

An interim report



Wisconsin Manufacturers' Development Consortium:

Cluster Development Policy in Action?

**The Center on Wisconsin Strategy &
The Advanced Manufacturing Project**

The Wisconsin Manufacturers Development Consortium (WMDC), in conjunction with the Wisconsin Manufacturing Extension Partnership, was formed in 1998 to improve supplier performance and to promote progressive supply management practices in the state of Wisconsin. The consortium, comprised of Ariens, CNH, Harley-Davidson, John Deere, Mercury Marine, Trane and the recently added Oshkosh Truck has already been the subject of two reports by the Center on Wisconsin Strategy (COWS).

- In June of 2000, (COWS) released *Common Problems and Collaborative Solutions*, a study of the changing relations between original equipment manufacturers (OEMs) and their suppliers. This report described the changing supply management strategies of the OEMs in the WMDC and showed that as applied in practice, certain aspects of these procurement strategies are problematic for supplier performance. To help resolve this "common problem," the WMDC was formed. The first report was able to provide strong preliminary evidence of the ability of the WMDC to stimulate mutually rewarding collaborative relationships between OEMs and suppliers.
- COWS then followed up on *Common Problems with Down the Line...: Supplier Upgrading, Evolving OEM-Supplier Relations, and Directions for Future Manufacturing Modernization Policy and Research in Wisconsin*. For this second report, we re-interviewed suppliers that had utilized training provided by the program. Here we were able to show that in such important manufacturing metrics as cycle time, productivity, and on-time delivery, among others, the WMDC has measurable positive impacts on the performance of suppliers. We also began the important process of mapping the structure of the Wisconsin supply base, which seems to be organized neither as a "web" in which all suppliers have equal access to OEMs nor as an orderly hierarchy everywhere "tiering" first and second tier suppliers. The evidence available to date suggests a sort of "structured web with tiered portions." Like the first report, the interviews for *Down the Line* suggest that long run supplier performance would be aided by convergent and consistent OEM practices, including a willingness to share the gains of improvement in the base.

The first report focused particularly on the role of the WMDC in solving a problem for OEMs, while the second showed that the WMDC can also effectively help the suppliers themselves. In this third report we will complement these two perspectives with a "big picture" approach – supplemented by detailed interview evidence for illustration of the argument – in which we speak much more generally about how (and why) the WMDC and similar consortia can logically serve an important public policy role in today's economy. We will:

1. Briefly discuss the concept of the "industrial cluster," an idea that has become a key focus of regional economic development efforts, not only in Wisconsin, but in numerous other states and countries. "Cluster development policy" depends in part upon the stimulation of cooperative linkages between firms as a means to industrial upgrading.
2. Draw upon our many interviews with personnel at OEMs, suppliers, the WMEP and other key actors in the regional economy to show that the WMDC is an example of "cluster development policy", potentially able to make the collectivity greater than the sum of its parts. The public provision of supplier training through a consortial structure such as the WMDC can leverage ongoing OEM efforts to improve their own suppliers performance. Importantly, WMEP can also leverage their relationship to the OEMs to provide services to suppliers otherwise relatively independent of OEM supplier

development efforts. Finally, supplier firms themselves are able to leverage the public supplier training programs to support internal modernization efforts.

3. Outline the ongoing research program of the “Advanced Manufacturing Project” (AMP). AMP is a research consortium which joins scholars from Ohio, Illinois, Michigan and Wisconsin (including COWS) to investigate the determinants and possible policy supports of improved performance in manufacturing, in what we take to be its key swing sector — component manufacturing — which is also the sector served by the WMDC. Firms in this sector fabricate and/or assemble molded, forged, formed, and machined goods made of metal and plastic, principally for sale to other manufacturers. In the final section we discuss areas of ongoing investigation that, when finished, should inform both the operation of the WMDC and state policy towards the component manufacturing sector.

Our general endorsement of the *principles* behind the WMDC do not mean that it is perfect, or that consortia are a panacea for all that ails a Wisconsin manufacturing economy in the throes of a significant recession. In the last year, there has been a significant fall-off in attendance at courses sponsored by the consortium. This undoubtedly reflects “belt-tightening” at suppliers, but also underlines the importance both of the OEMs’ commitment to the functioning of the program and of the need to keep it on the “cutting edge.” Furthermore, if consortia such as the WMDC are to be a model for “cluster development policy,” there remain important unresolved issues that should be brought into public discussion, including the need to widen access to supplier training, and the possible deepening of OEM involvement to ensure the overall efficiency of the program.

This report is drawn from aspects of the ongoing AMP research program, and is intended as an interim document focused particularly on the relatively narrow issue of the role of the WMDC *per se* in cluster development policy. At the conclusion of the AMP project, we will be in a position to give a complete treatment to the issue of supplier training in a decentralized manufacturing cluster, discussing the strengths and weaknesses of the various modalities of its delivery.

Clusters and consortia

The improvement of communication and transportation industries means that OEMs are freer than ever before to locate almost anywhere and to purchase on global markets, potentially taking advantage of dramatically lower labor costs available in many developing countries. However, while so much has been made of globalization, it remains true that particular regions of the country and world tend to specialize in particular types of production. Indeed, in popularizing the “cluster” approach to economic development, the Harvard Business School economist Michael Porter (2000) 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.” Clusters 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 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.”

A cluster-based economic development policy differs from a traditional industrial policy in many respects. Importantly, the government does not try to replace the market as a

selection mechanism, and should implement cluster strategies only when there is a critical mass of firms in place that has already passed the market test. Rather than "picking winners" by favoring particular industries, development policy emphasizes the overall competitiveness of a sector as a key goal, by complementing and focusing private sector leadership.

Industry clusters are rapidly becoming a preferred focus of regional economic development efforts, both in the United States and abroad. Recent surveys of existing cluster-based initiatives identify projects in 29 countries, 14 regions or states, and 11 cities or metropolitan areas.¹ States that have consciously formed cluster initiatives include Arizona, California, Connecticut, Massachusetts, Minnesota, New York, North Carolina, Ohio, New Mexico, and Oregon – with many others in formation. Well-known economists, public-policy experts, and regional development practitioners advocate the use of cluster strategies to consolidate and extend competitive advantages, promote growth and employment, and improve standards of living. In Wisconsin, there has also been considerable discussion of taking a cluster approach to economic development.

A cluster worthy of attention is the Wisconsin metal manufacturing cluster,² which relies in no small part on the many supplier firms producing metal and plastic components for several key end use sectors, including lawn and garden, agricultural and construction equipment, motorcycles, machinery, and automobiles. These supplier firms are an essential part of the Wisconsin economy. Indeed, even with a very narrow definition of the sector defined just by firms in its core industrial classifications,³ it provided 75000 jobs in 2000, or 20% of Wisconsin's total durable goods manufacturing employment.

Perhaps the most essential lesson of the many studies on economic clusters and their development is that firms located in them can benefit greatly from tight linkages between firms and other local institutions, but also that these linkages do not just "happen" – they can and should be *actively encouraged* by state policy. States should capitalize on their initial endowments, encouraging the development of both established and emerging clusters (Porter, 2000). Given the collective weight and historical importance of metal manufacturing in Wisconsin, the state can realize tremendous benefits by leveraging the OEM-supplier relationship to build the capabilities of the many mid-size supplier firms in Wisconsin, using the *existing* economic development infrastructure. The ability of suppliers to become strategic and core to the regional economy requires both that they have the capacity to interact with their OEM customers to learn of their dramatically shifting needs, and that they have the wherewithal to provide these new support services. The question, of course, is how best to create such a capacity. The WMDC, with its focus on cooperation between OEMs, suppliers, the WMEP, and training providers provides a model of cluster development policy. Despite its only partial coverage of the cluster, it remains a substantial force and a logical starting point

¹ See Porter, Michael. 2000. "Location, Competition, and Economic Development: Local Clusters in a Global Economy." *Economic Development Quarterly* 14:15-34; see also Waits, Mary Jo. 2000. "The Added Value of the Industry Cluster Approach to Economic Analysis, Strategy Development, and Service Delivery" *Economic Development Quarterly* 14, 1 (2000): 35-50.

² Drawn from the Wisconsin State Journal, February 25, 2002, which was reporting on the Cluster Mapping Project of Porter's Institute for Strategy and Competitiveness. Note that many metal manufacturers also depend on some plastic and electronic components suppliers, who are also thus members of the same cluster. In a related project, COWS researcher Matt Zeidenberg have begun to statistically identify and analyze the main existent and emerging clusters in Wisconsin.

³ SIC codes 308 - plastic products, 346 - forgings and stampings, 359 - pistons, valves, small motors, and 3714 motor vehicle parts.

to be reinforced. Indeed, in the year 2000 alone, the six OEMs that founded the consortium spent \$844,067,537 with the 250+ suppliers nominated.

The WMDC: Cluster development policy in action

Of course, any training program that improves the competitiveness of the shared supply base of firms in the cluster is, by definition, “cluster development policy.” The problem, however, is that training that is not *implemented* is just “information.” Implementation is the hard part. The unique aspect of the WMDC is that it also seeks to *leverage* the existing inter-firm relationships within the cluster to enhance the probability that training and modernization services will be used. In its simplest form, the WMDC is a series of “stand-alone” courses selected to ensure a fit with the strategies of sponsoring OEMs – as discussed in COWS’ first two reports on the WMDC, suppliers are often favored by fitting their own operations to the strategies of their customers, and are thus already more likely to implement the lessons of the training. However, the training does not need to be a “stand-alone” good, and in many important cases is supplemented either by OEM personnel working with key suppliers to upgrade operations, or by WMEP “manufacturing specialists” able to help to apply the lessons provided in the training courses. Our interviews also show that even suppliers who are relatively well-structured with significant internal resources have been able to help along their own development efforts using training and implementation services provided by WMEP and the consortium.

One Size Doesn’t Fit All: multiple institutional supports for diverse supplier needs

In this section we put some “meat” on the assertions just made. We draw on our numerous interviews with OEMs and suppliers involved with the consortium to first discuss in detail the complementarity of supplier training with ongoing OEM initiatives to improve the performance of their suppliers. We argue that there are at least four modalities in which the WMDC leverages the OEM relationship, training, and the WMEP to improve the overall performance of the manufacturing clusters.

1. WMDC training as supplement OEM initiatives at suppliers
2. WMDC as providing continuity for change processes “kickstarted” by OEMs.
3. WMDC as ensuring supplier access to key modernization resources even in cases of problematic OEM-supplier relationships.
4. WMDC as providing “multiple options” for the many suppliers in which the OEM does not choose to invest heavily in supplier upgrading.

We begin with a detailed presentation of the way in which supplier training can supplement particular OEM initiatives at suppliers. We then discuss the role that public resources – such as WMEP manufacturing specialists – play in cluster development policy, still drawing on our empirical case studies but with less ethnographic detail than in the first two case studies (since there is no need to re-present similar stories ad infinitum; we will focus only on relevant differences in the modality of service delivery).

A note on method

In the course of COWS research on the effectiveness, rationale, and functioning of the WMDC, we have conducted over 40 semi-structured interviews with suppliers and OEMs involved in the consortium. Through COWS participation in the Advanced Manufacturing

Project, we have access to interview data from over 60 suppliers and OEMs in other upper Midwestern states. In this particular report, our goal is to *illustrate* the various modalities in which the WMDC seems to serve as an example of a cluster development policy, and it would be both impossible and unreadable to adequately present detailed information from so many interviews in a short report. Hence, we present only such empirical material and draw on firm case studies as is useful to advance the argument, but wish to emphasize that the cases presented are by no means exceptional or “outliers.”

1. *One coin, two sides: the interaction between OEM resources and supplier training*

In extensive cooperation with John Deere Horicon works, COWS in July of 2001 conducted extensive case studies at two once-problem suppliers that had dramatically improved both their quality and their delivery.⁴ Each of these small companies had made considerable use of the training provided by WMEP through the Wisconsin Manufacturer's Development Consortium, and has also been the focus of extensive supplier development (hereafter SD) projects out of the Horicon works. The problem was to assess the relative contribution of each of these two potential drivers of supplier improvements. To briefly foreground the main conclusion drawn, the major improvements at these two suppliers cannot simply be ascribed to a single cause. Rather, they derive from a complex mix of supplier development, supplier training and the internal initiatives of employees at the supplier firms. What is clear, however, is that OEM-led supplier development and supplier training are *complementary*.

Companies A and B and the simple story: the OEM arrives and fixes everything?

A maker of engineered components supplying Horicon for over 10 years, Company A had a history of quality and delivery problems dating back to their inception as a Deere supplier, with the saving grace of a good working relationship with Horicon engineers, design capabilities, product development support and rapid delivery of prototypes. However, quality and delivery problems had gotten so bad that in 1999 Horicon was preparing to move the business. However, Horicon SD had been in Company A on and off over the years, though never for a particular long term project, and argued that many of the problems could likely be resolved through improvements in the manufacturing operation. Company A had poor layout and did not have a consistent, proven manufacturing process, leading to very irregular quality problems. Horicon personnel believed that if company A's manufacturing could be brought up to the level of their design and engineering, they could retain a valuable supplier, avoiding major switching costs.

After some discussion with the supplier, rather than moving the business, Horicon offered Company A a long term deal that guaranteed yearly cost reductions, but included a promise of supplier development. This was a risky move for both parties, as Deere was banking on their ability to improve quality and delivery at an *outside* supplier. Company A had to hope that the agreed upon cost reductions, and had to give full disclosure on all their costs (with a non-disclosure agreement), permitting Horicon full information on margins. While this information helps the customer to see opportunities for cost reduction that could in turn help the supplier with other customers, it is also information that could easily be mis-used for short-term gain.

⁴ A fuller write up of these two case studies, including a fuller description of the changes made and the resulting improvements, is available on request from the Center on Wisconsin Strategy. Please contact Josh Whitford at jwhitfor@cow.org.

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Out of this agreement, Horicon sent an SD engineer for extensive periods of time to the supplier, where s/he did root cause analysis, discovering (with the aid of supplier personnel) a fundamental welding problem and bringing in a Deere expert to help improve this process. This alone dramatically improved quality. However, there was also a "spaghetti layout" in which the supplier was batching from machine to machine and moving parts around in shopping carts. The SD engineer facilitated the formation of a multi-level cross-functional team at the supplier, including the scheduler, a key supervisor, the general manager, a process engineer, and a quality manager. Ultimately, all agreed on a new layout that more closely approximates a "single-piece flow" concept. Changes have been quite successful, effectively reducing cost and improving delivery at the supplier.

Company B is a job machine shop that was a problem supplier not long ago, but have now reduced their quality PPM to 400 from a 1999 peak of 1800+, while the delivery numbers have improved even more dramatically (13-fold decrease). These improvements have come in just the last few years, and have coincided with sustained help from Deere Supplier Development engineers as well as increased training efforts at B.

Deere personnel described Company B as a small family-run business that had decided to grow, but that simply grew too fast and outgrew its procedures. Prior to the turnaround, one Deere interviewee said that the factory was very messy, "real dingy and dark, with no real rhyme or reason why the machines were where they were, lots of parts piled up between operations. That was part of the problem, you would get parts that by the time they were here were missing a hole — they jumped an operation, parts shipped not done... Some was worker turnover, not having the workers really empowered, or even caring about their job, part of it was the way the machines were laid out. The computer system was part of the problem, to get info on a delivery, they would have someone walk out into the shop to see what stage it was at...." He added that they "wanted to get bigger, but at some point you can't just keep it all in your head, and mistakes start happening. They wanted to grow, but the computer system wouldn't let them grow, the way they managed the people and machines, the purchasing guy making sure they had enough steel — they would run out of steel because they weren't watching... They were getting swamped, we were giving them too many parts and we started to realize that they just couldn't handle it, they needed a little of everything fixed."

The first project was simply to improve part tracking, to make sure they got out the door, but that led into attempts to improve quality and ensure that there were no missed operations. And out of that, they began to help Company B implement manufacturing cells. The first cells were kept within particular departments, to make the adjustment easier, but Company B has gotten increasingly aggressive, and now has a significant portion of production coming through work cells. They have revamped operations and have devolved more responsibilities to shopfloor personnel, especially the lead people in the cells, but now expect operators to handle their own quality and some paperwork. They have been increasing wages, do much more training than in the past, and have implemented a formal suggestion system that has been helpful in getting ideas from the shopfloor and in getting workers involved in the changes.

The improvements have not only been in lead times, quality, delivery and cost. They used to be extremely slow in quoting because of internal paperwork problems, but these have been streamlined by a new computer system. Company B has seen major productivity improvements. Relative to 1999, they would be able to keep the same production levels (level is down some now because of the downturn) with 41% less people. They have

managed to eliminate redundant positions in both the office and shopfloor. They have also dramatically improved safety; the workers comp rating is now .84, where it had been as high as 2.04.

Because of the openness and improvements, Deere personnel are now increasingly comfortable sourcing parts from company B. In the past, a Deere employee said, they would be nervous about some of Company B's quotes. An initial bid would come in low, but 6 months later, there would be quality and delivery issues. Such problems no longer occur. Before, "if they bid \$1.50, in the past I was always apprehensive — are they really making profit on this, are they just bidding that way to get the business and they really don't know what the profit is? Because the other quote is, say, \$2.50. Are they really that efficient at \$1.50, or are they really missing the boat?" But now, he trusts the price, that they are efficient. Part of the past mistrust came from unstable prices, where they didn't know if the prices would hold before.

The "focused individual" and making change happen

The simple story told thus far obscures the important role of the suppliers themselves in improving their own performance.

Company A felt that in some ways, the single greatest benefit to having a dedicated engineer was simply having an individual able to step back and focus on their processes. They are a small organization, and by utilizing some of the WMEP training and existing talent, they might have been able to improve their processes on their own. They knew that the area in which they made the Deere parts was problematic, but they simply did not have the resources to dedicate to its improvement. As one employee remarked, they really needed somebody who could come in and do the grind work, to sit down and fill out the model. Maybe they *could* have done it themselves, but the fact is, they *would* not have done it. The general manager contrasted the Deere model of supplier development to a "quick-hit" approach in which the OEM would just go in, identify opportunities, give some tools, find a champion and leave, monitoring from afar. An approach that requires the outside party to get their hands dirty, and to build trust and relationships is — while more expensive — much more effective because it recognizes the resource constraints of a small, flat organization.

Company B tells the same story as Company A. They were nervous at first, but saw little risk, and the possibility of improvements at low cost. They too saw the single biggest benefit of an outside SD engineer as having someone who had been through the process before and was there regularly to push the issues, riding out the uncertainties as they began the slow and painful process of restructuring and rethinking the operation of their factory. Like company A, Company B does not think that the improvements were simply "caused" by supplier development. From their perspective, they feel like they have learned many new principles, some from customers and some from WMEP, and are increasingly able to build their own cells, establish their own part families, and generally improve operations on their own. Perhaps the customer provided them a useful "kick in the pants" to get them moving, but they played an active role in their own improvement.

The OEM engineers responsible for these companies argued that the most important initial step was to get everyone together to make some positive change, in order to bring people together. The skills of the production workers were adequate to the new ideas, or could be improved through some cross-training to be able to flex across positions when necessary, so the key issue was to help managers and supervisors to fully understand and believe in the principles behind a single-piece flow production model. Simply put, they needed to get

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people involved and understand *why*. The SD engineer responsible for Company B remarked that the difficulties in improving operations were not in deciding what the process should be, but in getting supervisors and managers to understand the importance of taking time to step back and *implement* the new process. He commented that “the problem was dedicating the time to work on something other than getting product out the door. They just couldn't get into their head that they had to do that, they would constantly want to find 10 minutes here, 10 minutes there, whenever they could, never allow time out of your day to do it.” He added that “When you get cells together, 10% is getting the equipment moved, the rest is just getting people to do it. The operators have been working there so long, so why do it some other way...?”

The role of WMEP training: getting suppliers and SD on the same page

As should be clear from the above discussion, improving the operation of a factory is not just moving machines around. It requires that the *people* working in the factory do their jobs differently. It is here that the WMEP supplier training program adds value, even in cases in which the OEM invests substantial time and money in improving supplier performance. The training offered by the WMEP, employees at company A remarked, was very much in line with the same principles being espoused by Deere SD, and they were able to use the courses to help diffuse the new ideas across supervisors and other key personnel. Having the courses provided by a third party, such as WMEP, was useful, they said, because there is always a fear that the customer is perhaps too focused, so it is much more convincing to have an objective outside opinion. Indeed, the general manager said, if the WMEP courses were *not* teaching similar principles and practices to those espoused by Deere, it would have forced him to question whether the knowledge of Deere SD was really up-to-date. Having both on the same page gave Company A confidence that they really were getting state-of-the-art manufacturing principles. They also found it helpful to go to courses with other suppliers who were trying to revamp their operations with similar concepts, and were able both to share ideas and assure Company A that they would work outside the classroom.

Company A has used the WMEP program extensively, asking all supervisory and managerial staff to attend at least one course a year and sometimes encouraging individuals to go to particular classes as needed. They have sent employees to 35 courses in the last year, an impressive number for a shop with approximately 50 employees. They sent so many people because they recognized that it was important to get everyone on the same page and speaking the same language. In tandem with the Deere SD initiative, they sent all of the people involved to World Class Manufacturing and many to related courses such as setup reduction and cycle time reduction. Interestingly, the general manager felt that a strong point of these courses (all in WMEP's “world class manufacturing” curriculum) was that much of the material overlaps across them. Fundamentally, they are all teaching the same principles and problem solving techniques that they hoped to implement in the new layout they were working on with Deere SD. A's scheduler noted that they are all basically giving the message that you need to eliminate steps and movements, and to try to drive out work-in-process. This was, he said, quite a contrast from the large factory where he had begun his career, where the idea was to “make sure you have plenty” to keep the machines running.

In addition to this focused use of WMEP training — to aid their collaboration with Deere SD — Company A also uses the training more generally to learn about changing manufacturing practices. The general manager felt that this was quite important as factories move to flatter organizational structures. Many supervisory and managerial personnel have come up off the shopfloor, and bring with them a wealth of manufacturing knowledge, but are not trained to

step back and look at the organization as a system. It is very helpful to Company A to be able to send these staff to courses to provide them with new concepts and problem-solving techniques.

Company B has been extremely active in using the WMEP training. They have used it to improve their understanding of cellular manufacturing and cycle time reduction and other classes that specifically relate to the ideas being pushed by their customers. However, they have also been able to take advantage of the program to streamline their office operations and are presently undertaking a major project to become QS certified. Like at Company A, the plant manager felt that the WMEP courses aided the SD project by giving confidence that it would work, in helping them to understand *why*, and in giving him means to train and educate supervisors and lead people. In speaking about the role of the WMEP training in improving the operations of Company B, a manager suggested that it was again important to have a focused individual who would keep track of the training and push people to use it. In their case, they have a training liaison able to keep track of what is out there and to be persistent.

Company B has also managed to implement many of the lessons from the WMEP training into areas not specifically helped by Deere SD personnel. They said that while the cycle time course class helped them on their shopfloor, it has had a bigger impact in the office, where they managed to eliminate five of nine positions by shifting and eliminating repetitive operations. They have significantly reduced paperwork and now have things that they used to do in the office done on the floor. As a result, they have put computers onto the shopfloor to improve order tracking. They suggested that because they have so improved the manufacturing side, they are discovering that many of the remaining bottlenecks are on the business side, so having access to the managerial training from WMEP is quite helpful.

These two "success stories," while exemplary of the potential of leveraging the inter-firm relationship to improve the effectiveness of state spending on worker training, should not be taken to represent the sole modality of successful OEM-leveraged economic development in the metal manufacturing cluster. Without re-presenting the "nitty-gritty" details of shopfloor change management (to avoid redundancy), it is important to recognize that there are numerous ways in which the WMDC is structured to leverage the existing cluster to improve the performance of the shared supply base. We again focus on the linkages beyond the simple provision of subsidized training.

2. Customer (OEM) resources can "kickstart" the change process, while consortial resources ensure continuity

Company C was had a problematic relationship with a key customers' plant, in which both sides thought the other to be at fault. The customer complained that the supplier was constantly late with deliveries, while the supplier felt that the source of all the difficulties lay in the extremely irregular ordering of parts by the customer, rendering the programming of work at the supplier factory virtually impossible. Relations were tenuous. As a manager at the supplier firm put it: "there was not a lot of mutual respect between us and [the customer]. Neither one of us thought the other had a clue." The corporate office of the customer approached the supplier, and suggested that they work together to reduce the response time at the supplier, improving the suppliers' flexibility to make them better able to handle the customers' order patterns.

A team consisting of both supplier and OEM personnel was formed, requiring significant investment of human resources by the supplier. In the words of a supplier manager: "It was

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tough. Nobody else was doing our jobs while we sat in these meetings 3 days a week. Every week... There were times where we would skip a week, but always with a reason – homework, projects to get done.... when [the OEM team leader] left, people would have their homework. But at the end of the day, you still had the rest of your duties too.... There was some great stuff though; up to this point, we had no clue what a takt chart was, or a Kanban system."

The project was not without its conflicts, of course (when real money is involved, they never are). There was an initial wariness about the release of information to the customer. The supplier commented: "Probably, in the course of the project, we thought we were giving up way too much information, but when the project was completed, and all was said and done, I don't know that we gave up anything that the customer didn't already know in most cases, or shouldn't know." Nevertheless, "I am sure we gave [the customer] headaches because we would do our darndest to tap dance around every issue, so we could discuss after he left if we really wanted to give that to him." The real problems, as might be expected, came in the "arm-wrestling over what was real savings, what was paper savings.... The downside, I would say, to the whole project, is that we still did not collect enough data to be really truly accurate. The savings at the end was done on projected savings. And I wasn't comfortable with that, and I don't think we ever saw that – but I also don't think they ever really got the full savings they asked for either... there was some kind of concession at the end of the year. There was a lot of stuff that was held back, and they never did claim all that they wanted to claim. My gosh, they were looking at how we were going to be renting out floor space because we would have extra – your floor space only has value if you are going to use it for something else."

Ultimately, however, personnel at the supplier were unequivocal in judging the project to be an "exceptional" success, with machine changeover times cut by 1600%. The company is still in "semi-batch" mode, but have halved the lead time from 3 weeks to 1.5 weeks. Productivity in the cell that was the focus of the project improved by more than 33%. More importantly, however, this is a firm that has multiple plants in Wisconsin, and they have since leveraged their engagement with the consortium and with WMEP in general to develop the internal capacity to carry out their own continuous improvement projects. While a few people had learned from the customer, generalizing the lessons across multiple plants required the aid of a professional training organization. They developed with WMEP a "curriculum for the continuous improvement leaders; it was everything from leadership and facilitation skills to set-up reduction, to process mapping, to cycle time reduction... to ... it was 6 weeks of tuesday-wednesday, two days a week for 6 weeks."

Now, the view at the company is that they will try to use internal resources supplemented by WMEP as necessary. The explanation is straightforward, especially at a time when suppliers are expected to provide customers with regular cost reductions: "I think more and more, I would prefer we just do it ourselves, I think we've got good people, I think customers oftentimes just get in the way, and I think that the biggest issue is calculating the savings... too much of it always has to be theoretical... yeah, you saved a thousand square feet of floorspace.... But exactly what are we going to do with it?"

After the first successful instance with their customer, which, one supplier manager said, "was the first time that anybody acknowledged, very grudgingly – we had to do it – that something was wrong. And afterwards, it was like, wow, this is not so bad." The final judgment is that they are grateful for the kickstart: "It may have been an expensive lesson, but we

learned a lot, and have recouped it many times over by carrying out [other such] projects [afterwards]."

Note that although Company C is part of a "group" of relatively small firms and do have access to their own "corporate" resources, they were still favored in upgrading their operations by the interventions of both their customers and their access to training and consulting services provided through the WMDC. Among suppliers firms interviewed, Company C was not unique in this pattern, and there were also other interviewed firms that were able to usefully supplement their internal resources with training provided through the WMDC.

3. *The WMDC as a substitute in instances of problematic OEM-supplier relationships*

In an extensive study of the effects of supplier development programs in the agriculture, construction, and industrial equipment industry, Mesquita and Brush (2001) note that some suppliers "see supplier consultants doing more the job of 'policing' than 'promotive development,'" leading suppliers to avoid seeking help, often because "the OEMs may value the help its consultants extend more than suppliers do. In such a case, suppliers have perceived that OEMs initiate a more aggressive bargaining behavior in order to extract 'unfair' price discounts.

As was also discussed in *Common Problems and Collaborative Solutions*, interviews by COWS researchers confirm this difficulty. Whereas Company C discussed above felt that the discussion of how to value the savings to share from a successful supplier development project was difficult but not fatal to the project, it is not always the case that suppliers are ever comfortable sharing the requisite information with their customers to allow for a successful project. However, these suppliers must still meet their customers stringent quality, delivery and cost reduction demands. The WMDC, using WMEP as a sort of "honest broker," then potentially becomes an important resource for supplier and OEM alike, ensuring that the former has access to training and project support while the latter is less likely to have to "transition" despite a problematic relationship. Even if the OEM does have the suppliers' best interests at heart, it is not necessarily perceived that way by the suppliers themselves.

An example of this is provided by Company D, who was pushed by large batch sizes and ensuing delivery and cost problems to make substantial changes in the organization of production, implementing a modified pull system. Although they did work some with customer supplier development engineers, they ultimately were not comfortable sharing "the nitty-gritty of all the facts as to how our processes are made and the time it takes. Because... we know what they'll do, they'll use it against us to say, 'Well, we know that you could take this much waste out. Now we want this cost reduction.' And we're doing everything we can right now to keep the cost the same, and to find ways to reduce the cost if we can." Instead, they have elected to work with their own resources, but also with WMEP on numerous projects, commenting that "you know, for a small company like this, training, huge training budgets are not possible, and so the cost is really good, you know, with the subsidized part What I tell, what I've told other groups time and time again, is that the WMEP training to me is World Class training" that "can bring in the outside knowledge."

4. *WMDC, the WMEP and "multiple options" for suppliers*

In this particular report, we are primarily concerned with explaining the manner in which a consortial structure represents a particularly viable "cluster development policy." Thus we

have concentrated particularly on instances of relatively intensive OEM involvement in supplier upgrading, showing that the WMDC aids this process not only by supplementing OEM-led initiatives through the training program, but also by helping suppliers to independently continue and to extend initiatives begun in tight collaboration with a customer, and even by substituting for OEM-led initiatives when these are problematic for various reasons.

However, this should not obscure that most suppliers eligible for training by the WMDC do not have extensive interaction with the supplier development resources of their customers, but can still take advantage of the training consortium and WMEP manufacturing specialists to upgrade their operations independently. In such cases, the OEM-supplier relationship is perhaps leveraged only slightly, in the sense that the supplier is made aware of new possibilities through their nomination to the program. The participation of the OEMs in the consortium further increases both the likelihood that suppliers will initially partake in the training, and that the training will have direct relevance to the needs of supplier firms. If the program is beneficial, suppliers will come back to a program on their own initiative. On the other hand, if the program is not “value add”, no further coercion or leverage by the OEM will convince their suppliers – who are generally savvy businessmen – to invest more time and/or money in it. And while there is no guarantee that suppliers will reap benefits from the training, the previous COWS reports, particularly *Down the Line*, suggest that there is good reason to expect many suppliers to find the training provided to be an important “toolbox” to help them stay competitive in a rapidly changing manufacturing economy.

Suppliers interviewed have leveraged their involvement with the training consortium in almost countless different ways, ranging from simply learning generally of changes in customer requirements to starting with coursework and then engaging WMEP manufacturing specialists to help them to substantially reorganize operations. For example, Company E, working for several consortium members, was moving to a more “build-to-demand” organization of production and sent the entire workforce to “lean courses” because, the general manager said, “if we’re going to go this way and we’re going to be doing some things, I wanted everybody to understand [why].” Company F, on the other hand, began by sending a couple of people to lean courses, and then moved on to send approximately 60% of the workforce to training offered by the consortium and has engaged WMEP field agents to help them push through the creation of several production cells. This “leveraging” of the training program as a means to learn about and use WMEP manufacturing specialists is a relatively common pattern among suppliers who use the program (note that many nominated suppliers never use the training at all). Of the 75 different suppliers who have taken courses sponsored by the WMDC, 27 have since signed contracts with manufacturing specialists (using \$228,410 worth of services).

Clusters, consortia, and policy rationale

Since suppliers and their customers are the main beneficiaries of training and development provided by WMEP and the consortium, it is logical to ask why they should not bear the full cost of the training. What, one might reasonably ask, is the purpose of the development subsidy. To answer this question, it is important to return to the idea of the “industrial cluster,” and the point amply made in the economic development literature that the shared supply base is essential to the competitiveness of the metal manufacturing as a whole. While many OEMs are willing to invest some resources in the competitiveness of their suppliers – as shown by their engagement in supplier development projects – they do not do this out of the

“goodness of their hearts,” but only because it can be justified by good business sense. They expect projects to pay off in cost reductions and improved quality and delivery. Likewise, suppliers invest in training and other such actions to improve their performance the expectation that the investment will “pay for itself.”

However, it is not crystal clear that participating suppliers and OEMs should bear the full costs of this training, as there is reason to believe that there may be a “market failure” – the *sine qua non* of industrial policy. Given that suppliers work for multiple customers, they are unlikely to be able to fully recover the cost of investment in supplier capabilities. Likewise, the suppliers themselves have relatively little bargaining power and the stringent cost targets they are expected to meet lead them to be wary of investments such as training with relatively intangible and long term returns. Indeed, the knowledge and the training invested in the upgrading of the supply base should 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. However, the very existence of the WMDC shows that all of the players involved are willing to make some investments in the reinforcement of the states shared supply base. The result is that by leveraging the existing network of relationships, that state is able to create a series of “diffuse benefits” across the economy. This relatively small subsidy can be viewed as a part of a larger effort to enhance the metal manufacturing cluster, and as such a part of a progressive strategy to enhance the formation of human capital and other “intangible” organizational assets that are part of a “high-road” economy.

Conclusions and future research

While the argument thus far clearly shows the potential role for multiple firm training consortia such as the WMDC in a strategy of “cluster development,” the practical actualization of even a well-designed policy model is never easy, and the WMDC is no exception. The substantial recession in the manufacturing economy, and particularly in metalworking, has had its effects on the supplier training program as well. Langdon, McMenamin and Krolic (2002: 4) report that American “factories eliminated 1,204,000 jobs, while sharply reducing their output, thus sending capacity utilization to its lowest years since 1983.”⁵ Likewise in Wisconsin, employment in durable goods declined by almost 10% between June 2000 and December 2001. Thus, there has been an unsurprising decline in the use of the supplier training program. As of March 1 2002, there was a 23% falloff in the number of “full training days” delivered to suppliers as of the same date in previous fiscal year.⁶ In the words of an interviewed supplier, “our training in the last year, the last fiscal year, has been down obviously because of the effect of the economy on the business. So our outside training has been” one of the areas in which they have been trying to save money. The full commitment of the OEMs to encourage their suppliers to participate may also be an issue. One of the OEMs in particular has participated only sporadically, and not all suppliers know little more about the program than that they have been nominated.

Beyond the issue of sustainability of the program in recessionary times, when training and other long-term investment – the very things needed to reorient the economy in new directions – seem always to be the first things cut as they don't pay the bills today – there are

⁵ see Langdon, McMenamin, and Krolic, 2002, “US Labor Market in 2001: Economy enters a recession,” *Monthly Labor Review* 125, 2.

⁶ March 1 was the last date for which full registration data was available at time of writing. Preliminary indications suggest a similar falloff between March and June.

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two other very important unresolved issues that need to be brought into public discussion if the WMDC is to become a full-fledged model of “cluster development policy.” These are the issues of “fairness” and “efficiency.” The former means that there must be wide access to the program, but this must be handled in such a way as to ensure that the sponsoring OEMs remain committed to collaboration with their suppliers. Indeed, it might be useful to encourage even deeper commitment than presently offered by the sponsors.

It is essential that OEM-leveraged economic development not be “corporate welfare,” and should benefit as wide a group as possible. Wholesale expansion –beyond a few new members – of the existing consortium is problematic given that the focus and commitment of the governing partners is important to its effective functioning. A more logical solution would be to stimulate the formation of additional consortia of locally-based OEMs with a sufficient commonality of purpose and a substantial shared in-state supply base. A risk to OEM-leveraged economic development is that the customer firm will be chiefly interested only in improving the ability of suppliers to meet their own very particular exigencies, while an OEM consortium involving multiple firms increases the probability that the skills imparted to suppliers will have general valence. A supplier that becomes a good supplier to a particular nominating OEM will be more successful in attracting business from other sources.

The issue of deepened commitment is one that we first brought up in *Common Problems*, our first report on the consortium, and it is one that bears repeating here. First, the very principle of a consortial model of supplier training is to leverage the commitment of the sponsoring OEMs to collaborative “win-win” relationships with their suppliers. Access to effective training and supplier development resources is an important problem, and, can be well handled by the consortial model as is, *so long as* OEMs provide their expertise and knowledge of manufacturing best practices to improve the ability of their suppliers to meet the stringent demands of global markets without sacrificing their margins or future investment. However, as was amply demonstrated in our first report and is regularly reported in interviews with suppliers, there is not a consensus even inside participating OEMs that collaborative relationships are sustainable, particularly in times of particular cost pressure. One of supplier firms’ main problems remains that their customers, even those who talk the talk of open and collaborative supplier relations, often do not always walk the walk, partly because of internal organizational barriers.

The first COWS report focused on defining the need for the WMDC by analyzing changing OEM purchasing strategy and ensuing difficulties among Wisconsin suppliers. The second was able to show that the supplier training program is able to tangibly improve supplier performance. This third interim report has focused on the policy rationale for public funding of a supplier training consortium, arguing that the WMDC provides an example of “cluster development policy.” As should be clear from the concluding section on the AMP research program, however, these first three reports are preliminary statements of a work in progress. Our final report, scheduled for June 2003, will finally draw together the inter-related themes in the ongoing AMP project, and will compare the WMDC to other forms of supplier training, both in the US and abroad.

AMP and future directions

COWS research *specifically* on the activities of the WMDC is of course only a part of the Advanced Manufacturing Project. The research of the AMP consortium is currently a work in progress, and it is too early to report results. However, there are numerous other aspects of ongoing AMP research – which is in part funded by WMEP – that will be able to usefully inform

both those responsible for directing and operating the WMDC and also the state policymakers ultimately responsible for ensuring the continued viability of Wisconsin's manufacturing economy. Three aspects seem to be of particular relevance

1. An international workshop on Supply Chain Governance and Regional Development in the Global Economy
2. A more intensive focus on intra-firm relationships
3. An extensive survey of component manufacturers in the upper Midwest

Supply Chain Governance and Regional Development in the Global Economy

On September 10th, 2002, COWS, the Center on World Affairs and the Global Economy (WAGE), and the Advanced Manufacturing Project (AMP) will co-host a workshop on "Supply Chain Governance and Regional Development in the Global Economy." This workshop will bring together practitioners and academics from the US and Europe concerned with supply chain governance and restructuring in the manufacturing sector. The workshop will address three interrelated themes:

- The general shift in the character of outsourcing by large Original Equipment Manufacturers (OEMs) in sectors such as autos, construction and farm equipment, industrial machinery, and electrical and electronic equipment. This shift can be broadly characterized as a move from capacity subcontracting (where external sourcing supplements OEMs' own in-house production capabilities) to specialized subcontracting (where customers rely on component suppliers for inputs they do not themselves command, often including technological and design expertise). How far and in what ways this shift is occurring across different sectors and regions will form a primary focus of the workshop.
- Problems of cooperation between large OEMs and suppliers in areas such as product development, logistics, and cost reduction. How do customers and suppliers in different sectors and regions negotiate power imbalances in their relationship and overcome internal organizational barriers to effective collaboration?
- Efforts on the part of OEMs, trade associations, labor unions, and public agencies to help supplier firms successfully make the transition into the new form of subcontracting. What are the strengths and weaknesses of different organizational models of supplier development, training, and restructuring currently being pursued across US states and European regions, from large firm and government-led approaches to consortial and associational initiatives? And how best can policy makers and other concerned actors ensure that the effects of supply chain restructuring prove beneficial for regional economic development, manufacturing employment, and workforce outcomes?

Understanding change processes inside the firm

AMP research has to date focused mostly on inter-firm relations—OEM-OEM relations in the WMDC; OEM-supplier relations in supplier development; and the structure of supply chains more generally. We have recently extended the scope of AMP research to include a focus on intra-firm relations. An AMP researcher is now working on in-depth case studies of labor-relations, work organization and restructuring *within* component manufacturers. Currently involving four case studies—two at represented suppliers and two at non-union suppliers—this research is focusing on how decisions are made within firms to reorganize the workplace to cellular/flow manufacturing and apply lean principles such as kanban, kaizen, etc.

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In addition to studying in depth *how* such decisions are made, this research is focusing on the role that labor market intermediaries, such as the Wisconsin Regional Training Partnership and the WMEP, unions, and joint labor-management teams within unionized firms play in “modernizing” supplier firms. The COWS report *Down the Line* suggested two complementary questions that this research will address: the decision to modernize and workforce effects. On the former, the key issue is which factors promote changes in firm strategy and allow firms to successfully implement advanced manufacturing practices—e.g., institutional and locational factors (labor market characteristics such as availability and skill profiles of workers; proximity to suppliers or OEMs), strategies of rival firms, ownership structure, unionization, position in supply chain, intermediary institutions, MEP. On workforce effects, key issues involve the effects of reorganization on job classifications, departmental lines, training and workforce composition.

Surveying the population of component manufacturers

Building on the results of the and hypotheses developed in our many interviews, the AMP research consortium is now designing and preparing to administer a multi-state survey of industrial component manufacturers, enabling us to situate our findings more precisely in a broader national and regional context. The questionnaire will be based in part on – but will supplement – Luria's Performance Benchmarking surveys, which have been carried out for several years, and Helper's international surveys of automotive suppliers. The survey will provide a careful mapping of component manufacturer strategy, focusing as well on understanding the range of responses to customers' policies of price reductions and devolving of design and subassembly responsibility. We will seek to assess the impact of firm practices on performance, asking for example about TQM, training, “lean” initiatives, trust and collaboration with customers, and capital investment. Furthermore, we will look at the impact of clustering and network placement on component manufacturer strategy and performance. We expect the results of this survey to be of significant value not only to AMP researchers but also to practitioners working to improve the competencies of component manufacturers.