VOLVO UDDEVALLA

A DEAD HORSE OR A CAR DEALER'S DREAM?

AN EVALUATION OF THE ECONOMIC PERFORMANCE OF VOLVO'S UNIQUE ASSEMBLY PLANT 1989-1992

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RÉFÉRENCES
1. "YOU HAVE CREATED SOMETHING VERY SPECIAL...."

Four years ago, in 1989, Volvo inaugurated a radically new assembly plant in Uddevalla at the Swedish west coast. Boasted the plant manager: "This isn't just new production technology. It is the death of the assembly line" (Business Week, August 28, 1989). The plant design was conspicuously different from standard car plants. Instead of one long line, a multitude of small parallel teams built complete cars. At regular production pace, individual cycle times ranged from 1.5 to 7 hours - a stark contrast to the one-minute standards on the assembly lines. The teams were supported by a partially automated materials handling process that for each car delivered an individual kit of parts and components to the assembly shops. Vocational training and technical information had been redesigned to sustain a new assembly culture, characterized by functional understanding and combined product and process knowledge. New technical aids made assembly work ergonomically vastly superior to traditional forms. This included an ambitious project to develop new hand tools adaptable to different sizes and strengths, as well as tilted assembly, enabling assemblers to work in an upright position for nearly all operations.

The plant has been visited by many American academics. In October 1992, when a shutdown decision was imminent, one of them, Wayne Cascio, in the University of Colorado at Denver, wrote to Uddevalla's plant manager: "You have created something very special in the Uddevalla plant. Embrace it, cherish it and by all means, find a way to make it economically viable over the long term." Other American observers were less than enthusiastic. A long report in New York Times (July 7, 1991) concluded that the plant was doomed to failure, since "assembly lines are just more efficient". In the same article James Womack, at the MIT, asserted that Uddevalla was "a dead horse".

In November 1992, Volvo officially announced that Uddevalla would be shut down in 1993 and the Kalmar plant in 1994. (This plant builds the top-of-the-line model, Volvo 960, and represents an earlier stage in Volvo's trajectory of production innovation). As a consequence, all Swedish assembly will be concentrated in the main factory in Gothenburg, where Volvo also has its headquarters, design and engineering departments. After all, were the critics right? Was Uddevalla just a "noble experiment in humanistic manufacturing", as NYT said, an answer to the industrial labor crises of the 1980s, when Swedish manufacturers had so many difficulties in recruiting and keeping production workers, but doomed to failure in the hard times of the 1990s? The answer is no. In terms of productive performance and commercial potential, the Uddevalla operation was a remarkable success. In October 1992, the plant was thoroughly evaluated against the line assembly plant in Gothenburg. In this comparison Uddevalla emerged as an internal bench-mark for Gothenburg. This may come as a surprise to many readers. Let me first summarize the achievements of the plant, before I present them in more detail.

**Productivity: A 50% improvement 1990 - 1992.**

After a slow start Uddevalla took off and in 1991 reached the level of the Gothenburg massproduction plant. From the last quarter of 1990 to the last quarter of 1992 Uddevalla cut the assembly time at an average rate of one hour a month. This rapid learning curve surpassed developments at the Gothenburg plant, where lean production techniques were introduced to boost performance.
Quality: A clear edge in customer satisfaction.
In the early 1990s, both Gothenburg and Uddevalla improved their quality records considerably, but Uddevalla had a lead. According to American customer evaluations, surveyed by J D Power, Uddevalla was clearly ahead of Gothenburg.

Cost-effective technical solutions.
Simple and smart technical solutions in Uddevalla's parallel assembly reduced the amount of mechanized equipment and tools required by one half compared with conventional line assembly.

Savings in social costs due to minimization of health and safety hazards
The job design and equipment at Uddevalla represented fundamental improvements in ergonomics, work content and physical variation. The plant had a long-term prospect of maintaining a highly stable personnel and low costs for repetitive strain injuries and workers' compensation.

High flexibility: 50 % lower tool and training costs at each annual model change.
At Uddevalla, flexible production design and highly skilled teams rendered the yearly model conversions much easier than at line assembly plants. For the three years 1990-1992 this resulted in very substantial cost savings in both tools and training. The time required to return to normal productivity after an annual model change was half the time needed on the lines at the Gothenburg plant.

Combining customer order assembly and short delivery times.
In the fall of 1992 Uddevalla started building all cars for Europe on customer orders only. As a result, dealers could offer customers individually specified and equipped cars within 4 weeks, instead of persuading prospective buyers to accept pre-specified 'plan cars'. The total lead-time was cut from two months in 1991 to one month in 1992, and a further 50% reduction was planned for 1993. The savings in finished product stock equaled the value of the entire assembly time! Moreover, since "plan cars" normally must be heavily discounted, in particular in flat markets, every custom-ordered car also implied a significant commercial saving.

Many of these points fly in the face of conventional wisdom, so let me explain them somewhat more carefully.

1.1. Rapid Productivity improvement
One of the most widespread performance indicators in car production is assembly hours, in spite of the fact that assembly only represents a minor fraction of total manufacturing costs. During its first year of operation final assembly time per car at Uddevalla averaged 70 hours, including materials handling, maintenance and other indirect activities, but no salaried positions. This high level was anticipated, however, since the plant focused on training new teams, expanding its product range and bringing new assembly shops on stream. Late in 1990 Uddevalla started to improve rapidly. The last quarter that year the plant scored 59 hours/car, and from then on assembly time per car was reduced by one hour every month on average. By early November 1992 the figure was down to 33 hours! (It must be noted that this and subsequent figures are not comparable with the assembly time that MIT researcher John Krafcik and his colleagues calculated at various car plants. The aim of the MIT study was to compare
data across plants and countries. Thus they only registered a standardized sub-sample of assembly activities at each plant and did not compute total assembly times.)

According to both MIT and NYT, Uddevalla would never reach the productivity of a line plant. Nevertheless, in mid 1991 Uddevalla's performance equalled Gothenburg's assembly line. Admittedly, at this time the Gothenburg plant was not very productive in European terms, a main reason being the drastic decline in Volvo's sales and volumes. As a result, the plant was operating on a very low capacity level. Inspired by Japanese methods, a new management eliminated the overstaffing and launched a comprehensive productivity program, that strongly focussed on process quality. By this acceleration, Gothenburg overtook Uddevalla in early 1992, but in the second half of that year, Uddevalla put in a second gear. In the month prior to the shut-down decision the two plants completed neck-to-neck, but Uddevalla appears to have had a clear edge in worker hours per car. (Even for these two plants within the same company, there are measurement errors, concerning for example the allocation of maintenance and other indirect activities, that tend to blur the picture when differences are small.) There were no significant differences between assembly teams working in long cycles (1.5 hours) and teams working in very long cycles (3.5 hours). Shorter cycle times were somewhat easier to learn, but the assembly task in these teams required a more elaborate form of group interaction.

Uddevalla had abundant potential for further rapid improvement. None of its managers doubted that the plant could reach the target of 25 hours/car in the middle of 1993. In fact, most of them were absolutely confident that Uddevalla would beat the line plants in straightforward productivity terms. One of the reasons for this confidence was the belated but very successful introduction of a plant-wide Kaizen program in the fall of 1992. The plant's advanced team structure turned out to be ideally suited for sustaining continuous improvement activities, and following the introduction of this program the number of worker suggestions increased dramatically.

1.2. A quality edge

Quality is the second general performance measure of Volvo's assembly operations. For many years the company used an index system, where 1,000 signified an absolutely perfect car. In 1990, the target was to attain index 900. Uddevalla reached 890, and Gothenburg basically the same. In 1991 the target was raised to 910, Uddevalla achieved 907, slightly ahead of Gothenburg. In 1992, Volvo tightened the auditing procedures and revised measurement. Instead of reporting an abstract index, the number of defects per car was made the new yardstick. In the months before the fatal decision, Uddevalla reported a few, mostly minor, defects per car (approximately 920-925 points in the old index system). This was better than the Gothenburg plant, although the difference was not big. Best in class was Kalmar. That plant was the first to introduce and train all operators in a rigourous system for quality assurance, from error detection, problem analysis and application of countermeasures, to follow up. Originally, management had expected Uddevalla's quality advantage to be much more significant. It was thought that high motivation and broad skills would produce outstanding quality more or less automatically. Only in 1992, the plant introduced and trained workers in the rigourous routines and procedures that are needed for achieving world-class quality in the auto industry. Nevertheless, the difference between Uddevalla and Gothenburg was clearly perceived by customers. According to surveys carried out by J D Power for model year 1992, U.S. customers ranked cars built by Uddevalla higher than those assembled in Gothenburg. Volvo's internal customer auditin~ programme, "Voice", verified these results.
1.3. Further Uddevalla advantages - tools and logistics

Contrary to widespread belief in the superiority of specialized line production, the small-scale parallel assembly at Uddevalla enjoyed cost advantages also in terms of equipment and tools. Thus, whereas the plant in Gothenburg required 1.6 tools, fixtures and units of mechanized equipment per assembly minute and operator, Uddevalla needed only 0.6, that is, less than half. In long-cycle assembly an operator finalizes a complete functional task before moving on. This eliminates a number of jigs needed in line assembly just to keep parts in position, while one worker starts to mount a component, another adds some more parts and a third or fourth finalizes the operation.

Uddevalla is a pure final assembly plant, and has no press, body or paint shop. Car bodies are shipped from Gothenburg, 100 kilometers to the south. This structure was a decisive political disadvantage in the power game preceding the closure decision. Did it also imply a cost penalty? To the surprise of many, including the Uddevalla organization, the answer is again no. In fact, the evaluation in October 1992 found that the additional cost of shipping car bodies 100 kilometres was more than compensated for by less expensive deliveries of other parts. Uddevalla was much closer than Gothenburg to several Swedish suppliers of volume components, such as bumpers and seats, and overall the cost of logistics was less than that of the main plant.

1.4. Stable personnel, healthy environment and low costs for repetitive injuries

Uddevalla was planned in a time of industrial labor crises in Sweden when Volvo was plagued by widespread employee dissatisfaction. As late as in 1990 personnel turnover at the assembly plant in Gothenburg exceeded 35%. Total annual costs for the deficiencies in the working environment and ergonomics of this plant was estimated to be 670 MSEK (100 million USD). A basic mission at Uddevalla was to bring about a renewal of manufacturing work. In this the plant was extremely successful. While car assembly still is hard work, the broad and varied job content and superior ergonomics at Uddevalla imply very low risks of repetitive strain injuries and cumulative trauma disorders.

In 1989, management had viewed Uddevalla as a strategic investment to meet the demanding labor market of the 1990s. Three years later these considerations were forgotten. Sweden was in deep recession and unemployment on a sharp rise. In the midst of down-sizing, Volvo had no need to recruit new workers and no problems with labor turnover, not even in Gothenburg. Uddevalla's achievements in humanizing assembly work, in constructing new tools and developing new forms of work, did not play any role for the Volvo managers who decided to lay the plant idle. Unfortunately, that testifies to a very short-term perspective in the present Volvo leadership. When the economy picks up again Uddevalla's new design and organization would have been very competitive in terms of personnel costs. At the Gothenburg plant, on the other hand, the current labor stability is deceptive. According to 30 years of experience, labor turnover at this plant will rise as soon as unemployment falls. This will not only increase personnel costs, but also jeopardize the future of the programs for continuous productivity and quality improvement at the plant. In contrast to Uddevalla, the enhanced performance at Gothenburg remains fragile, since none of the fundamental problems of assembly work have been solved.
1.5. Superior flexibility in changing models

High flexibility is a fifth import advantage of Uddevalla's parallel team assembly and broad worker competence. One indication is the low effort needed to introduce annual model changes at the plant. The three model changes 1990 - 1992 were introduced with between 25% and 50% lower cost per car compared with the Gothenburg plant. Uddevalla needed less investment in tools and training, and returned to normal productivity in only half the time after the model change. Normally, Volvo's annual changes are quite insignificant. That was the case in 1992. That year the best Uddevalla teams needed to build only 2-3 cars (approximately one day) before resuming 95% of normal production pace. The least efficient teams needed 5-6 cars, or two days. One of the advantages of the parallel team system was that support staff could concentrate solely on helping those teams that were in most need. On the line at the Gothenburg plant, there is normally one day's gap between the old and new annual models. During that time industrial engineers and subforemen relocate materials, adjust equipment and provide new tools. Assembly workers are informed about the changes, but seldom participate very actively. By contrast, the assembly teams at Uddevalla themselves implemented the changes, they studied the new instructions and rearranged their workplaces. The system of materials provision, the kits, were by themselves an important means to help assemblers learn the new annual model.

The head of the plant's industrial engineering department emphatically stressed: "It's a myth that our parallel and long-cycled assembly requires more tools and longer time for training when changes are introduced. Our cost for training and preparing people for new models has been only half that of the Gothenburg plant. The main reason is the enormous competence and skills of the assembly workers and materials handlers."

Parallel assembly at Uddevalla meant that cars were built in many places simultaneously. Before the plant came on stream, it was generally expected that this would result in considerably higher tool costs. An evaluation of the model changes 1990-92 showed that the opposite was true. One reason was the plant's deliberate low-tech strategy for the assembly process. Simple, flexible tools were substituted for complex dedicated equipment. As a result, existing tools could be modified instead of replaced when a new model year commenced. At Volvo's other plants, process engineers had always accepted the product designers assembly specifications. At Uddevalla, engineers required designers to standardize and modify technical requirements in order to minimize the need for extra tools. In that way the annual model change became a much more interactive process than it used to be, resulting in considerable cost savings.

Another aspect of Uddevalla's high flexibility was its capability of radically changing the variant mix in a short period of time. In January 1992, 60% of the cars assembled at the plant were station wagons, and 30% were destined for the United States. Two months later, in March, 70% of the volume were US cars and all of them were sedans!

1.6. A dealer's dream: Customized assembly, short delivery times

In Volvo, as in many other car companies, efforts to improve efficiency and productivity have focussed on the industrial system, the components supply, and above all, the assembly hours. Much less attention has been devoted to the efficiency in the commercial and distributional systems. The MIT book "The Machine That Changed The World" is a good example of this narrow production focus. The book abounds in assembly hour statistics from various plants,
but there is not one single statistic comparing lead times from customer order to delivery between different manufacturers.

At Uddevalla, there was early on an awareness of the importance of fostering close contacts with the market. Now and then customers were invited to the plant to see the cars being assembled. Sometimes they returned six months later, either to complain (or, to use the Japanese term, "suggest improvements"), or to offer the assembly team a big cake. Volvo's system for plant evaluation, however, concentrated narrowly on parameters such as assembly hours and quality indices. In the company's strongly departmentalized organization, production was strictly separated from product design and marketing. Uddevalla had to focus on improving its assembly performance, and nothing else. In 1991 though, when productivity had reached the Gothenburg standard, it was possible to widen the focus. A study of lead times, based on a large sample of cars, was conducted and revealed that if a customer ordered a particular car, the average time from order to delivery in Sweden was two months, with a range from one to four months! Many factors served to increase the delivery times: the rigid planning system, the functional specialization with high barriers between production and marketing divisions, and the complex product structure with its high option content. At this time, only 20% of Uddevalla's volume was custom-ordered. The overwhelming majority of the cars was assembled according to the company's central scheduling system. For these "plan cars" total cycle time was even worse on average they spent twelve weeks after production waiting to be sold and delivered. The depressed auto market, where dealers had to work hard to get the cars moving, contributed to the excessive lead times. This situation made it all the more important for Volvo to overhaul its ordering and delivery system.

Uddevalla took the lead and established direct communication with all Swedish dealers. The plant also pioneered direct deliveries from the factory to selected dealers. Previously, all cars had taken a long route through the Marketing Division's pre-delivery inspection and central warehouse in Gothenburg. Soon Volvo's car plants in Gothenburg and Ghent also started to reorganize their relations to dealers and to compress delivery times. But Uddevalla was quicker off the mark. Beginning on October 1, 1992, started to assemble all cars for the Swedish market on customer orders only. One month later this principle was extended to the whole European market. Uddevalla planners told dealers in Europe that the plant would not promise any specific delivery times for cars that had been scheduled by the central planning system, on the basis of market forecasts. By contrast they would guarantee delivery within four weeks of any custom-ordered car. Basically, Volvo Uddevalla now did the same as Toyota initiated ten years earlier, when its sales subsidiary was merged with the manufacturing arm, and direct links between salespeople and factory scheduling was established. (Stalk&Hout 1990: 67-69.)

In Volvo it was the Uddevalla plant, so ridiculed by the MIT researchers, that pioneered this very lean principle! Uddevalla planners had to do an enormous amount of manual rescheduling to adapt materials supply and production planning to the customer orders, but did so happily since the response from European importers was overwhelming, as is demonstrated by the following quotes:

- "Honestly I don't trust my eyes....extremely fine...no stockcars??? Please tell me more about your planning principles." (Italy).
- "...the excellent seNice they offer on customer sold cars...this is a real opportunity to make D'90 work." (Brussels)
- "This fabulous... Now. at last we can have a go." (Spain)
The customer orientation at Uddevalla built on the strength of its flexible production system. To remain productive, the many parallel teams and materials handlers did not need any specific sequencing of cars with different option contents (for example, every second car a turbo, every third an automatic transmission, every fourth a 16-valve engine, etc.). Rather, the introduction of customer order-planning provided an additional motivational advantage for the teams. Now the teams knew that the cars were not to be stored in a warehouse somewhere, but delivered directly to individual customers. The plant took a pride in taking on difficult requests. Once, for example, the plant received an enquiry from a journalist living in Britain. He was going to Stockholm in one week and wanted a car with highly unusual equipment to be delivered at the time of his arrival. The marketing department in Gothenburg considered the request impossible, but Uddevalla and the local dealer managed to get the car ready in less than one week. By contrast to Gothenburg, such requests were not seen as "disturbances" but as inspiring challenges by white collar staff as well as assembly workers.

In 1991, when the program to compress lead times started, 20% of the assembled cars were custom-ordered and the rest were plan cars. In November 1992, on the eve of the shutdown decision, 70% of the cars were specified by individual customers. The corresponding figure at Volvo Gothenburg was 35%. In one year Uddevalla had reduced the total lead time by half, from 60 to 30 days. The plan was to cut it by half again, to 14 days, in the next few years. The move to custom-order assembly was Uddevalla's single most important economic contribution. By ceasing to build "plan cars" scheduled by the central planning system, the plant reduced the time from factory to customer by ten weeks (from twelve to two weeks) and further improvements were in the pipeline. With an estimated capital cost of 100 SEK per car and day this saving matched the total cost of final assembly (35 hours times 200 SEK an hour)! Moreover, in the depressed market of the early 1990s, Volvo dealers normally had to grant customers a discount of 3000-4000 SEK on every "plan car". By contrast, custom-ordered cars could be sold at the full price. All in all, the change to customer ordered assembly with short delivery times, represented cost savings of a magnitude unparalleled by any program directed at reducing assembly hours, the favourite object of media interest and managerial effort. The beauty of Uddevalla's production system was its capability to offer customer order assembly and short delivery times without compromising productivity and quality. To quote one of its managers: "This plant was poised to become the most efficient plant for customer order assembly in the world!" Not surprisingly, the dealers have regretted the closing in very strong terms.

Uddevalla's aggressive move to custom-order assembly challenged the Gothenburg plant to rethink its traditional ways of relating to the market. Since October 1992, significant progress has been made in Gothenburg, increasing the share of customer ordered cars of the plant's output. In a truly customized system, however, work load will be very uneven. A stream of highly specified and labour intensive cars might be succeeded in unpredictable ways by cars which have a low option content. Such variations is difficult to accept at a conventional plant, "lean" or not. In order to maintain a steady work flow on the long assembly lines, it is vital to sequence and even out production. Thus it is very difficult for the Gothenburg plant to accomplish a complete custom-order assembly in the way Uddevalla did, without seriously impairing productivity and jeopardizing its targets for reduction of assembly hours.
2. FURTHER CUSTOMIZATION: BUILDING COMPLETELY CUSTOMER-EQUIPPED CARS

Uddevalla had the potential for a very profitable further customization, since nearly all Volvo cars are sold with a lot of "extras", for example radios, telephones, tow hooks, etc.. The installation of such additional equipment at the point of production would disturb the sensitive flow of normal car plants, so instead dealers take care of these requests. That helps them keep workshops busy and provides an additional revenue stream. To customers, though, this division of labor between plants and dealers means high costs and extra delays. Uddevalla's flexible assembly would have no problem producing fully equipped cars, including all features traditionally handled by dealers. Such an integration would result in substantial advantages: lower installation cost, reduced handling and warehousing, higher and more consistent quality, shorter lead times. For example, it is much more efficient to mount a tow hook, including necessary wire connections, when the car is being assembled, than to do it afterwards when several components first must be dismantled. This dismantling entails the risk of damaging other components, and quality procedures in dealer shops are seldom of the same calibre as the factory standards. According to a preliminary study, Uddevalla could install the tow hook in a third of the time taken by the dealer shops. Beginning in mid 1993, Uddevalla's market and delivery planners had advanced plans to integrate almost all of this traditional "dealer installations" in the factory process, and as a result be able to produce cars that could be delivered directly to customers. At the line plant in Gothenburg, there were no such plans - for good reasons. Its assembly lines could not cope with additional variation.

In the Swedish debate, Uddevalla's performance has been established beyond doubt. Most of the factors listed above have been recognized by top management (albeit too late). That only means that the initial question remains, now even more puzzling. Why did Volvo decide to shut such a productive operation?

3. A DISASTROUS MARKET

Volvo's official answer refers to depressed markets, heavy losses and low capacity utilization. Indeed, the automaker is in deep trouble on its main markets. In only three years, from 1989 to 1992, Volvo's total sales of "large cars" (the 200, 700/900 and the new 800 series) dropped by 30%, from 280 000 to 200 000. The Swedish market, Volvo's second most important, virtually collapsed. Registrations plummeted from 344 000 in 1988 to 155 000 in 1992, the worst figure in more than 30 years. 1993 will be even worse. In the end of the 1980s, when sales had already started to fall, Volvo expanded production capacity in Belgium and commissioned the new plant in Uddevalla. Theoretically the two plants in Ghent and Gothenburg alone have the capacity of producing 300 000 cars, which is 50 percent in excess of current sales. For two years, the result has been in the red. In 1992, the Group's operating loss was estimated to be 2,6 billion SEK (approx. 400 million USD); of this Volvo Car accounted for half. Management became preoccupied with immediate measures to reduce capacity and cut costs. In this situation of disastrous capacity utilization, Uddevalla's character of being a small and incomplete plant (only final assembly, no body or paint shops) was a fatal disadvantage. According to the official calculation, presented in 1992, Volvo Car will save 350 MSEK (50 MUSD) annually by consolidating its Swedish operations in Gothenburg. This figure has been seriously disputed, however, and for good reasons. I will look at the data in
more detail before proceeding to what I think is a much more real issue - corporate politics and power. First, 100 MSEK of the total 350 is a fictitious capital saving, resulting from accounting transactions. Instead of annual depreciations, the investment at Uddevalla is written off at one stroke as part of restructuring costs for fiscal '92. This is of course no real saving, but it is politically important for the new CEO, Soren Gyll, who was appointed in 1992. In this way he will be able to demonstrate improvements and claim that he has started to turn the company around.

Second, Volvo argues that the company will save 250 MSEK in operating costs by closing down the two small plants. Many of the entries on this list are debatable or, at worst, spurious. For example, white collar workers are treated as an entirely fixed cost. By consolidating production in Gothenburg, all staff positions at Uddevalla are eliminated. In theory, costs are reduced by 30-35 MSEK. This estimation assumes that there will be no increase in salary positions in Gothenburg as a result of the added volume. Unfortunately, this presumption is impossible to check ex post. There may be excess overheads in Gothenburg before the transferral, or new staff positions that are in fact volume-induced may be created under new names or motivated by model changes.

Even more debatable is the way the Gothenburg economists treat the anticipated costs in plant and equipment when the 900 series will be replaced by a new platform in 1997-98. This future investment in dedicated equipment is "counted backwards", put on top of Uddevalla's operating costs in 1992 and, hey presto, another 15MSEK is saved by closing the plant now. The obvious counter-argument is of course that the plant could be operated another five years, and closed down in 1997 instead, without incurring any of these costs.

Closing the production warehouse in Uddevalla accounts for another projected cost saving of approx. 10 MSEK yearly. The assumption is that the production warehouse in Gothenburg will remain the same, but this is by no means proven. Further, this theoretical reduction is not compared with the very real reduction in finished product stock Uddevalla could achieve by introducing customer order assembly (that saving was worth four times more than the plant's entire production warehouse). That omission is symptomatic of the whole exercise only the costs and none of revenues of operating Uddevalla are listed. The Uddevalla participants in the company's study team presented a very different calculation. According to this Volvo would save only 50MSEK (7 MUSD) per annum by closing the plant.

Irrespective of the exact evaluation of individual items in these exercises it is clear that the operational savings of shutting the plant are insignificant. The puzzle deepens - why did Volvo take this decision?

4. THE POLITICS OF THE CLOSURE - AN UNHOLY LABOR-MANAGEMENT ALLIANCE

It is impossible to understand Volvo's decision without referring to corporate politics. Of course, arguments of this character are difficult to substantiate, since it is always embarrassing for top management to admit that strategic decisions are based on other considerations than objective analysis of economic facts. Pleasant or not, there is very strong evidence that Uddevalla's future was decided already at a board meeting in early fall, long before the thorough analysis and evaluation of the plant's performance had started. At this meeting the Volvo executive was under heavy pressure from the company's major shareholder, the French state-owned Renault corporation. The Renault managers demanded that Volvo implement
radical measures to stem the red ink and eliminate excess capacity. The Renault CEO, Louis Schweitzer, publicly criticized Volvo's production structure in general, its small-scale plants in particular. Renault executives never bothered to study Uddevalla's performance. Compared with Volvo's option range, Renault's best selling Clio is a much more standardized car concept, relying on tightly scheduled mass-production plants. Renault managers could see no particular advantage in Uddevalla's flexible capability of building highly individualized cars.

Volvo's president P G Gyllenhammar was conspicuously absent at the press conference in November announcing the decision, and there were many indications that he opposed it. Historically he has played a very important role as an advocate of "humanistic manufacturing". His overall impact on Volvo has been highly ambiguous, however. While promoting work reforms and decentralization of authority to the shop floor his own management style became increasingly elitist and autocratic, thereby alienating the most able senior executives. As a result, Volvo's top management team is weak in terms of industry experience and product expertise; there is a conspicuous absence of "car guys" in the leading echelons. Gyllenhammar's penchant for grand deals, acquisitions, mergers and far-flung diversification (to energy, drugs and food businesses) has diverted managerial attention away from the core business and created illusions that Volvo could survive without continuously up-grading process and product. He has pursued a portfolio strategy similar to the strategies of merger and acquisition that gained such importance in the US during the 1960s and 1970s and contributed to the subsequent loss of competitive advantage in American capital-intensive industries. (See Chandler 1990: 627.) Despite his lack of detailed knowledge of the auto business, Gyllenhammar has nevertheless repeatedly interfered with the sensitive product development, adding extra delay to an already inefficient process. In 1992, his position had been seriously undermined because of a recent strategic failure, the aborted merger with a Swedish state-owned food company Procordia. This gave the new CEO, Soren Gyll, a strong position. For more than two decades P G Gyllenhammar had been Mr. Volvo. He was closely associated with the development of Kalmar and Uddevalla. Gyll now wanted to definitely seize the reins (his predecessor, Christer Zetterberg, had failed to do exactly that, and quickly lost his position). To Gyll, Volvo's production structure was a matter of simple logic not warranting any close examination; one big consolidated plant must be better than one big plus two small. When Gyll visited Uddevalla, shortly before the closing was announced, he was genuinely impressed by the plant's productivity improvement, as well as its responsiveness to customer demands and dealer requests. But his only conclusion was: "Thank you, you have done a damn good job. Now Gothenburg will have to do the same." That comment summarizes Uddevalla's predicament. First the plant had to prove its performance and match Gothenburg beyond any doubt. Then, when Uddevalla took the lead and developed a number of innovative features, management took for granted, without demanding any proofs, that Gothenburg could do the same. For Gyll, learning about Uddevalla's accomplishments only made the pain worse, since the plant's future had already been decided.

A third fateful player in this process was the Gothenburg plant. This works had taken a series of heavy cuts and neither management nor unions accepted taking any more. They both demanded the sacrifice of Uddevalla to save volume and jobs at the main plant. Only a few years earlier the Swedish Metalworkers' Union had been heavily involved in the development of the Uddevalla concept. The plant was seen as a model of labor-management cooperation and a proof that the Metalworkers' demand need for a fundamental renewal of manufacturing was no wishful thinking. At two consecutive congresses this was the main policy line, spelt out in several documents advocating a "Solidaristic work policy" (see "Rewarding Work", Stockholm 1987). At the time of the first contest, this union commitment came to naught. The Gothenburg
union representatives on Volvo's board urged management to close Uddevalla, and the national union found no way to surmount these entrenched local interests.

5. THE REAL PROBLEM: A NEW PLANT - OLD CARS

The situation would have been very different, and Renault's influence much less important if Volvo's economic performance had not been so poor. The Swedish automaker has two standard explanations of its financial problems, the general economic recession and the simultaneous slump on its three major markets. This is more of an excuse than an explanation, however. On the shrinking US market, Volvo has not only lost volume but also market share. The company's fundamental problem is not excess capacity that has necessitated plant closures. The basic weakness of Volvo is its painfully slow process of product development and the gaps in its current model lineup. This problem is not unknown to the management. As early as 1984, Volvo took a very close look at Honda, Japan's premier product innovator, but failed to implement anything of Honda's entrepreneurial organization. Nor have the headquarters in Gothenburg been able to learn any lessons from revitalized European competitors, such as BMW. Volvo certainly has a strong technical competence, but it is an archetypical example of what Stalk and Hout labels "a slow innovator". Although such companies "plan significant product improvements for each introduction cycle, they plan less-frequent introductions than do fast innovators." (Competing Against Time, 1990: 120).

The 850 model (introduced in Europe in 1991, in the US one year later) is a high-performance family car that offers a number of new safety features. The problem is that Volvo needed more than ten years for the development process. After the introduction of the sedan, Volvo had to spend another two years to get the station wagon ready for the market. The new car was originally planned to replace the old but still popular 200 series (a derivative of a model introduced in the 1960s), that will reach the end of the line in mid-1993. The image and the price of the 800 cars are very different from the robust, "no frills", 200 series, however. In Sweden, the 245 station wagon has a sticker price of 156 000 SEK, whereas the 850 wagon is priced above 210 000 (almost 30 000 USD). The new car has attracted new customers but is no substitute for the old series. When production of the 200 model (a fourth of its total sales) is discontinued, Volvo will probably lose an important part of its traditional customer base.

Another problem is that the new 800 series is only slightly smaller and in most versions more expensive than the 900 model, the supposed up-market cars. Hence there is a danger that 850 cars will cannibalize the older product. When GM was hurt by model cannibalism in the 1970s, that company marketed a multitude of models. Volvo offers only two different platforms (plus the Dutch 400 cars) and yet, has not been able to position them in a consistent way. Volvo's top-of-the-line car, the 960 model, is also a reason for concern. It is basically a highly specified, six-cylinder-powered version of the 900 platform. Its exterior is hard to differentiate from the basic 940, but the sticker is not, 300,000 SEK in Sweden (more than 40,000 USD). Now, customers paying this price want something special and conspicuous also exterior-wise. Unable to offer that, the 960 model has fared badly in the face of Japanese, American and German competition in the luxury market. This is a reason for distress at the Kalmar plant, which used to be dedicated to this car. Another weakness of the 900 series is the engine program. A customer cannot get a six-cylinder engine without paying a price premium of more than 100,000 SEK (that is, to buy a 960 car). In this respect, too, Volvo compares unfavourably with its competitors. Most serious of all is that the successor to this platform is not scheduled for production until 1997/98. There will be at least one major face-lift before that date, but the fact remains that the basic model will become 17 years old before production...
ceases. With that sluggish pace in its product development, it is hardly surprising that Volvo is plagued by overcapacity.

When GM launched its Saturn operation, this venture combined a greenfield production site, an innovative manufacturing system, and most important, a brand new product line. By contrast, Uddevalla had to start with an eight-year-old product with no relief in sight for another eight years! (The 800 cars are built in Belgium.) This mismatch sealed the fate of the plant. The shutdown will certainly not improve the future of Volvo. The dramatic depreciation of the Swedish currency in 1992 (more than 20% down in relation to the dollar) will ease Volvo's financial problems for some time. From the long-term perspective, that is no blessing since it might conceal the company's fundamental problems. What Volvo really needs is not a cheaper currency, but revamped product planning, an acceleration of its product development cycle, and a determination to attack emerging niches of the increasingly fragmented car market. To achieve this, the company need its small, innovative, and flexible plants more than ever. The decision to close them is, to quote the French 19th century statesman Talleyrand, worse than a crime, it is a stupidity.

For all those interested in the development of competitive humanistic manufacturing, the shutdown of Uddevalla is a sad and disheartening event, but the evaluation of the plant's performance is a kind of consolation. This "experiment" was not only a bold step in creating humane work, but a success in a wide range of performance measures. Rapidly improving productivity and quality was combined with superior flexibility, low cost tooling, unparalleled customer orientation and a unique responsiveness to market demands. Volvo has abdicated from its pioneering position, but the invaluable experience is there for anyone interested in making use of it.
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