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Source: *Economic Geography*, Vol. 71, No. 4 (Oct., 1995), pp. 383-401

Published by: [Clark University](#)

Stable URL: <http://www.jstor.org/stable/144424>

Accessed: 31-10-2015 15:27 UTC

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Fordism at Ford: Spatial Decentralization and Labor Segmentation at the Ford Motor Company, 1920–1950*

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Abstract: The identification of a system of flexible production, with its own spatial logic, in contrast to an older system of Fordist mass production has generated much interest among economic geographers and political economists. This distinction rests on a widely accepted and rarely questioned understanding of the constituents of Fordist mass production. The leading examples of Fordist production are the Ford Motor Company's Highland Park and River Rouge plants. Contrary to this standard narrative, I suggest that the spatial logic of production at Ford included both industrial concentration and spatial decentralization of some tasks formerly centralized at both Highland Park and the Rouge. Beginning in the early 1920s, tasks were moved out of Highland Park and the Rouge and into separate Ford-owned plants known as the village industry plants. I examine neoclassical location theory through the transaction cost theory of industrial location advanced by Scott and suggest that this approach does not adequately account for Ford's location decisions. Instead, I advance a neo-Marxian theory of industrial location based on labor market power and labor market segmentation in order to explain the life cycle of the village industry plants. By offering an account of production at the village industry plants, I argue that mass production itself contains contradictory logics of centralization and decentralization, deskilling and skilling, craft, technical and bureaucratic control within specific geographic locales which allowed for particular employment strategies that both derived from and reinforced existing divisions between urban and rural residents.

Key words: flexible production, Fordism, labor process, labor relations, location theory, Marxism, transaction costs, unionization, vertical integration.

Beginning in the early 1980s, with the publication of Piore and Sabel's *The Second Industrial Divide* (1984), political economists and economic geographers began to identify a marked shift in the nature of capitalism itself. According to this perspective,¹ the social, spatial, technological, and political conditions of capitalist accumulation have metamorphosed from a system based on mass production to one organized around the principle of

"flexible specialization." As a result, labor markets have been reconfigured and labor redeployed.

Flexibility refers variously to changes in (1) the design and function of machine technology, (2) production characterized by increased attention to matching product design to the demands of particular market niches, (3) the number and variability of skills attached to individual jobs, and (4) the degree to which markets replace the firm in the allocation of resources to production (Schoenberger 1987, 1988; Gertler 1988, 1989, 1992; Harvey 1989; Hirst and Zeitlin 1991). Taken together, these features appear to define a system of capitalist production in marked contrast to the old system of Fordist mass production. While there

* I wish to thank Richard Peet along with the anonymous referees for their comments and suggestions.

¹ For interpretive reviews of the theory of flexible specialization, or post-Fordism, see Albertson (1988), Hirst and Zeitlin (1991), and Jessop (1990).

may be differences in flexible accumulation versus mass production strategies of accumulation, this distinction tends to ignore their similarities and, in so doing, fails to provide a detailed account of the historical transition from Fordist to flexible production (Graham 1991; Gertler 1992; Peck 1992; Sayer and Walker 1992; Pietrykowski 1994).

For example, the process of labor market reconfiguration is not, in itself, new under capitalism. Gordon, Edwards, and Reich (1982) maintain that the dialectic of capital-labor relations is such that, over time, institutional arrangements which are conducive to profitability are themselves undermined by class conflicts engendered by the very same institutional arrangements which first gave rise to successful capital accumulation. Capitalists then search for alternative institutional arrangements when the conditions for sustained profitability are threatened. Thus labor can be deskilled or reskilled, spatially dispersed or reintegrated through processes of dynamic exploration and change. Indeed, capitalists may be able to help define and redefine the ideal typical workplace and worker.

This is not to deny the importance of flexible labor market arrangements. Flexibility creates opportunities for expanded capital accumulation while it also engenders worker resistance and creates new class cleavages and new opportunities for class/gender alliances (e.g., formerly secure male blue-collar and male white-collar workers) (Harvey 1989; Storper and Scott 1989; Zukin 1991). Given similar labor cost conditions, capitalists may prefer to employ workers who more easily and readily identify with the dominant consumer culture or way of life. Cultural conditions may then become a factor in labor (Benson 1986) and land (Zukin 1991) market practices. What I question is the assumption that there is a particular spatial logic associated with mass production that is inherently antithetical to that associated with more flexible production processes.

Fordist mass production is best exem-

plified by production that began in 1914 at Highland Park and in 1926 at the River Rouge auto manufacturing plants run by the Ford Motor Company.² These plants are primary exemplars of fully integrated, centralized mass production. I argue that the process of industrial concentration and centralization³ marked by production at Highland Park and the Rouge was accompanied by a simultaneous, though much smaller, process of spatial decentralization: the establishment of Ford's "village industries." By offering an account of production at the village industry plants, I suggest that mass production itself contained contradictory logics of centralization and decentralization, deskilling and skilling, craft, technical and bureaucratic control within specific geographic locales which allowed for particular employment strategies which both derived from and reinforced existing divisions between urban and rural residents. The village industries represented an attempt to combine elements of mass production with flexibility. A historical analysis of the spatial logic of production at the Ford Motor Company reveals that differences across localities in labor markets and labor relations affected the choice of plant location and the choice

² Piore and Sabel (1984, 47) refer to a mass production "paradigm": "By the 1920s, the sheer material success of mass production made it almost irresistible as a paradigm . . . But the real measure of its attraction was not its fascination for those to whom it promised wealth and power; rather, it was its appeal to those schooled to detest mass production: workers raised in the craft tradition. Few demonstrations of this appeal are so convincing as the story of a leader of the reformist French Socialists, a skilled metalworker and mutualist, who in the inter-war years visited Detroit, worked in automobile factories, and returned to France a convert to Fordist techniques."

³ The terms "centralization" and "decentralization" are used to denote spatial integration or disintegration of the means of production. I refer to spatial centralization and spatial decentralization to distinguish it from Marx's (1906, 684–86) notion of industrial centralization and decentralization.

of technique employed at different locations. Specifically, the relocation of jobs from the Detroit-area Highland Park and Rouge plants into the rural countryside of southeast Michigan can be better understood in terms of Ford's strategy of union avoidance than as a response to diseconomies of scale or changes in the structure of transaction costs facing Ford Motor. Once the location decision was made, however, differences in production techniques helped to maintain differences across plants in the structure of labor relations.

In the paper's first section, I identify those features of production at Ford most closely identified with the concept of Fordist mass production. I then suggest some possible explanations for Ford's decision to relocate jobs outside of the large Highland Park and Rouge plants. In the next section, I compare neoclassical and neo-Marxist theories of industrial location and industrial organization as they pertain to the village industry plants at Ford. I then present a historical analysis of auto parts production at the village industry plants from the 1920s through roughly 1950, followed by a description of the labor process at the village industry plants. In the final section I analyze the effect of successful unionization on labor relations at the village plants.

The Limits of Spatial Centralization and Mass Production at Ford Motor

Scott describes the constituent components of Fordist production as "a search for massive internal economies of scale based on assembly line methods, technical divisions of labour and standardization of outputs" (Scott 1988b, 173). Indeed, one of the salient features that distinguishes processes of flexible production from Fordist mass production is the tendency for flexible producers to "disintegrate into extended divisions of labour" and to engage in "dynamic vertical disintegration" (Scott 1988b, 175). By

contrast, the Fordist system is marked by vertical integration and spatial centralization.

The epitome of mass production was the Detroit-area Highland Park plant.⁴ There, unlike the older vertical production structures marked by skilled workers assembling cars in teams by hand, a modern horizontal plant layout allowed workers to remain stationary while the parts and components moved around them. Borrowed from the meat-packing industry (Hounshell 1984), the assembly line facilitated both the division of labor and increased flow of product (Chandler 1977, 1990).⁵ In addition, Ford, beginning in 1921 with construction of the Rouge, aggressively pursued a strategy of backward integration. According to Chandler (1990, 208), "Ford was the world's most integrated automobile company. To be sure of constant, tightly scheduled flows of materials through his huge plants . . . and thus to enhance the economies of scale, Ford made massive investment in the production of steel and glass, parts and accessories. Therefore, as output declined, unit cost rose much more rapidly than did those of his competitors. Ford's integration was primarily within the plant."

Not surprisingly, these signal features of mass production took their toll on workers. Enormous turnover rates in the

⁴ The received wisdom about the Detroit region holds that Detroit became the center of the auto-making world largely because of its fortuitous location near the iron mines and forests of the Upper Peninsula, the waterways of the Great Lakes, a skilled labor force (Hounshell 1984; Babson 1985), and entrepreneurial business elites (Davis 1988; Rubenstein 1992). In particular, the development of the Ford Motor Company is often described in terms of the choices made or not made by Henry Ford.

⁵ The combination of mass production, semiskilled labor, and the resulting unit cost reductions allowed Ford to make huge gains in market share during the 1910s and 1920s (Chandler 1964).

Highland Park plant are well documented. In 1913 the average rate of turnover at Ford was 370 percent (Meyer 1981; Peterson 1987). In 1914 Ford resorted to paying workers five dollars a day to stem the tide of worker quits.

The five-dollar day allowed for the creation of what Aglietta (1987) has called a consumption norm for the working class. In contemporary theory, Fordism is taken to mean an ensemble of social relations of both production and consumption. High, stable wages afforded workers the opportunity to develop stable patterns of consumption.⁶ "For the first time in history, Fordism created a norm of working-class consumption in which individual ownership of commodities governed the concrete practices of consumption" (Aglietta 1987, 158). Early mass production of automobiles therefore required spatial centralization, workers who were less skilled, technical control, and a wage policy linked to consumption, productivity, and low labor turnover. Yet the paradigmatic view of mass production as technically integrated and spatially centralized is incompatible with the historical development of Ford's village industries. The village industries afforded workers high wages, but they severed the necessary link to centralization and technical control.

The development of a network of village industries throughout rural south-east Michigan began in 1918. Ford converted an old flour mill (Nankin Mills) into a hydroelectric plant and small factory capable of producing screws and carburetor parts. Production started up in 1921, with work transferred from the Highland Park plant. As Thomas P. Hughes explains:

At another converted mill in Plymouth, water turbines generated twenty-five horsepower, and twenty-five skilled mechanics

worked at taps and machine dies. At Phoenix [Michigan], 150 women made Ford generator cutouts in a village factory. Not far away, at Northville, 350 men made valves for the Model T motor, and at Waterford, another village, a new Ford dam provided 280 horsepower for a small Ford factory making gauges. Ford was dispersing some of the five hundred departments at the Highland Park plant to these village waterpower sites. (Hughes 1989, 308)

Both the Highland Park and Rouge plants were in production during the establishment and operation of most of the village industry plants.

The most common explanation for Ford's experiment was that it was a hobby of Henry Ford (Nevins and Hill 1962). Yet there are several other potential explanations for Ford's decision to decentralize production. First, in keeping with the consumption logic of Fordism, the village industry plants may have stemmed from Ford's desire to stabilize the purchasing power of farmers in rural communities by providing a source of employment during slack agricultural periods. Farmers were a major early source of demand for Ford cars and trucks and, of course, Fordson tractors (Wik 1972). One quintessential feature of the more general Fordist regime described by Aglietta (1987) is the necessary linkage between mass production and mass consumption. If the five-dollar day was a, albeit evanescent,⁷ prerequisite for sustained consumption patterns among the urban industrial working class, then the village industries could be seen as a necessary means to supplement the volatile income flows of farmers and rural merchants. However, this reason alone does not explain why the village industry plants involved the selective spatial decentralization of only a few production tasks. Second, the move to spatially decentralize particular clusters of jobs was the result of internal disecon-

⁶ Note also that Ford's wage premium elicited higher productivity from Ford workers. In this sense the five-dollar day acted as an "efficiency wage" (Raff and Summers 1987).

⁷ Meyer (1981, 197) notes that the recession of 1920–21 forced Ford to end his "profit-sharing" scheme. Instead, Ford introduced the six-dollar day and a year-end bonus based on length of service and skill.

omies of scale at Highland Park and the Rouge plants. Vertical disintegration would be expected if the company wished to economize on coordination costs (Williamson 1975; Scott 1988a). The third explanation is that Ford may have been experimenting with a means to forestall or avoid unionization (Hurley 1959; Gordon, Reich, and Edwards 1982; Markusen 1985; Gartman 1986; Hughes 1989). Ford's decision to decentralize some production units was most likely determined by a combination of these three reasons.⁸ Yet to say that the decision was irreducible to a single determinant does not preclude a closer investigation into the sources and the actual conditions surrounding that decision. The last two explanations draw on neoclassical transaction cost and neo-Marxian theories of industrial location. I shall focus on both of these explanations to analyze the process of industrial location of auto parts production at Ford Motor.

Industrial Organization and Industrial Location Theory: Neoclassical and Neo-Marxist Views

Standard neoclassical location theory maintains that firms will operate at the point where input costs are minimized.⁹ From this simple prespatial starting point, transportation is then added as a factor input into the production process. In this way, the neoclassical model allows for the spatial separation between production sites and market sites. The profit-maximizing firm will then take into account the cost of transporting raw

materials and finished products in its search for the least-cost site of production. A spatial analogy to economies of scale production is then introduced via the notion of agglomeration economies (Chapman and Walker 1987; Leitner and Sheppard 1989; Rubenstein 1992). Agglomeration theory maintains that firms producing for the same product market will tend to cluster in a particular market area to take advantage of specialized production inputs such as skilled labor or raw materials. The agglomerative process allows for reduced input costs as suppliers relocate closer to the site of production. This is similar to the more general case of firms experiencing declining costs due to economies of scale. Vertical integration comes about as the unpredictability of outside suppliers places a constraint on future profitability. The uncertainty or potential volatility of supplies raises market transaction costs above the cost of internal production. In such a case the firm would choose to produce the supplies in-house.

Scott's (1988a, 1988b) more recent reconceptualization of neoclassical location theory incorporates insights gleaned from the "transaction cost" theory of firm behavior. In transaction cost theory, participation in the market itself is a costly activity. The primary costs involve the determination of relevant prices together with the costs of writing and negotiating contracts. Indeed, according to Coase (1937) and later Williamson (1975), firms seek to minimize transaction costs by replacing market transactions with internal firm governance structures (Williamson's "hierarchy"). Hence, optimal firm size is determined, in part, through a comparison of the cost of using the market versus the cost of providing the good or service internally. Williamson (1975, 1985) has used this approach to explain processes of vertical and horizontal integration.

Scott (1988a) applies transaction cost analysis to firm location decisions and maintains that firms in which the ratio of internal versus external transaction costs

⁸ Indeed, the Fordist explanation, tying plant location to a desire to stabilize consumption patterns across localities, may well be an additional, and possibly unintended, outcome of location decisions based primarily on either transaction costs or class conflict.

⁹ For an excellent review of the basic development of classical location theory, combined with illustrative historical case studies, see Watkins (1980).

is high are characterized as having either (1) unstable product demand, (2) flexible production schedules, or (3) differential access to segmented labor markets (Scott 1988a, 37). In each of these cases the goal of the firm would be to adopt a strategy of vertical *disintegration*. In the “markets versus hierarchies” approach of Williamson (1975), the firm can choose either to produce in-house or to contract with an external supplier. Scott, in addition, refers to the possibility that a vertically integrated firm may choose to engage in spatially separated (or spatially decentralized) production if diseconomies of scope associated with jointly producing inputs and output at the same location exceeds the higher transportation, communication, and coordination costs associated with spatially decentralized input production. Furthermore, if the costs of contracting out the production of the input fall below the costs of producing it under conditions of vertical integration and spatial decentralization, then the transaction cost differential will favor the vertical disintegration of production. Since economies and diseconomies of scope referred to by Scott have their origin in differential transaction cost structures facing the firm, both plant location and the internal organization of production are dominated by transaction cost considerations (Scott 1988a, 34–41). It is a mistake to identify in-house production exclusively with spatially centralized production.¹⁰ Nevertheless, Scott constantly conflates vertical integration and spatial centralization

when discussing actual forms of urbanization and industrial development: “Vertical disintegration and externalization of transactions are the dual faces of a single phenomenon definable as a switch in the overall technology of production away from hierarchies as a means of organizing labor processes and toward markets” (Scott 1988a, 53). Furthermore, given the need to coordinate parts supplies with assembly schedules at the Highland Park, Rouge, and, later, branch assembly plants (Rubenstein 1992), it is not clear how the transfer of production from vertically integrated plants to company-owned plants outside of Dearborn/Detroit would economize on transportation or coordination costs.

In contrast, a neo-Marxian theory of location would seek to highlight the choice of location in a manner similar to the logic determining capitalists’ choice of technique (Marglin 1974; Edwards 1979; Gordon, Edwards, and Reich 1982; Storper and Walker 1983; Lazonick 1991; Peck 1992). While the cost structure is taken as a given within the neoclassical model, from a neo-Marxian perspective costs are themselves the outcome of a pattern of conflict around class, gender, and racial cleavages. These conflicts are socially constructed, in the sense that they are at once conflicts over material resources and contests about the interpretation of meanings and symbols in everyday life (Milberg and Pietrykowski 1994).

Transaction cost analysis offers an explanation for the internal structure of the firm. Scott appropriates this analysis in an attempt to explain industrial location patterns. Bowles and Gintis (1990) provide a neo-Marxian alternative to transaction cost theory, suggesting that market exchange is costly because market contracts are of necessity incomplete and subject to contestation. As such, the use of *both* external and internal labor markets for the recruitment or maintenance of an adequate supply of labor is costly. Where Williamson refers to costs in terms of worker or employer malfeasance, Bowles and Gintis speak in terms of the ability of capital to

¹⁰ Four sets of spatial-industrial patterns of production are identifiable: (1) vertically integrated, spatially centralized (e.g., traditional description of mass production at Ford’s Highland Park plant); (2) vertically disintegrated, spatially decentralized (e.g., external subcontracting); (3) vertically integrated, spatially decentralized (e.g., village industries of Ford); (4) vertically disintegrated, spatially centralized (e.g., external subcontracting performed on-site). For examples of the fourth pattern see Friedman (1977), Taylor and Thrift (1982), and Holmes (1986).

extract surplus labor from labor power. These are by no means identical arguments. One of the most important differences rests on the assumption by transaction cost theorists that malfeasance, or the propensity to engage in opportunistic behavior, is randomly distributed among workers and bosses, whereas Bowles and Gintis hold that such action is structured by the relative power of the "short side" of the market. From a macroeconomic perspective, a regime with high unemployment—with employers occupying the short side of the labor market—would be better able to sustain profits because the cost of losing one's job would induce workers to shirk less and to work harder.

Yet a contradiction arises between, on the one hand, the high cost of job loss and, on the other, the ability of workers to buy all of the output generated by a high-productivity regime. Indeed, the link between high wages and high productivity is taken to be the basis of the Fordist system of mass production at Ford in the 1920s. This contradiction has local, site-specific manifestations.

At the level of the firm, an analysis of regional variations in unemployment and the existence of qualitative differences in labor supply would be useful in explaining location decisions (Massey 1984; Peet 1984; Storper and Walker 1984; Storper and Walker 1989; Wekerle and Rutherford 1989). Specifically, firm location decisions could be seen as strategies to maintain short-side power in the labor market. For instance, the spatial decentralization of production facilities at Ford could be seen as one strategy to segment the labor market and to maintain short-side power.

Ford's Spatial Decentralization in Southeast Michigan: The Village Industries

Ford's village industry plants were small in size and located on rivers, whose flow was employed to generate the hydroelectric power used to run the

plants (see Fig. 1). These plants developed in two waves. The first generation of plants opened in the early 1920s and produced parts previously produced at the Highland Park plant. Work was transferred out of Highland Park and into these small-scale plants. The second wave of plants was opened by Ford in the 1930s with work transferred from the Rouge plant (Table 1). In addition, a few of the second-wave plants were only tangentially related to auto production. Ford's interest in soybeans accounted for some of the production in these later village industries.¹¹ Nevertheless, most of the village industry plants, especially the first wave, (1) represented component parts jobs transferred from the Highland Park plant, (2) utilized skilled as well as semiskilled and unskilled labor in apparently high-quality batch production, and (3) remained viable for at least 20 years, employing in total some 4,000 workers at the height of production. While the overall level of employment never exceeded even 10 percent of the number of workers employed at the giant Rouge plant, the parts produced at the village plants were essential inputs into auto assembly at Highland Park and the Rouge. I focus below on five of the first-wave plants, in order of year of production start-up.

The *Northville* plant opened in 1920 to produce valves, work transferred from the Highland Park plant. The Northville plant employed skilled and unskilled workers, and by 1935 it was employing 310 men on three shifts. This plant remained in production until 1981 (Davis 1983).

Nankin Mills began production in 1921 and employed 11 men in 1925 in the production of springs, screws, rivets, and carburetor parts. In 1937 Ford moved the script die and stenciling department to

¹¹ This fact may well account for the general assessment by historians that the village industry plants were a Ford hobby—and a curiosity at best (Nevins and Hill 1957, 1962; Lewis 1976).

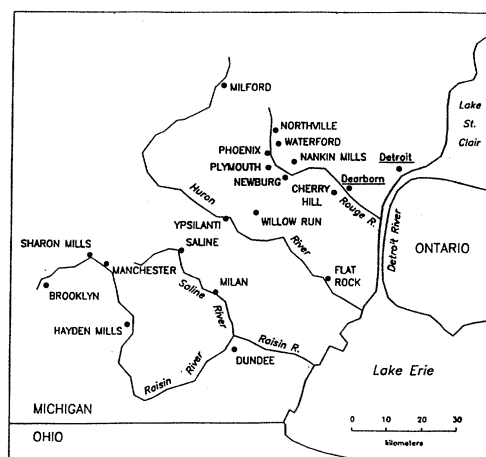


Figure 1. Location of village industry plants.
Source: Rubenstein (1992, 103).

Nankin Mills from the Rouge. Employment rose to 50 men. Interestingly, while Ford transferred some skilled Rouge labor, the existing Nankin Mills workers were “given the chance to learn die-making” (Davis 1983, 26). In 1947, production was permanently moved to the Waterford plant.

The *Phoenix* plant, started in 1922, produced half of Ford’s supply of generator cut-outs, voltage regulators, and stop-light switches. It employed an almost entirely female work force and by 1935 employed 92 women. Phoenix remained in production into the late 1940s.

Plymouth opened in 1923 for the manufacture of taps for threads, with work transferred from Highland Park. This plant could be characterized as a small machine shop employing skilled workers engaged in small-batch production. In 1947 Ford moved production to Waterford.

Begun in 1925, the *Waterford* plant manufactured precision gauge blocks from work transferred from the Highland Park plant. Employment jumped from 65 men in 1935 to 210 workers by 1952. This plant employed highly skilled workers, and it was the only Ford plant that did not hire quality inspectors or supervisors (Tobin 1985, 38–39). In 1947, the Waterford plant

was expanded to include workers from Nankin Mills, Plymouth, and Newburg. In addition, skilled crafts workers employed in the production of Johanssen gauge blocks (“Jo blocks”)¹² were transferred from Dearborn to Waterford.

These plants were all used to provide parts for final assembly. Yet the production relations put into place at several village plants suggest that the process of Fordist mass production may not be fully understood solely in terms of transaction costs and scale economies.

Location and Labor Market Segmentation

The received history (Chandler 1977, 1990) holds that Ford Motor was the first giant corporation in the automobile industry precisely because Ford was able to successfully exploit, first, economies of scale at Highland Park, and then, backward vertical integration at the Rouge plant.

Hounshell (1984) suggests that the system of conveyors and gravity slides in place at Highland Park were the precursors to the mechanized assembly line. Both production innovations allowed management to reconfigure the shop floor in such a way as to marginalize craft workers (Montgomery 1987; Babson 1991). But craft work did not disappear. Rather, craft labor became separable from the job of vehicle assembly. Hence, though the labor process underwent deskilling, the entire production process was only partially deskilled. Skilled machinists and tool and die makers were still a necessary requirement of the automobile labor force, but now they could be spatially segregated from other shop floor laborers. In that the skilled trades were sources of union agitation in the 1910s and 1920s (Montgomery 1987), physical isolation could prove to be a means to thwart unionization among the nascent auto industry work force.

¹² Hounshell (1984, 286) singles out the “Jo block division” as an example of high-precision manufacturing at Ford.

Table 1
Ford's Village Industry Plants

Plant Name	Start of Production	Parts Manufactured
Northville	1920	Valves
Nankin Mills	1921	Script dies, stencils, I.D. badges, and engravings
Phoenix	1922	Generator cut-outs, voltage regulators, and stoplight switches
Plymouth	1923	Taps for threads
Flat Rock	1923	Headlights, taillights, reflectors
Waterford	1925	Precision gauges
Ypsilanti	1932	Generators and starters, starter switches, reconditioning
Newburg	1935	Drill bits
Hayden Mills	1935	Cleaned and stored soybeans
Dundee	1936	Copper welding tips
Saline	1938	Soybean extraction
Milan	1938	Ignition coils, soybean extraction, ammeters
Milford	1938	Carburetors
Sharon Mills	1938	Dome light switches, stoplight switches, and cigar lighters
Brooklyn	1939	Horns and starter switches
Manchester	1941	Ammeters, assembled gauges
Willow Run	1941	Ignition and door locks, keys
Cherry Hill	1944	Ignition and door locks, keys

Source: Davis (1983).

From the neo-Marxian perspective, union avoidance would be one reason to spur the movement toward spatial decentralization, thereby isolating the jobs performed by skilled trades workers.¹³ By "spatial decentralization" I am not referring to the establishment of branch assembly plants (Rubenstein 1992). Rather, I am using the term to describe the process of spatially disintegrated production, whereby production tasks formerly located at the main production establishment are reassigned to workers living and working at some distance from the primary production facility.

¹³ Gordon (1978) suggests that industrial decentralization in the late nineteenth century had to do with the growing fear of labor unrest in U.S. cities. A similar argument can be made that the period immediately preceding the establishment of the village industry plants saw a rise in labor militancy. "Between 1916 and 1922, when levels of strike participation soared far above those of any other period thus far in the country's history, workers' demands became too heady for the AFL or even the Socialist Party to contain and too menacing for business and the state to tolerate" (Montgomery 1987, 6).

What transaction cost analysis ignores is the possibility that vertical integration and spatial decentralization could occur together. This is precisely what began at Ford in the 1920s. It confronts transaction cost theory with several problems.

For example, if Ford was decentralizing and moving specific production tasks into rural southeastern Michigan, does this suggest that the Highland Park plant had reached the limits to scale and scope economies of internal production and hierarchy via in-plant coordination and supervision? If so, why would Ford then choose, in 1921, to operate an even larger plant on the Rouge River? Furthermore, what accounted for the partial process of decentralization? Why some tasks and not others? The issues raised through an analysis of Ford's village industry plants help us to assess the relative merits of neoclassical and neo-Marxian theories of location and industrial production.

Mass Production Reexamined

Of the six village industry plants that began production in the 1920s, four were clustered close together along the banks

of the Rouge River (Fig. 1). Aside from the early 1930s, employment levels at the village industries remained stable from the 1920s through the mid-1940s. This reflects the integral role in parts production that the village plants played in maintaining supplies to the Highland Park and Rouge plants.¹⁴ As for the technology employed at the village plants, a 1946 accounting of the cost of machinery and equipment and the level of employment reveals that the cost of capital per worker was highest at the Plymouth plant and lowest at the Phoenix plant (Fig. 2). Of the five plants, the cost of machinery per worker is quite comparable among Nankin Mills, Northville, and Waterford. Each of these plants employed highly skilled workers. The Plymouth plant also employed skilled machine tool workers.

Anecdotal evidence highlights the issue of skill at the village plants. The fate of a supervisor at one of the village plants illustrates the particular culture of production associated with many of the village industries. A Mr. Carpenter (pseudonym) was a Ford employee for 30 years, first as a tool and die maker and tool room supervisor at Highland Park and then at a village plant, where he was promoted in 1923 to the position of supervisor. In 1946, the superintendent of the village industries fired Mr. Carpenter for failure to "keep abreast of the times in his manufacturing and heat treating methods, having much outmoded machinery which should have been replaced long ago. It has been impossible to give Carpenter any help as he has never been receptive to new ideas and progressive methods. He assumes the attitude he knows all there is to know about tap manufacture . . . He [Carpenter] stated 'This is not a production plant but a Tool Shop.' He is

very caustic with his superiors and unfit to head up a Department" (Ford Motor Company n.d.). Thus it appears that a craft culture remained at the village industries long after it had disappeared from the shop floor of the large assembly plants at Ford. The similarity in worker skill among four of the five village plants suggests that the strategy of spatial decentralization might be connected to a strategy of union avoidance. I will examine this issue in the next section of the paper.

The village industry plant at Phoenix was marked by relatively little machinery per worker. This would suggest that the production process at Phoenix entailed less technical sophistication. The Phoenix plant employed a mostly female labor force. Women were hired as bench hands¹⁵ on the assembly line, involving tasks such as calibrating, assembly, punch press operation, packing, power rivet operation, inspection, and soldering.

Based on a survey of the employment records of 62 female Phoenix plant employees between 1923 and 1935, 40 (65 percent) were under 25 years old at the time of employment. In addition, 45 (73 percent) were single, 7 were married, 4 were divorced, 5 widowed, and 1 separated. Married women were employed only if their husbands were ill or, in one case, incarcerated. Indeed, one worker was dismissed because of a report that she had gotten married the previous month. Her supervisor reports that she continued to work even though "she knew it was against rules because her husband 'didn't earn very much'." Of the 33 quits listed with a reason, the most common reasons were marriage (21) and poor health (8). In only 26 cases is a nationality listed. "American" is listed 24 times, "English" once, and "English/French" once. Therefore, at the Phoenix plant, a female, unmarried, native-born work force com-

¹⁴ Given the smaller scale of production at the village plants, one can speculate that the buffer stocks supplied by the village plants were smaller than buffer stocks supplied by large-scale on-site producers, thereby offsetting the pressure to lay off workers during periods of slack demand.

¹⁵ The term "bench hand" refers to the position of the worker at a bench in front of a conveyor belt that moved parts past the worker.

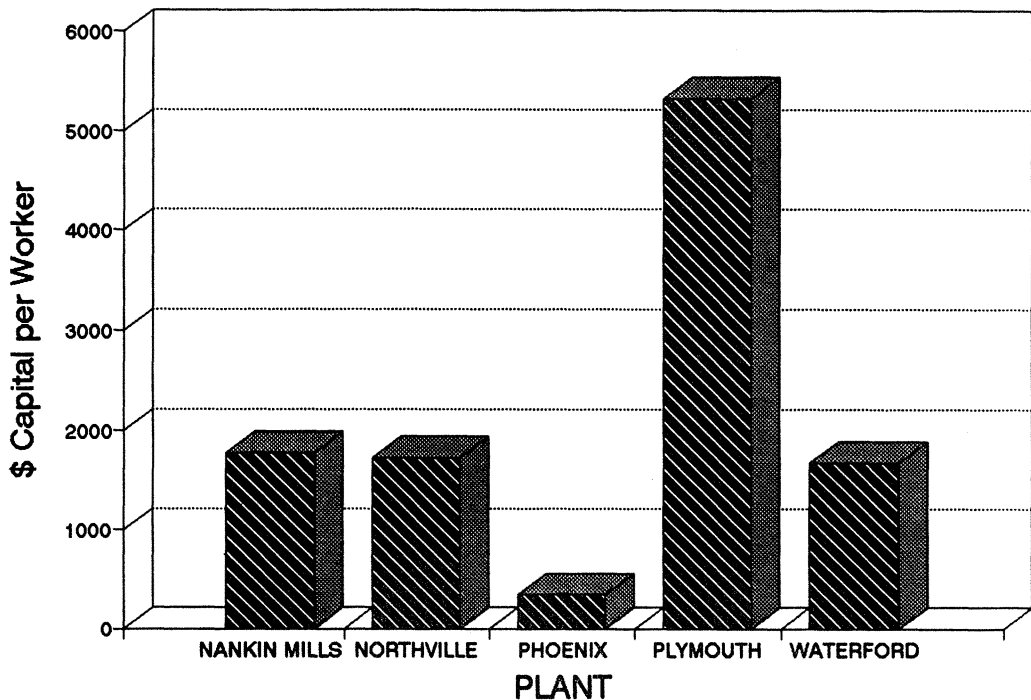


Figure 2. Cost of machinery and tools per worker, selected village plants, 1946. Source: Ford Motor Company (1946c).

bined with assembly line production allowed Ford to draw on a particular pool of labor in the surrounding area. Relations on the shop floor centered around a strong shop forewoman whose tenure at Phoenix lasted 18 years (1922–39) and who was personally in charge of hiring, reinstatement, and firing—subject to the final approval of the (male) superintendent of the Phoenix plant. In these ways the shop floor environment at Phoenix resembled the paternalistic system of employment in place in the New England textile mills of the nineteenth century.

However, workers at the Phoenix plant were more than just a source of cheap labor. Many were attracted to Ford because it offered higher wages than alternative forms of employment.¹⁶ Though labor was

clearly segregated by gender at the Phoenix plant, wages, while lower than those paid other Ford workers, were significantly higher than the wages received by some male auto industry workers. Table 2 provides data on occupation, wages, and employment patterns for male auto workers in 1923. Table 3 compares the wages in each of the six groups of male auto workers to the average wage earned by Phoenix women workers in 1923. Of the six groups reported, Phoenix women's wages are (statistically) higher than either helpers or laborers and are lower than machine tenders and skilled workers. There was no statistically significant difference between Phoenix workers' wages and the category assembler or inspector/tester. Thus segregation by gender played a more complex

¹⁶ Many women at the Phoenix plant had previous work experience. Of 54 women who indicated prior employment, 32 had worked in

a nonfarm establishment and 3 on a farm. The remaining 19 women listed housework as their previous occupation.

Table 2

Occupation, Wage, and Employment Patterns of Male Auto Workers, 1923

Type of Operation	Number of Establishments	Number of Workers	Average Hourly Wage (\$s)	Increasing or Decreasing Proportion of Work Force
Machine tenders	39	12,332	\$0.68	Increasing
Assemblers	40	4,631	0.66	Increasing
Skilled workers (trades)	34	2,360	0.84	Decreasing
Inspectors and testers	31	4,043	0.61	No conclusive data
Helpers	23	653	0.56	No conclusive data
Laborers	24	2,307	0.46	Decreasing

Source: Reitell (1924). Reprinted in Chandler (1964, 185).

role in the village industries than simply as a site for cheap labor.¹⁷ Gender and skill, therefore, are two dimensions of difference which the village industry plants utilized in the production of parts and the reproduction of a quiescent work force.

Unions at the Village Industry Plants

I wish to argue that Ford's strategy of relocating parts plants away from Dearborn and Detroit represented an attempt to forestall unionization at Ford. This is not to say that union avoidance was the only reason for industrial relocation.

¹⁷ Gordon, Edwards, and Reich (1982, 152) maintain that, "It was precisely the relatively weak bargaining power of women, and their neglect by male unions, that helped contribute to the ability of corporations to isolate women and continue to manage female labor with relatively traditional techniques." While I would agree that an employer's labor management technique is influenced by the degree of gender segregation, an explanation that relies on weak bargaining power is problematic in the case where women's wages for low-skilled labor were considerably higher than some male wages in the same industry (McDowell 1991). Indeed, the very notion of skill as a gendered concept needs to be reexamined in order to understand the long-standing maintenance of distinct labor management techniques (Cooper 1991).

Rather, the village industry plants represented an experiment both in the spatial reorganization of production and in the recasting of shop floor labor relations.

In the years leading up to its successful union organizing drive at Ford, the United Automobile Workers (UAW) made unionization of Ford workers a top priority. By 1941 the UAW succeeded in organizing workers at Ford. Yet the failure to gain UAW representation prior to 1941 had negative consequences for bargaining at other auto companies and supplier plants which had gained union representation more than four years ear-

Table 3

Comparison of Female Phoenix Worker Wages to Average Male Auto Workers Wages by Occupation, 1923

Type of Operation	Average Hourly Wage (\$s)	Wage Differential vs. Average Phoenix Female Wage ^a
Machine tenders	\$0.68	+0.05*
Assemblers	0.66	+0.03
Skilled workers (trades)	0.84	+0.21*
Inspectors and testers	0.61	-0.02
Helpers	0.56	-0.07*
Laborers	0.46	-0.17*

^a The average Phoenix wage is \$0.6291, and $n = 49$.

* Statistically significant at the 0.01 level (t -statistic)

lier (Chandler 1964; Babson 1985; Gartman 1986).

If Ford's outlying plants were indicative of the technological limitations of centralization or merely the result of Ford's fertile imagination and passion for experimentation, one would expect the UAW to take little notice of plants that employed a small fraction of Ford workers. However, the increasing decentralization of production facilities was an important enough problem to warrant a resolution, passed during the 1937 UAW annual convention, aimed at gathering additional information about the effects of this practice. The resolution declared, "It is the policy of many automobile and parts manufacturers located in large industrial towns, to move their work to small communities in their efforts to avoid union conditions prevailing" (UAW 1937, 151).

Two years later, UAW President R.J. Thomas singled out both Ford and the process of decentralization in describing corporate attempts to avoid unionization. It is interesting to note that, in a speech that covered topics ranging from dues collections to factional strife over Homer Martin to the AFL and organizing in Canada, Thomas follows a plea for workers to choose the UAW over Ford with an extended commentary on the small parts industry.

In the competitive parts industry, or the competitive parts plants in the industry, we still need further organization, due to the fact that in certain parts of the country where organizational work and where the organization has become solidified and we have the membership in those plants, we find this: that there are little plants out there in other parts of the country that are unorganized. That in the parts of the country where we have organization the manufacturers are trying to run away from that organization. They are trying to cut wages in other parts of the country, they are trying to work long hours, they are back at their old speed-up plan. (UAW 1939, 16)

A little later in the speech, Thomas links the small-plant corporate strategy to a similar strategy to move skilled labor from large plants.

In the tool and die, we have practically the same problem as I spoke of in the competitive plants. In districts where tool and die makers are well organized and under contract, they are receiving the highest wages of any tool and die workers in the country, but only a few miles away in the unorganized districts the manufacturers are setting tools and dies and giving orders to those districts for less than the money that is paid to tool and die makers in the organized districts. (UAW 1939, 16–17)

I am not suggesting that Thomas was referring directly to Ford's village industries. Nevertheless, it appears that the strategy of either spatially decentralizing parts production ("competitive parts plants in the industry") or subcontracting to independent non-union suppliers ("competitive parts industry") was clearly seen by the UAW as a union avoidance strategy.

During the 1940 UAW Convention, one of Ford's village plants was directly connected to a union avoidance strategy. A delegate recounted that a contract between Ford and an independent supplier of carburetors was "taken away from the Detroit company who had it and the carburetors were now being made in Milford, Michigan. He called attention to the fact that wages of 90 to 95 cents existed in comparison to the wages of \$1.00 to \$1.20 in the organized shops" (UAW 1940, 414).

By 1942, the UAW had established locals at all Ford plants, including the village industry plants. All of the village plant locals sent delegates to the national convention that year in Chicago. The village industry UAW locals were charged with representing workers at the plant level, with no consolidated local in charge of all the village industry plants.¹⁸ To some extent this extreme localization of union responsibility may have exacerbated any sense of separateness and isolation already experienced by village

¹⁸ On the other hand, by 1947 Ford had organized the outlying plants and parts manufacturers into a separate operating division.

industry workers. In using the term isolation I refer to the social distance that was maintained between workers at each plant even after unionization at Ford. In 1946 Ford, implementing a form of bureaucratic control (Edwards 1979), began to offer workers a source of information from which to construct a sense of identity that linked the interests of the worker with the interests of the company. This was accomplished, in part, through the publication and distribution of a village plant-wide newspaper, the *Hydro Plants News*. The *Hydro Plants News* was the only nonrecreational institutional link among workers in the village plants. By 1946, 15 village plants were well established, having been in operation anywhere from five to 26 years. Yet, prior to 1946 no attempt was made to provide workers with interplant information.

Each issue of the *Hydro Plants News* included a question posed to a sample of village industry workers. Below are responses to the question: "What do you consider some of the advantages of working in a small plant?" (*Hydro Plants News* 1, no. 6 (September 1946), 8).

I live with my folks on a farm near here and I find plenty of time to do my share of the farm work and get in plenty of hunting and fishing. It must be a waste of time to drive a long way through a lot of traffic to get home from work. I've never worked in a big shop but I understand working conditions are a lot better in a small plant. (male, assembler, Milford plant)

I think people working in a small plant have a lot of advantages. I live with my parents, three sisters and a brother and living close to my work gives me plenty of time with my family and also for my music. I don't think I'd ever make it if I had to wait around for busses and street cars and then walk a half mile through a big shop to get to my department. (female, semi-grinder, Northville)

Folks who work here are more like one big family and that's the way it should be . . . It's easier to team up on a job after you've teamed up in a recreational or social

undertaking. (male, lathe operator, Waterford plant)

I've been here 22 years and sure like it . . . I live on a three acre farm just a two minute walk from here. (male, machine operator, Plymouth)

If the above statements reflect the feelings of the majority of plant employees in 1946, workers themselves saw some advantages to the small scale characteristic of the plants. However, it may still be true that the very conditions which are cited favorably by workers were also obstacles to interplant union organization.

A typical edition of the *Hydro Plants News* consisted of news relating to the position of Ford Motor Company in the national economy, news of Hollywood stars, tips on sewing and baking, brief items about the personal events of workers in each plant (weddings, anniversaries, births, awards, promotions), and plant recreation activity summaries. I suggest that the interplant newspaper was an attempt to create a common identity among workers at village plants at variance with the identity that workers were forming as union members. While at least one early issue contained an article refuting claims made in the Local 600 (Rouge) publication *Ford Facts*, the preponderance of articles focused on non-union, often nonproduction, aspects of workers' lives. Two competing constructions of identity were being offered to workers at the village plants, one by the company and the other by the union. It appears, therefore, that a contest was being played out for the loyalty of workers at the village shops (Gintis 1976).

In addition, beginning in 1946, management was discussing the merger of several village plants (Smith 1954). In August 1946 the merger of the Nankin Mills, Newburg, Plymouth, and Waterford plants was announced. Production would be consolidated at an expanded Waterford plant. It was also announced that the Ypsilanti plant would be expanded and that a new central employment office would be located at the Ypsilanti plant. In November it was an-

nounced that the Johanssen Gauge Division would move from the Engineering Lab in Dearborn to the Waterford village industry plant. In May of 1947 Ford announced the creation of a new division responsible for the manufacturing of parts and accessories in the "outlying plants." Henry Ford II appointed Roscoe Smith, formerly the superintendent of the village industries, general manager of the new division. Two years later Smith would be named director of quality control for Ford.

Changes continued at the village industries with the transfer of production from Nankin Mills, Newburg, and Plymouth to Waterford in October of 1947, "in all cases without layoffs" (*Hydro Plants News* 2, no. 10, 1). Despite the combined production facilities, the newspaper still provided separate columns for Waterford plant news and still reported on recreation leagues based on *former* plant identification. Thus, plant identities remained intact even though the plants themselves had shut down.

It has been suggested by historians that village industry production died with Henry Ford in 1947 (Nevins and Hill 1962). This explanation conforms to the notion that the village plants were a costly hobby of Henry Ford. And while it is true that consolidation of production took place in 1946 and 1947, the revised organizational chart of the Ford Motor Company now included the village plants as a separate operating division (Ford Motor Company 1949). If the plan was to dismantle the small plants, there would appear to be no need to restructure the managerial hierarchy to oversee their production. In fact, production continued at some of the village plants into the 1950s. An alternative explanation for the demise of the village plants lies in shifts in the relationship between labor and management after union representation was accomplished by the UAW.

The recognition of the UAW as the legitimate bargaining agent for production workers at Ford required a restructuring of the institutional relationship between capital and labor. Ford Motor did not have

previous experience negotiating with labor unions and lacked personnel trained in collective bargaining procedures (Ford Motor Company 1946b). For Ford Motor, the process of creating a new system of intra-company labor relations coincided with a production speed-up to meet the demands for wartime output. In response, workers at Ford, in direct opposition to the UAW wartime no-strike pledge, engaged in numerous wildcat strikes. In 1942 there were 163 work stoppages at Ford, and in 1943 the number climbed to 254 (Ford Motor Company 1946a). Worker militance at the Rouge plant was especially worrisome for Ford officials. A member of Ford's Industrial Relations Research Department, in a memo providing background to the 1944-46 contract renegotiations, expressed concern over labor relations at the Rouge plant: "The problem of dealing with the UAW-CIO in the Rouge Plant was particularly difficult and without exact parallel anywhere in industry. From the Company's viewpoint, the mere physical size and number of employees presents problems of handling personnel and dealing with their representatives not present in smaller units" (Ford Motor Company 1946b, 2).

The UAW also faced problems coordinating negotiations and grievance procedures at Rouge Local 600, the largest union local in any industry. Ford initiated a process to centralize negotiations by establishing labor relations offices at the major plants. Throughout the early 1940s Ford and the UAW began to rationalize the system of labor-management relations. By 1945, 92 work stoppages were reported at Ford. And while 1946 saw record numbers of U.S. workers on strike, by November of 1946 Ford Motor, according to its own accounts, had only 22 work stoppages, involving 4,984 workers (Ford Motor Company 1946a). By the late 1940s, the organizational problems associated with grievance arbitration and contract negotiations at large plants like the Rouge had been successfully addressed by Ford and the UAW.

Hence, Henry Ford's death alone is not fully responsible for the decline of the

village industries. Rather, changes in the structure of capital-labor relations in the postwar period and the changes made necessary by the recognition of the UAW as the legitimate bargaining agent for all hourly Ford employees rendered small-scale production atavistic from the perspective of modern management and modern labor unions. A system of production premised on paternalism and craft or task solidarity was ill suited to corporate management trends toward centralized personnel administration and bureaucratic control (Edwards 1979; Jacoby 1985). From the union's perspective, the power vested in the village industry supervisors in plants like Phoenix and the less stringent enforcement of work rules characteristic of multiskilled workers at Waterford were in conflict with the system of grievance, promotion, and staffing rules and procedures fought for by the union (Rubery 1978; Jacoby 1985; Tomlins 1985; Clark 1986). Segal (1988, 203) claims that union preferences for objective standards upon which to adjudicate labor grievances eradicated the unique features of the village industry plants: "Despite the alleged generosity of the contract . . . the workers at the village industries lost one critical measure of autonomy: their opportunity to learn to perform virtually all aspects of their particular production process . . . This change in turn allegedly undermined the village industries' much-heralded efficiency."¹⁹

Conclusion

What has been neglected in the debates over the spatial dynamics involving the transition from mass to flexible production is a reassessment of the logic of industrial location under mass production. The

history of Ford's village industry plants points out the need for more detailed accounts of the spatial manifestations of the capital-labor relation in the era of mass production. The location of Ford's village plants suggests that spatial decentralization coexisted with the vertically integrated business organization representative of large-scale mass production. I argued that transaction cost theories of industrial location associate vertical integration with spatial centralization. This has the effect of reducing the spatial dynamic of industrial location under mass production to a single type explainable by a single spatial model. Yet the example of production at the Ford Motor Company from the 1920s through the 1940s reveals a logic of spatial separation and labor market segmentation that is not reducible to variations in transaction costs. Attention paid to issues of class conflict and, in particular, union avoidance helps us to better understand the location strategy associated with the mass production of automobiles at Ford.

Additionally, the production techniques and labor relations employed at some of Ford's village plants contained elements associated today with flexible manufacturing. The plant at Waterford, for example, utilized skilled labor in multiple tasks producing small batches of output requiring little direct supervision. Not all the village plants utilized flexible techniques of production, however. At the Phoenix plant, for example, assembly line techniques were utilized by an entirely female labor force. Here labor control was embodied both in the pace of machinery and in the order maintained by a strong shop supervisor. In general, the village plants were marked by a diversity of production techniques and methods of labor management.

Finally, the establishment of the village plants at Ford is consistent with the more general Fordist attempt to link production to an extension of stable patterns of consumption into rural southeastern Michigan. More important, I believe, is that the history of production at the Ford village

¹⁹ The most frequent boasts of village industry efficiency are made by Henry Ford himself. See especially Chapter 12, "Turning Back to Village Industry," in *Today and Tomorrow* (1988[1926]).

industries forms an important microfoundation to the more traditional macro-level account of Fordist regimes (Lipietz 1986; Aglietta 1987; Boyer 1990). By providing a historical account of the process of industrial location at Ford I sought to convey a view of Fordist mass production that is more complex and contradictory than has recently been acknowledged in the debates surrounding flexible production.

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