturing. Companies are making a concentrated effort to reduce the asset intensity of their operations to improve shareholder returns, devolving an increased proportion of production to supplier firms. Fiat, for example, increased the “outsourced” proportion of vehicles from 65% to 72% between 1997 and 2000, while the French producers PSA and Renault jumped from 45 to 70% and 65 to 80% respectively. This outsourcing, however, has been coupled with both a “rationalization” and a reduction in the number of direct suppliers, many of whom are asked to provide full “modules” or at least subassemblies. This subcontracting tends to be based less on manufacturing cost *per se* than in the past, and more on design and engineering. It requires suppliers to take on significantly greater responsibilities, not only in design, but also in continuous improvement, cost reduction, and quality. Working with a limited number of direct suppliers makes it easier for the assemblers to maintain collaborative relationships, eliminates duplication of effort, and helps suppliers to recover up-front investments in product design and manufacturing facilities. This strategy is not without risks, however, and there remains variation in the degree both to which assemblers have devolved full responsibilities to suppliers, and to which they have been willing to utilize “sole-source” supply relationships (Veloso 2000). Assemblers that devolve full production responsibilities give up significant power over the supply chain and are likely to fall behind in the

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<sup>1</sup> The next two sections rely heavily on Veloso (2000), who has produced an excellent overview of these issues. We only broadly summarize the changes in the overall organization of production in the industry to provide the context for our discussion of developments in the second and third tiers and their implications for regional industrial policy.

production knowledge that would allow them to bring component production back “inside” should they become dissatisfied with their suppliers.

## THE REORGANIZATION OF THE SUPPLY BASE

The reduction in the number of direct suppliers coupled with the dramatic increase in investments required to remain a “first-tier” supplier (research and design capabilities, the ability to set up new plants near many or all assembly facilities) has significantly restructured the automotive components industry. While some of the firms eliminated from the assemblers’ “direct” supply base have either closed or left the industry, many have simply become second or third tier suppliers, supplying the remaining direct suppliers with components for modules and subassemblies (Follis and Enrietti 2001; Veloso 2000; Vitali 2001).

Drawing on the numerous studies of the automotive supply industry by the International Motor Vehicle Program, Veloso (2000: 13) explains that other than raw material suppliers, the remaining direct suppliers “are becoming large global firms, which are either specialized in complex systems or integrators of several simpler subsystems.” These firms must have a global presence and be capable of coordinating a substantial supply chain. The remainder of automobile suppliers are “component specialists,” a category that encompasses the majority of suppliers in the automotive supply chain, and includes the many firms that previously supplied the assemblers directly but now supply instead the first tier module makers and systems integrators. They can be further divided into: “component manufacturers,” process specialists almost always at the second or third tier; and subassembly manufacturers with some assembly and integration capabilities, possibly (but increasingly rarely) supplying the assembler directly.

The shift in assembler strategies required firms wishing to remain at the first tier to make enormous investments. Few such firms were equipped to take this step. Hence, there was in the 1990s a huge wave of foreign investments, consolidations and mergers resulting in the creation of a relatively few “mega-suppliers.”<sup>2</sup> The industry has become concentrated into a few globally operating world leaders. Reasonable forecasts indicate, in the medium-to-short run, there will be just 20 – 25 global first-tier suppliers (able to operate with more than one car producer at one time and on different markets), resulting in approximately a one-to-one ratio of major first tier suppliers to car producers (Price-Waterhouse-Cooper 1999). As these firms now supply relatively complex components and must manage global operations, they must carefully select the technologies and products on which to concentrate their resources, often allotting to sub-suppliers the production of numerous components. Hence, direct suppliers now buy an increasing number of the parts they assemble, including some that are crucial for the functioning of the components that they supply. This has a series of important implications for their relationship to

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<sup>2</sup> The “failure” of many firms to remain at the first tier is not in fact a failure so much as a strategic choice. Firms whose strongest capabilities are in particular components are often well-advised to focus on those competencies rather than trying to become a full-fledged standardizer or integrator. Drawing on Automotive News data, Veloso (2000: 17) shows that if a firm’s “strongest capabilities and competences are associated with particular components, they may be able to do as well or better than systems manufacturers, even if that means working as a second tier firm.”

their own supply chains, especially in the areas of cost reduction, design improvements, and quality.

*Cost reduction:* It is common in contracts between car manufacturers to include calls for yearly cost reductions, with an assurance that the supplier will provide the component in question for the life of the model. For example, Renault, has asked for -18% between 1997 and 2000; PSA, -25% from 1997 to 2000; Ford, -5% per annum between 1996 and 2000; Honda UK, -1.5% per annum; and Fiat 3% per annum. Given that a significant portion of direct suppliers' costs are at the second and third tiers, they are more or less bound to push similar requests down the chain. Lower tier suppliers that are unable to consistently improve their own productivity will be forced to exit the industry or sacrifice their margins, the latter obviously unsustainable in the long term.

*Development and design:* Until recently, second tier suppliers were generally expected only to conform precisely to the design and technical specifications supplied by first tier companies, requiring only a good practical know-how of manufacturing processes. This is becoming insufficient. First tier suppliers are increasingly charged by final assemblers with the responsibility for design, development and innovation of increasingly complex components. This in turn often requires that they work more closely with their own suppliers, asking them in turn to take on some engineering and design responsibilities, though retaining overall control of the product development process.

*Quality:* Quality standards in the automobile industry are extremely high, and there is an expectation that suppliers will get quality certifications (i.e. ISO, QS). Furthermore, warranties on new vehicle efficiency are an increasingly critical asset in competition between automotive companies. In recent years the scope as well as the time period of these warranties has been continuously enlarged, even for low price models. This service entails heavy costs for automobile producers. To reduce these costs, the obvious solution is to involve direct suppliers in the after sale service, both by imposing contractual clauses which bind them to pay for failures of their products, and by asking them to produce adequate technical information about the components they supply, in order to allow personnel in the repair chain to avoid unnecessary substitutions of costly complex components that could be otherwise repaired substituting one of their parts. Inasmuch as these requests are going to involve in turn second tier suppliers, they put a further pressure on their quality performances and on the ability to broaden the scope of their operations beyond manufacturing.

## THE AUTOMOTIVE SUPPLY CHAIN IN ITALY

Italian industry has certainly been touched as well by the ongoing reorganization of automobile production. The impact is especially pronounced in the "old" industrialized Piedmont region, which, along with neighboring regions in the Italian northwest, supplies almost 50 percent of automotive components. The effects have been somewhat different in the areas surrounding Fiat's new "greenfield" southern plants, where growth in the components industry has lagged expectations.

## The evolution of Fiat strategy

Fiat undertook a major restructuring in the 1990s, decentralizing and deverticalizing production. They introduced the “integrated factory,” a variation on cellular manufacturing that borrows from the Japanese model, with adjustments to account for the very different institutional and cultural contexts (Bonazzi 1994). Camuffo and Volpato (1998) argue that the design of the new organizational model “proves that Fiat has learned the lesson that advanced technology had to be carefully matched with innovations in organizational and human resources practices.” Fiat’s longtime role as the only major automobile assembler coupled with the relatively low technological level of the Italian components industry had required the firm to be relatively vertically integrated. However, beginning in the 1980s, they began to move towards a flatter structure. First, they allowed more autonomy to their internal components divisions (Teksid, Magneti Marelli), then shifting an increased proportion of production to outside suppliers. Finally, in the 1990s, they devolved a significant proportion of design responsibility. The number of direct Fiat suppliers has fallen drastically, from 1200 in 1987 to just 330 in 2001 (table 1), even as the company has consistently reduced its level of vertical integration (table 2): Fiat Auto has both increased the proportion of components purchased outside the group (decentralization of production), and has assigned suppliers an increasing proportion of design responsibilities (decentralization of design).

Table 1. - *Trend of the number of Fiat Auto suppliers*

1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	2001
1.200	1.050	990	723	670	560	520	410	380	370	350	364	330
(100)	(87,5)	(82,5)	(60,2)	(55,8)	(46,6)	(43,3)	(34,2)	(31,7)	(30,8)	(29,2)	(30,3)	(27,5)

Source: Fiat Auto

Table 2. - *Fiat Auto: levels of vertical disintegration*

	1982	1987	1992	1996	1998	1999	2000
External Production	50	52	65	70	70	73	72
External Design	30	30	45	59	70	73	72

Source: Fiat Auto

## From supplier to partner?

The new method of production is premised on the building up of privileged relationships with a smaller number of suppliers, and “partnership” was put forth as key to corporate strategy. The purchasing strategy is now a model that on its face, Zirpoli (2001: 19) notes, presents “more analogies with those described with reference to some Japanese OEMs than with the ‘adversarial’ model in use in Western contexts until, at least, the last decade.” It includes such features as careful supplier selection, risk sharing, co-design, parallel sourcing, early supplier involvement in price setting, target costing, and so on.

The difficulties in building an effective collaborative relationship across multiple tiers of a supply chain should not be underestimated, especially when the relative power of the contracting parties vary significantly. In a study of Fiat supply management practices that included

interviews with both Fiat personnel and suppliers, Zirpoli (2001) has shown that despite Fiat Auto's formal choice of a collaborative purchasing strategy, its implementation is rife with contradictions that may undermine its overall objectives. Suppliers have shown a willingness to take on R&D responsibility and to differentiate the customer base, but many are concerned with "the sustainability of this strategy in the presence of constant cost reduction of component prices imposed by Fiat. The latter does not renounce its market power in order to reinforce the co-operation and strengthen the relationship with suppliers" (Zirpoli 2001: 10).

It is now standard practice in many industries, especially auto, for OEMs to expect their suppliers to provide annual cost reductions, using "target costing" techniques selectively borrowed from Japan.<sup>3</sup> Importantly, this is envisioned as a *collaborative* practice, potentially involving concomitant changes at various places in the supply chain and thus requiring considerable information transfer and joint exploration of production cost drivers. Furthermore, these techniques should not cut into supplier margins ("price reductions") and need not translate into wage reductions, or even into immediate changes in the organization of production, given the numerous and imaginative ways in which suppliers and OEMs can collaborate to reduce the effective cost of the product.<sup>4</sup> Their justification is quite straightforward: the responsibilities devolved to suppliers leave them more intimately familiar with the details of the components and their day-to-day production, and thus better positioned than the OEMs to come up with incremental cost-saving ideas.

According to suppliers interviewed by Zirpoli (2001: 10), however, Fiat does not live up to its word.<sup>5</sup> He writes that "the Fiat approach, in this respect, is not only seen as unfair by suppliers but is also considered incompatible with plans of development of new technology and new Fiat dedicated components." The strategy is premised on extensive information sharing, but Fiat has over time focused increasingly on cost aspects, frequently imposing cuts even without the technical discussions with suppliers presupposed by its own policies. Suppliers "seem to

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<sup>3</sup> Target costing has two main dimensions: reducing the initial cost of newly designed products; and ensuring that part costs are further reduced while in ongoing production. In new product development, as the practice is described by Nishigushi (1994: 126), OEMs use a "market-price-minus" principle, rather than cost-plus. They work together with a selected set of suppliers who are expected to help to evaluate design possibilities, "keeping in view what the consumer needs and desires," but "the combined costs of the parts are reduced step by step, toward the target cost while keeping constant the required specifications." For ongoing production, suppliers are expected to reduce their costs to meet target productivity improvements. As developed in the Japanese auto industry, Smitka (1991: 142) explains, the targets took into account the customer's own experience of productivity improvement, and were "chosen to be achievable, but were kept uniform across suppliers rather than being set higher for firms with a good track record or lower for firms with a poor one. Fixed targets (and hungry rivals) thus provided an incentive for firms to engage in internal process improvements." The cost breakdowns used in the bidding process were also used to focus engineering efforts on areas "most amenable to improvement on the basis of interfirm experience. The reduction was thus intended to fair across suppliers, and achievable in fact – even if it took the aid of the auto firm itself."

<sup>4</sup> In a memo written for the Advanced Manufacturing Project (focused on the metal and plastic component industry in the U.S.) by Gary Herrigel, based on 30+ interviews with OEMs and suppliers in Illinois and Wisconsin, he writes: "Reductions can also be achieved, e.g., through the cooperation of customer and supplier to gain leverage on raw materials purchases OR by redesigning the interface between supplied part and its environment OR by changing the details of delivery conditions OR by giving the supplier business in a new area in exchange for a price reduction in an older area. The possibilities here are very nearly limitless"

<sup>5</sup> This is not a *moral* condemnation, but an economic one, in the sense that it may foment mistrust and undermine collaboration.

accept the fact that cost cutting is an industry necessity but would also like more emphasis by Fiat on practices such as *value engineering and value analysis*” and lament the absence of a formalized procedure for sharing cost reductions. The result of Fiat’s failures in these areas notes include supplier unwillingness to reveal information to Fiat, lest it be used against them in cost negotiation. Zirpoli (2001: 12) concludes that “the absence of profit sharing techniques consistent with the risks taken by suppliers threatens their motivation, their attitude to co-operate and their willingness to continue investing and taking risks.” Note that Fiat is not unusual in the retention of numerous “irrationalities” that impede their ability to form a genuinely collaborative decentralized production model. These problems cut across industries and countries, with, of course, significant variation (some OEMs and assemblers have superior “relational competencies”).<sup>6</sup>

Zirpoli’s findings were echoed in a recent interview by the authors at a major Fiat first tier supplier. The supplier complained that in devolving responsibilities to suppliers, the Assembler has let go much of its original technical competency. When there are quality problems, Fiat rarely engages with the supplier to collaboratively resolve the problem, electing instead to resort to “contractual” means. The supplier also complained of organizational confusion at Fiat in the design phase, with the assembler constantly changing ideas in mid-project. This devolves numerous hidden costs on suppliers. The extra uncertainty injected into the relationship makes it hard for subsuppliers to make investments in productive capacity, at times even forcing the first tier suppliers to make sourcing decisions based not on capability or even cost, but rather on the basis of the willingness to make upfront investments, getting the return only over the years on piece price. This same supplier explained that when Fiat’s volumes are either too low, or production begins late, the supposed risk sharing with subsuppliers is not always feasible, and they are forced to pay for parts never ordered.

### The Piedmont automotive technology district

Fiat’s changing supply strategy has had a major impact particularly in Piedmont, where over the last 10 years supplier firms have significant new capacities and markets, to the point of becoming an “automotive technology district.”<sup>7</sup> Based on a survey of 56 first tier suppliers in Piedmont (contacting the same suppliers in 1990 and 1997) Bianchi et al (2001) show that these firms – historically dependent on Fiat – are increasingly likely to export and also to serve foreign OEMs and assemblers. As of 1997, sampled firms exported 25% of production. Between 1990 and 1997, independent (non foreign owned) firms more than doubled their share of the export market, also showing substantial growth in non-automotive sectors – essential diversification for

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<sup>6</sup> Interviews conducted by one of the authors with suppliers of metal and plastic component suppliers in the American Midwest, including both automotive and non-automotive suppliers, show that despite efforts to build collaborative relationships, many OEMs still hew to “traditional” procurement practices, seeking to leverage suppliers against one another and to drive down margins to unsustainable levels for short term gains, just as there remain many suppliers quite willing to play the same game in reverse. Whitford and Zeitlin (2002) show that organizational obstacles all too frequently lead firms to deviate from apparently well-designed official procurement strategies, potentially undermining formal safeguards against the short term exploitation of the many vulnerabilities opened up by collaborative relationships. Problems such as staff-turnover, poor inter-departmental communication, and corporate-plant disjunction can impede the development of collaborative relationships both because of issues of incentive compatibility – the local incentives of buyers are not always those of the organization – and because they may lead to miscommunications with negative repercussions.

<sup>7</sup> See Bianchi et al (2001) for an explanation of what is meant by “automotive technology district,” and for a fuller description of the evolution of the regional system.

a group that otherwise sells 50% of its product to Fiat. First tier suppliers in the Piedmont district clearly survived the reorganization, increasing overall sales to Fiat by 17%, but also increasing their exports to other OEMs by 52% (to 10.5% of sales) between 1990 and 1997. Importantly, overall employment increased by 17.5%, and by 21% in white collar and managerial staff, indicating that these firms are taking on the personnel required to handle more complex demands (design, management of subsuppliers).

Firms that ceased to be direct Fiat suppliers did not fall out of the industry, and often moved to the second tier, serving Fiat indirectly, but also selling to foreign markets. Among firms in the sample, those that had Fiat business in 1990 but did not in 1997 increased their subcontracting sales three-fold. Likewise, firms that did not serve the OE market at all in 1990 were sending 17% of their sales to foreign OE markets by 1997, and had also increased their sales to industrial vehicle markets.

Research specifically on the second tier of automotive component supply in Piedmont is consistent with Bianchi et al's finding that firms "cut out" of direct Fiat supply moved to the second tier (Vitali 2001). It also suggests that the "global" patterns described above are a reality in northern Italy. Just as the assemblers are looking to strengthen relationships with first tier suppliers, these latter firms are often also seeking "partnerships" with key second tier suppliers, requiring in turn improved performance and responsibility. A sample of 79 second tier suppliers elaborated by Vitali (2001) describes a relatively complex organizational picture in the Piedmont filière. Given its long automotive history, it is no surprise that there is a thick network of inter-firm relationships across the various levels, in which relationships are neither rigidly vertical nor hierarchical (Fiat Auto → first-tier supplier → second tier supplier → third tier...) but are instead a "hierarchical network" (e.g. second tier suppliers may supply, along with first tier suppliers, both the assemblers and other second tier firms). Notably, the structure quickly flattens below the second tier, in the sense that in many cases, it is the "last" level of specialization in Piedmontese automotive supply.

Firms at the first tier export substantially, but those at the second tier generally only export through their customers. Lower level suppliers are quite dependent: second tier firms sampled sold 43% to their top customer, and 69% to the top three (Vitali 2001).<sup>8</sup> Although many first tiers have long-term contracts with Fiat, few second tier suppliers had similar deals with their own customers. Nevertheless, there is substantial evidence that changes in the assembler-supplier relationship are moving down the supply chain. Vitali (2001) notes that despite the lack of formal long term contracts, there are relatively intense relationships between first and second tier firms, especially in the evolution of technology and quality. For 38% of firms sampled, the lower tiers had experienced a "strong push" to innovate, and a substantial majority deliver "just-in-time" to clients. Requests for design expertise are increasing as well (Vitali 2001). Sixteen percent of sales were of components co-designed with the customer (first tier or assembler), showing the replication at lower levels of this increasingly standard practice between assemblers and first-tiers (Cerruti and Enrietti 2002).

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<sup>8</sup> Third tiers were similar, selling 65% to the top three customers.

## **Territorial variation within Italy**

Comparing Piedmont, with its long history of auto production, to Melfi (in Basilicata), site of the most recent new greenfield Fiat plant (with Pratola Serra, an engine plant), makes it quite clear that there are very different organizational logics in interfirm relationships between the two regions. In Melfi, there was an initial expectation that the new plant would create an articulated and strong industrial system, but the regional supply system has remained relatively undeveloped and unspecialized (Territorio 2002) (Bubbico 2001). Most first tier suppliers in Basilicata are owned by groups located in central and northern Italy, often owned in turn by multinationals. They generally utilize the same second tier suppliers of their northern Italian factories, and thus provide relatively little local demand, most of it requiring minimal technological capacities (Bubbico 2001).

Between the two regions, there are significant differences in the type of suppliers. In Piedmont, firms are capable of maintaining a direct relationship to the assembler, doing some of their own design, and looking towards foreign markets. In Basilicata, firms remain almost exclusively subcontractors with minimal autonomy, often getting raw materials or partially finished goods directly from the client. As a result, second tier suppliers in Basilicata are quite dependent, averaging almost 90% of their sales to a single customer, as opposed to just 42% in Piedmont. Firms in Melfi also tend to be smaller, about evenly distributed amongst “small” (<15 empl.), “medium” (15-50) and “large” (50+), whereas in Piedmont, 42% of firms employ between 50 and 150 people, representing about 80% of employment and sectoral sales. These larger firms tend also to have higher productivity and a higher investment/employee ratio (Cerruti and Enrietti 2002).

There are significant differences between the regions’ technological and innovative capacity. In Basilicata, just 28% of firms have design capacities. In Piedmont, 60% of second tier firms have a design department, as do 20% of those at the third tier.<sup>9</sup> Unsurprisingly, this is confirmed by looking at the percentage of firms patenting innovations: not a single firm in Melfi had deposited a patent, unlike 20% of their Piedmontese similars.

## **RATIONALIZATION AND COMPETENCY BUILDING IN THE ITALIAN AUTOMOTIVE COMPONENTS INDUSTRY**

There is reason to believe that the ongoing reorganization of production responsibilities requires a substantial rationalization of the relationship between assemblers and first and second tier suppliers. Indeed, a recent Fiat Auto study based on diagnostic reports of its repair shops showed that 75% of the defects that entailed repairing or substituting a component concerned parts that had been produced by second tier suppliers. Similar figures are supplied by occasional observation of specific streams of supply to other car manufacturers (Follis and Enrietti 2001).

Despite the many positive signs of technological and organizational development at the lower levels of the system – and even though second and third tier SME suppliers often have quite advanced technical skills – there remain significant lacunae. Porzio (2002) shows three areas of particular need: creation of quality systems, process control, and financial management.

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<sup>9</sup> Note that when we speak of design capacities at the second and third tiers, we are in many cases referring especially to issues of process design and design-for-manufacture, rather than to proprietary products per se.

Small suppliers tend to be more reactive than proactive, often with no single functionary or department responsible for human resources. They invest minimally in training, relying largely on the on-the-job training, or on finding already skilled labor on the labor market (Porzio 2002). As Piedmontese first tier suppliers seek to enter export markets, they depend significantly on the capacities of their sub-suppliers, both to meet ever more stringent quality standards, but often also to help them to design and quickly produce innovative products. This requires them to select carefully amongst suppliers, and to help some to improve quality and to grow organizationally. These problems are perhaps even more pressing in the southern Italian component producing areas, where the enhancement of local capacities seems a prerequisite to the creation of a regional automotive component system.

### **Rationalization by selection of suitable companies**

Many first tier suppliers have an unmanageable number of sub-suppliers. In the middle nineties there were some 14,000 firms operating in Italy below the first tier of the automotive supply chain, against some 400 Fiat Auto direct suppliers.<sup>10</sup> Furthermore, since firms operating at the second tier of the chain often supply several direct suppliers, the “effective” ratio of second-to-first tier suppliers is much greater than these figures would imply. This allowed direct suppliers to leverage among multiple second tier suppliers in order to shift some of the cost pressures put on them by assemblers. However this advantage is presently overridden by the transaction costs entailed by fragmenting purchases – so long as product quality is a critical issue – and by the need to involve sub-suppliers in co-design and engineering.

At the same time, not all the firms presently operating at the second level of the supply chain are able to meet these new requirements. In the Italian case, the process of rationalization especially affects smaller firms, many of which will not have an interest in making the investments required to remain in the automotive supply chain.<sup>11</sup> Suppliers that are not highly specialized in the automotive industry, or that do not already have a stable relationship with a first-tier supplier may be advantaged by concentrating their energies on industries with less demanding service and quality requirements. This does not mean that there are other “easy” industries, only that smaller suppliers must adjust their operations to fit a changing reality which at times requires significant specialization – and they need to select that specialization with care. The rationalization of the supply chain by means of selection and concentration is not occurring only in auto, but also affects lower volume industries with similar technological content and industrial processes.<sup>12</sup>

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<sup>10</sup> Fiat Auto, *Suppliers Convention*, 1994.

<sup>11</sup> For the Italian case, see especially *Dinamiche Competitive e Innovazione nel Settore della Competitività Auto*, edited by Rolfo and Vitali(2001).

<sup>12</sup> Second tier automotive suppliers in plastics and metal stamping have the possibility of working in the appliance industry, another historic area of specialization in Piedmont. Balloni et al. (1999) argue that in that industry, increased competition in the 1980s led to a “new division of labor [between assemblers and suppliers], seeking efficiency and innovation.” The outcome was the birth of true productive specialization, with the birth of auxiliary industries dedicated to the appliance industry. This is a pattern that is repeating itself across industries and economies. In a study of metalworking firms in the American state of Wisconsin, studies by Whitford et al. (2000) and by Rickert et al. (2000) found that the large OEMs in industries such as agricultural and construction equipment, motorcycles, lawn and garden tractors were also cutting the number of direct suppliers from 750-1200 to 250-300, concentrating larger amounts of purchases with a smaller number of suppliers upon which they could rely for more services. The selection process in these industries, like that in auto, can also be rigorous, demanding regular cost reductions and investment in design capabilities.

### **The diffusion of competencies and Fiat's guided growth program**

Despite the intense competition and winnowing of suppliers, there is evidence that a sufficient rationalization of the supply chain cannot be had by selection processes alone. Likewise, it is overly simplistic to blame the difficulties of lower tier suppliers on the “opportunism” of their customers. Selection at the first tier has in many cases not removed firms unable or unwilling to make the necessary investments from the supply chain, but has rather pushed them down the chain. Many of these suppliers have sufficient technical capacities, but they often lack the material resources, know-how, and perhaps even cultural attitude to meet the changed demands of their customers. Their dependence on improved supplier capabilities has in many cases led automobile assemblers and other OEMs to undertake substantial efforts to transmit competencies to their suppliers – through such activities as ““supplier development” or, in Fiat’s case, “guided growth.”<sup>13</sup>

#### **“Guided growth” at the first tier**

In February 1990, after Fiat Auto had reduced the number of direct suppliers and demanded improved production quality, they launched a project called “Development and integration of the supplier system”<sup>14</sup> in which suppliers were divided into three groups: *leader*, *coleader* and *follower*.

*Leader* firms were chosen on the basis of quality, service, delivery and price, but also for their commitment to define and plan joint actions with Fiat to reduce product weight, to standardize components, to reduce the cost of quality, and to reduce inventories. Contracts were on a three year basis, with a commitment to source between 90 and 100% (depending on the product) of the contracted components with the firm in question.

*Coleader* firms were those suppliers with some weaknesses either in quality or reliability, but that were judged to have potential for improvement. These firms were inserted into a process called “guided growth” to lower their costs and to help them to restructure their production to improve response time and efficiency – with the goal of becoming “leaders.” The initiative began with the joint definition of a project, and then the constitution of a work group of personnel from both Fiat Auto and the supplier in question, along with experts from ISVOR<sup>15</sup>, a training institution. These parties then jointly worked out a methodology to reduce waste and improve efficiency in design, operations management, and financial management of the suppliers. A significant number of firms was involved. Beginning in 1991 with just 8 firms, by 1993, 304 firms (table 3), or 55% of suppliers in that year, had taken part.

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<sup>13</sup> On supplier development, see especially Sako (1998); Helper (1999); Rickert (2000); Rickert (1999); Dyer (2000). On “guided growth,” see Enrietti (1995) and (Volpato 1996). The growth of many first tier auto suppliers into well-structured, highly capitalized multinationals may mean that the future role of “supplier development” will increasingly be in non-automotive industries, and at the second and third tiers of auto supply chains.

<sup>14</sup> “Sviluppo e integrazione del sistema fornitori”

<sup>15</sup> ISVOR is one of Europe’s most important full-line training companies in terms of turnover, size, quantity and quality of staff. ISVOR was founded in the 1970s through a merger of all Fiat’s training activities.

Table 3. - *Number of first tier suppliers participating to guided growth*

Years	1990	1991	1992	1993
Suppliers	8	43	91	162

Source: Fiat Auto

*Follower* firms – those without the necessary requisites to remain Fiat suppliers – were moved out of the supply base, with the components they supplied assigned to other firms. These firms provided only a small percentage of Fiat's supply needs (roughly a hundred suppliers providing only about 600 million lire of product annually). They were either firms that were “out of line” in terms of cost (including, for example, Bosch for windshield wipers after the revaluation of the mark). Others supplied only simple components which were integrated into systems or subassemblies. A final group consisted of firms that simply chose not to invest in the relationship with Fiat.

### “Guided growth” at the second tier

Until quite recently Fiat Auto considered the problem of the quality of sub-suppliers' output to be marginal, or, more precisely, it addressed it in purely contractual terms, by transferring responsibility to direct suppliers. Fiat Auto imposed penalties on them for defects detected in the inputs which came from sub-suppliers. This position was coherent with the selection policy followed from the early nineties, when it made its suppliers responsible for the quality of its output. This gave them a strong incentive to select their own suppliers, and/or to establish better agreements with them, but it ultimately proved to be insufficient. By 1998 it was not feasible for Fiat Auto to carry out a further selection of direct suppliers (see table 1; a relative exhaustion of the process). Therefore it had to change policy and decided to take an active but indirect role in improving the quality of the products supplied by firms at the second tier of the supply chain.

Nearly ten years after its application to the first tier, Fiat returned to the “guided growth” policy, but at the second tier. The basic idea was to have first tier companies play the same “mother-hen” role with their suppliers that Fiat Auto had previously played with them. However, this required the design of an organizational scheme to induce these companies to invest time and resources in such a program. The initial solution was to entrust the executive authority over the program to a consortium formed by first tier suppliers and their main customers, the three largest Italian automotive companies of Fiat Group (Fiat Auto, Iveco, New Holland). The consortium, called CONSAF, was founded in 1998.<sup>16</sup> Training and administrative aspects of the program were entrusted to ISVOR, while first tier supplier firms were expected to follow their sub-suppliers performance and ensure the practical implementation of the training.

The initiative was presented to just over 130 first-tier suppliers (excluding suppliers of raw materials, and firms without any establishment in Italy) and to about 700 of their subsuppliers. Ultimately, 102 first tier suppliers joined the consortium, bringing in 428 second tier suppliers.<sup>17</sup> While this is an average of four subsuppliers per client firm, a relatively few first-

<sup>16</sup> See: ‘Integrarsi per crescere’, *Qualitas*, No 23 (1999); CONSAF, (1999) *Progetto Crescita Guidata Fornitori 2° livello*, Turin.

<sup>17</sup> Of these, 53 later quit the project.

tier firms dominated the initiative; only 30 first tier firms brought four or more subsuppliers. The choice of which subsuppliers to select was left completely to Fiat's direct suppliers, who generally selected subsuppliers that were particularly important in their own supply chain (key component, phase of production and/or high sales volume).

The firms selected generally have only *manufacturing* competencies (and usually in a single technological process), as can be seen in the following table showing the distribution of firms by their predominant technology (table 4):<sup>18</sup>

Table 4. - *Predominant technologies in second tier suppliers participating to guided growth*

Technology	Number	Percentage
Plastic molding	87	24%
Metal stamping	92	25%
Machining	46	12%
Rubber	16	4%
Wire Harness	10	3%
Plating	14	4%
Painting	16	4%
Heat Treatment	4	1%
Metal cutting	10	3%
Other	75	20%
	370	100%

Fifty-one of the 375 firms were engaged in two major technologies, and 15 had three. The combinations were generally “logical”, in the sense that metal stamping tended to be associated with machining and metal cutting, while plastic moulding was combined with machining operations.

Note that most of the firms involved have “transversal” technologies, that can be used for products of varied complexity (from electrical/electronic components, to sheet metal products, complex products requiring the assembly of multiple components, etc.). Nearly 50 firms were nominated by more than one first tier firm, suggesting both a convergence in the individuation of firms to be “grown” as well as a certain sharing of a common second tier supply base by Fiat's first tier suppliers. This figure certainly underestimates both of these phenomena, as the authors have been told in interviews with first tier suppliers that they at times had not nominated particular second tier suppliers only because they knew they were already “taken” by other first tiers.

The typology of second-tier firm chosen to participate in the initiative seems to have varied in part depending both on the previous supply strategy of the first-tier suppliers, and by the customers with which they had previously worked. Regarding the former issue, note that the request for high quality levels and reorganization of their own sub-suppliers was a strategy that some first-tier suppliers had already begun in the early 1990s. For these, “guided growth” at the

<sup>18</sup> Stamping and molding are relatively simple and require a minimal capital investment operations requiring minimal capital investment and with low barriers to entry.

end of the 1990s was an instrument that inserted easily in an established strategy. Sub-suppliers selected for the initiative were those that the firm already intended to develop, and thus the CONSAF courses were used as an alternative to internal support actions between the first and second tier firm, actions that likely would have occurred in any case.<sup>19</sup> The markets in which direct suppliers operate are relevant because in many cases, stringent performance requirements were imposed by many of Fiat's competitors already in the 1980s. This, of course, forced many of them to rationalize supply at the second tier somewhat earlier.

Unsurprisingly, the subsuppliers that participated in the initiative are largely small firms. We only have size data on a subsample of 57 (table 5), concentrated in plastic moulding, metal stamping and machining. Note, however, that these technologies cover 60% of the firms involved in the project. Of this subsample, 88% have less than 100 employees, and just over 60% have less than 50.

Table 5. - *Number of employees of second tier suppliers*

Employees	Nº	
<10	4	7,02%
10-24	16	28,07%
25-49	16	28,07%
50-99	14	24,56%
100-260	7	12,28%
	57	100,00%

For these 57 firms, we also have some data on the ratio of production to office staff in these firms. Even among the smallest firms (<25 employees), firms have 12 and 30% of staff in this positions, indicating in many cases a relatively complex structure, though not sufficient to satisfy the quality requests of first tier suppliers. Most (82%) of the 380 firms sent one person to the course, while 16% sent two. Unsurprisingly, 60% of participants worked in the quality department, though 15% were firm owners or chief officers.

### The functioning of the program

The main features of the program can be summarized as follows.<sup>20</sup> Each selected sub-supplier is called on to undertake three subsequent modules, which are aimed at improving the quality of their performance relative to a definite production technology, for a total six month period, each module consisting of:

- ✓ a 10 day training course about a definite topic designed to improve quality. These courses are addressed to the owners and/or to the top managers of the firms involved, and are run by ISVOR. The courses focused on the regulamentation of the production process; production quality and error prevention techniques; and quality improvement methodologies.

<sup>19</sup> These direct suppliers expect their sub-suppliers to have ISO (or similar) certification. In its absence, the first tier would evaluate the product/process.

<sup>20</sup> The cost of the program is rather low - about 1000 Euro per person- so that most sub-supplier firms can afford them, and have more than one person attending each course.

- ✓ a one month test run during which sub-supplier firms have to implement the methodologies and procedures which their managers have been taught, with the advice and under the supervision of professionals from the client company. The much higher cost of such activities (e.g. the time spent by professionals, by sub-supplier firms, and the time spent by their own human resources) is met by client companies.

At the end of the six-month period the results each sub-supplier has achieved are assessed by experts of the client company overseeing the improvement process. To ensure coherence, these evaluations follow the specific criteria outlined by ANFIA, the Italian association of companies in the automotive industry. ANFIA includes the Fiat Group companies as well as all the main first tier supplier companies. The audit process used is a simplified version of “VSQ94”, a system jointly defined by Fiat Auto and several suppliers to assess quality by means of a process of audits.

As of December 2000, 120 second tier suppliers had achieved a positive evaluation. The data clearly show that rapid closure of the process with a positive evaluation and corresponding certification of the second tier supplier is strongly correlated with the interest and effort put forth by first tier suppliers. 120 second tier suppliers (32% of the total) were evaluated by 45 first tier suppliers (41% of the total), just 18 first tier suppliers evaluated and certified 77 subsuppliers (64% of the 120). Most of these 18 firms were among those that had brought at least four sub-suppliers to the initiative, an indicator that they were interested from the start. This group brought fully 80% of the suppliers nominated all the way through the process.

## **CREATING SUPPLIER COMPETENCIES IN COMPARATIVE PERSPECTIVE: THE WMDC**

Purely private initiatives such as Fiat's guided growth program are not the only means by which competencies are diffused throughout the supply base. Beyond the obvious (an existing education infrastructure, etc.), there are numerous subsidies available to firms from such sources as the national and regional governments, as well as the European social fund. Indeed, the CONSAF consortium as an association of first tier suppliers and companies in the Fiat group was founded in 1997 and charged with the “horizontal” task of aggregating the training needs of these firms – most of them relatively small – to get sufficient scale and then of navigating the bureaucratic and logistical complexities of public funding. The consortium then purchases all of its training from ISVOR. CONSAF's partial extension of guided growth, on the other hand, represents a “verticalization” of this associational scale, coupled with the relatively novel leveraging of the inter-firm relationship to render the training more effective. In combining these two principles, it bears some similarity to a public-private initiative in the American state of Wisconsin, the Wisconsin Manufacturers' Development Consortium (WMDC). To provide some background for our argument below, we briefly describe this experimental program, returning then to a discussion of the role of industrial policy in a regime of decentralized production.

While the WMDC bears some similarities to the guided growth initiative, but differs in certain key respects. Most importantly, while it depends for its governance on a consortium of guiding OEMs (with no single player so dominant as Fiat in the Italian case), it is fundamentally

administered in partnership with existing *public* manufacturing modernization resources. The lead OEMs are also not in the automobile industry,<sup>21</sup> but they do produce engineered metal goods and require in many cases many of the same changes of their suppliers as does the automotive industry. One significant difference relative to auto, however, is that they produce for lower volume markets and seem to have less “hierarchical” supply structures than does the that industry (Whitford, et al. 2000). As a result, the consortium focuses largely on the development of the shared base of *first tier* suppliers, which are, however, generally less structured than first tier suppliers in auto and may have more in common with (or be) second tier auto suppliers in many cases.<sup>22</sup> The program also differs significantly in that it does not focus only on quality, but extends its mission to provide suppliers with a range of training options.

Originally known as the Wisconsin Supplier Training Consortium, the WMDC began as a joint effort between a state-subsidized manufacturing modernization and consulting service, the Wisconsin Manufacturing Extension Partnership (WMEP), and John Deere (a leading producer of agricultural, construction and lawn and garden equipment), but soon added representatives of the other five OEMs that now form the consortium. The Consortium partners also drew support from the state technical college system, with which WMEP already had a close relationship. It was inaugurated in summer 1998, aided by a \$500,000 allocation from the state budget that subsidized the classes so that small- and medium-sized enterprise (SME) participants could get high-quality training at a 50% discount.

The consortium provides suppliers with a problem-centered training program, primarily focused on the concrete goal of improving performance in lead and cycle time reduction, delivery, product quality, and cost. It also aims to improve supplier viability more generally by enhancing supplier/OEM business relationships, increasing understanding of OEM performance expectations and perhaps helping suppliers to gain additional customers. Training is limited to firms nominated by at least one of the six governing OEMs. To be eligible, suppliers must be located in Wisconsin and employ fewer than 500 people (that is, be considered SMEs as defined by the National Institute of Standards and Technology). Furthermore, the OEMs are required to select firms they consider “strategic,” and with which they have at least a 24 month relationship that they intend to continue.

While it is difficult both to create change, and – if it happens – to measure its effects, there is evidence that the WMDC has produced concrete results. One of suppliers’ biggest difficulties is often quite simply that they lack sufficient resources to dedicate to process improvement; for many of these suppliers, training alone is not enough. Thus, in the vision of the WMDC, supplier training is to be supplemented by other resources external to the supplier, drawn from two sources: the WMEP itself, which employs a team of manufacturing specialists that sells consulting services to small and medium sized enterprises, subsidized partially by the NIST; and OEM supplier development engineers, who regularly work on projects at supplier

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<sup>21</sup> The OEMs in question are in these industries: motorcycles, farm machinery, construction equipment, lawn and garden products, snow-throws, industrial water chillers, outboard motors

<sup>22</sup> There is not space to fully discuss the significant difference between these industries and the auto industry. In this venue, we are concerned with institutional design, and do not believe the differences to be significant for our general argument.

firms.<sup>23</sup> Interviews with suppliers in Wisconsin have provided considerable evidence of concrete and measurable improvements on key manufacturing metrics such as cycle time, productivity, and on-time delivery.<sup>24</sup>

## DISCUSSION: REGIONS, INDUSTRIAL POLICY AND OEM LEVERAGING

The improvement of communication and transportation industries means that automobile assemblers, OEMs and large suppliers are freer than ever before to purchase on global markets, potentially taking advantage of the dramatically lower labor costs available in many developing countries. The twin trends of outsourcing and streamlined logistics now imply that the location of a large factory does not guarantee a large impact on the regional economy. However, this does not mean that geography no longer matters, or that states cannot play an important role in economic development. Indeed, in popularizing the “cluster” approach to economic Porter (2000: 15) has argued that “clusters, or geographic concentrations of interconnected companies, are a striking feature of virtually every national, regional, state, and even metropolitan economy, especially in more advanced nations.” They involve the many entities that interlink to create regional competitiveness, including suppliers of specialized inputs and infrastructure, governmental and other institutions that provided needed training and technical support, as well as trade associations and unions. Importantly, Porter (2000:15) notes, “clusters represent a new way of thinking about national, state, and local economies, and they necessitate new roles for companies, for various levels of government, and for other institutions in enhancing competitiveness.”

As our discussion of changes in the organization of automotive supply chains globally and in Italy has shown, both assemblers and first tier suppliers recognize that their competitiveness is enhanced by an ability to buy “more than just parts” from their suppliers. Developing support capabilities, above and beyond the supply of the actual “parts,” is a strategy progressive suppliers use to strengthen the ties between themselves and their customers. This makes them less likely to lose business on the basis of price alone, and can thus more safely invest in new technology and worker training. However, the ability of suppliers to become strategic and core to the regional economy requires first that they have the capacity to interact with their larger customers to learn of their dramatically shifting needs, and then that they be able to provide these new support services. Implementing these capabilities requires specialized knowledge and human resources, but too many small-and-medium-sized manufacturers are “lean

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<sup>23</sup> The training is provided as a “stand-alone” good. However, many of the most successful cases of supplier restructuring facilitated by the Wisconsin consortium have resulted from the ability of OEM supplier development engineers or WMEP manufacturing specialists and supplier management to leverage the resources provided by the training program to help implement successful projects by providing supplier supervisors and lead operators with an understanding of the principles of flexible (or “lean” as it is now increasingly termed) manufacturing. The difficulty of actually *implementing* change at the supplier firm is well known to the OEMs. A lead manager in charge of supplier development at one of the OEMs comments that “the engineering part of supplier development is by far the easiest thing to handle. The change management side, on the other hand, is by far the most difficult” and is one that can be helped along by providing suppliers with an independent training source

<sup>24</sup> Space constraints preclude a full discussion of the concrete effects and usages of the training program. Detailed discussion of concrete results is available in the two reports produced by one of the authors and his collaborators at the Center on Wisconsin Strategy (Rickert, et al. 2000; Whitford, et al. 2000), both available at [www.cows.org](http://www.cows.org).

and mean,” priding themselves on low overheads and staffing levels commensurate only with “getting product out the door.”

It is quite clear that there is a need for skills upgrading at the lower tier of the automotive supply chain, at least in Italy. But it is less clear who should provide the training. As the CONSAF experience shows, one obvious solution is to use the first tier client firms. These companies are well acquainted with the procedures and the competencies required to achieve good performances in product quality, cost effectiveness, design capability. Moreover, since they have themselves achieved these results by means of training, they are also aware of the potential pitfalls. Thus they should be quite suited to take care of their own suppliers’ development, until they become able to establish a virtuous circle of continuous improvement. The term “mother-hen” captures effectively the rationale of the experience transferring process that is used. However, these firms often do not have specific expertise in training, and are thus usefully aided by a third-party training organization such as – in the case of CONSAF – Isvor, or WMEP in the Wisconsin case. Ideally, such an external organization should also be familiar with the particular needs of and differences between firms of different sizes, as there is the risk in “top down” approaches such as guided growth that lead firms – despite superior access to global knowledge – will be insufficiently aware of such problematics and inappropriately impose a “one size fits all” approach.

The structure of an assembler “stimulated” consortium has the further benefit of creating a common ground where the latter, on account of their collective presence, are encouraged to put forward their own interest and to call for a rationalization of all the links in the supply chain, as a precondition for taking on the role of “mother-hens” towards their small supplier firms. The initial meetings of the consortium were an occasion for first tier suppliers to raise many complaints about the inefficiencies of their client firms. At the same time, this rationalizational structure, and particularly the presence of Fiat Auto, allows participants to solve the implicit conflict of interest that normally prevents first tier companies from investing in the improvement of their own suppliers’ performances, even when the latter also produce for other first tier companies. Potential paralysis is overcome by the arbitrage position held by Fiat Auto with regard to first tier suppliers, as the assembler can induce suppliers to accept innovative solutions, such as forcing the sharing of the expenses incurred by one first tier company with other beneficiaries. Like the WMDC, but without an explicit public role, the CONSAF initiative seems to provide an example of a collective effort stimulated by Fiat auto to build thicker inter-firm relationships, to encourage collaboration across links of the supply chain, and to enhance the shared resource of a capable supply base in a key and leading industry in Piedmont.

The fundamental facilitating role of Fiat Auto also represents a limit, however. If they, as a single player, withdraw, the guided growth of second tier firms becomes problematic. In fact, this is what happened in the second half of 2000. The definition and implementation of the GM-Fiat Auto joint venture in purchasing (and another j.v. for powertrain) led to a concentration of Fiat’s resources on forming the alliance, with a resulting lack of attention towards second tier suppliers. The training initiative was suspended in November 2000, contradicting one of the founding elements of the initiative: its extension to other suppliers at both the first and second level. The suspension of the initiative has effects not only on the participants, but also for the regional economic system, especially the Piedmontese auto technology district (Bianchi, et al.

2001), which benefited from the positive externalities created.<sup>25</sup> The quality improvement and more solid organizational structure of second-tier suppliers helps the local productive system to become more independent from Fiat Auto, both through differentiation of the client base in the auto industry and through other non-automotive markets. The diversification of the suppliers' client base, from the point of view of the initiative, has the further perverse effect of lessening Fiat's incentive to facilitate the program, insofar as they capture a smaller portion of the returns.

One of the essential lessons of the work on economic clusters is that the firms located in them can benefit greatly from tight linkages between firms and other local institutions, but also that these linkages do not necessarily just "happen" – they can and should be *actively encouraged*.<sup>26</sup> Another lesson is that states should take advantage of their initial endowments, seeking to encourage the development of both established and emerging clusters (Porter 2000). Joint training programs such as CONSAF and the WMDC seem to present examples of just what might "cluster development" might mean in practice.

However, it is not clear who should bear the costs of these training actions – here, there is reason to fear a market failure, the *sine qua non* of industrial policy. First tier suppliers' willingness to act as "mother-hens" can be hampered by the risk of not being able to recover the costs this role entails. Inasmuch as sub-suppliers deal also with several direct suppliers at the same time – as often happens – any of the latter might reasonably contend that other firms, often competitors, will be significant beneficiaries of improved sub-supplier performance, and should thus bear a portion of the cost. Indeed, the knowledge (and the training) needed to improve second tier suppliers' performances must be conceived as a "public good", for which no private concern in the supply chain is rationally interested to foot the entire bill, even if the envisaged improvement should increase the efficiency of the whole system. Second tier suppliers, while essential to the overall functioning of the system often have relatively little bargaining power and fear that if they invest significant resources, they will be "held up" by their customers.

However, as both the Wisconsin and CONSAF projects make clear, all of the players are willing to make *some* investments – first and second tier suppliers both paid for the courses – but without a facilitating party, the program does not go forward. Because the "guided growth" project has a general character, there is a space for "leveraged" public policy initiatives, including perhaps initiatives that look beyond just quality standards and that seek to expand the leveraged consortial model to cover other areas of need at the second and third tier. In particular the Piedmont Regional Government, along with entrepreneurial and categorical associations, could promote a re-launching of the project with an eye towards the consolidation of the automotive district.

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<sup>25</sup> 342 firms took part in the courses in Torino, 51 in Pomigliano (Napoli) and 8 in Melfi (Potenza).

<sup>26</sup> Likewise, in the literature on Italian industrial districts, despite disagreements on just *what* is to be done there is a consensus on the need for more structured interfirrm linkages. See Whitford (2001).

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