

PLANT SIZE AND FREQUENCY OF STRIKES

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Plant Size and Frequency of Strikes

By C. FRED EISELE

In Illinois and Iowa (the two states surveyed), the author finds that plants with approximately 750 employees have suffered the highest strike-frequency rate. Why at this size? Among other explanations, it is posited that in significantly smaller plants labor-management relations can be personalized—and tensions reduced—while in appreciably larger plants sophistication in dealing with disputes may, of necessity, have been developed. C. Fred Eisele is a graduate teaching assistant at the University of Iowa's College of Business Administration.

FROM CASUAL OBSERVATION it is obvious that some unionized industrial plants operate with a minimum of labor-management difficulty, while others have strikes with some degree of regularity. The causes of this difference are likely to be both numerous and complex. In an effort to gain further insight into this problem, the author recently made a survey of manufacturing plants in Iowa and Illinois to determine if some categories of plants were more prone to have strikes than others.

The specific purpose of this study was to determine if any relationship exists between plant size and frequency of strikes.

For the purpose of this study plant size was defined as the number of employees at a particular plant currently covered by one or more labor-management agreements. Such plants will be referred to as organized or unionized.

Strikes were classified according to two categories: lawful strikes, that is, those authorized by unions and occurring in the customary manner are referred to as legitimate strikes or simply as strikes. All other nonauthorized work stoppages such as walkouts, wildcat strikes, etc., are referred to as wildcat strikes. The main concern of this study was with legitimate strikes.

Relevant Literature

Although an exhaustive search was not made, the author found the literature dealing with the relationship between plant size and strikes extremely limited, and much of it was only indirectly related.

Although this study deals with strike frequency, two other commonly used measures of strike activity are strike duration and man-days idle. The latter includes strike duration as a component. In this regard it is of interest to note that Horvath, in an analysis of 3,332 work

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stoppages for the year 1960, found no relationship between plant size and duration of strikes.¹

Kerr and Siegel attempted to show that different types of industry have different propensities to strike,² although Ross questions their hypothesis.³ Since most of the plants in this study would fall in a single general category—as defined by Kerr and Siegel—this effect, if it does exist, should be minimized.

Knowles, in a study of British industry, found some regional differences in "strike-proneness."⁴ Harbison and Coleman claim that small- and medium-sized communities are more conducive to industrial harmony than large urban centers.⁵

Revans reports a study that does relate plant size and work stoppages. Unfortunately, his research was quite limited, conducted in a foreign country (Britain), and in a different type of industry (coal mining). Nevertheless, it shows a strong positive correlation between size (number of employees) and production lost due to work stoppages. Revans states that, "these trends with size cannot in any way be accounted for by differences in the productivity of the two different sizes of pits; the effect is

purely a social one." His speculation is that this result is due to a more general positive relationship between size and morale, but his conclusion is that "the reasons for the size effect must still be sought."⁶

In another more recent British report, Ingham shows a definite relationship between plant size and workers' political attitudes and behavior. In fact, in some cases the "size-effect" was sufficient to override what would be customary Conservative or Labor Party attitudes.⁷

In the United States, Pondy has developed a concept which he calls "administrative intensity," defined as "the ratio of the number of managers, professionals, and clerical workers divided by the number of craftsmen, operatives, and laborers employed by an organization." Among other things, he shows that "administrative intensity" is related to plant size and to value added per production worker.⁸

Somewhat similarly, Joan Woodward found the ratio of managers and staff to other personnel to be related to plant size for certain types of technology.⁹

Lester has developed a theory which predicts reduced strike frequency as unions mature, although he admits

¹ William J. Horvath, "A Statistical Model for the Duration of Wars and Strikes," *Behavioral Science*, Vol. 13, No. 1, January 1968, pp. 19-28.

² C. Kerr and A. Siegel, "The Interindustry Propensity to Strike—an International Comparison," in A. Kornhauser, R. Dubin, and A. Ross (editors), *Industrial Conflict*, New York, McGraw-Hill, 1954, pp. 189-212.

³ A. M. Ross, "The Prospects for Industrial Conflict," in *Industrial Relations*, Vol. 1, No. 1, October 1961, pp. 57-74.

⁴ Knowles, K. G. J. C., "Strike-Proneness and Its Determinates," *American Journal of Sociology*, Vol. 60, No. 3, November 1954, pp. 213-229. Also in Walter Galenson and Seymour Lipset (editors), *Labor and Trade Unionism—An Interdisciplinary Reader*, London, Wiley, 1960, pp. 301-318.

⁵ F. H. Harbison and J. R. Coleman, *Goals and Strategy in Collective Bargaining*, New York, Harper, 1951, pp. 131-132.

⁶ R. W. Revans, "Industrial Morale and Size of Unit," *Political Quarterly*, Vol. 27, No. 3, July/September 1956, p. 303. Also in *Labor and Trade Unionism—An Interdisciplinary Reader*, cited at footnote 4, at pp. 295-300.

⁷ Geoffrey K. Ingham, "Plant Size: Political Attitudes and Behavior," *Sociological Review*, Vol. 17, No. 2 (New Series), July 1969, pp. 235-249.

⁸ Louis R. Pondy, "Effects of Size, Complexity, and Ownership on Administrative Intensity," *Administrative Science Quarterly*, Vol. 14, No. 1, March 1969, pp. 47-60.

⁹ Joan Woodward, *Industrial Organization: Theory and Practice*, London, Oxford University Press, 1965, pp. 50-67.

that "union maturity" is a difficult term to define.¹⁰

Methodology

The two populations studied consisted of all the manufacturers in Iowa and Illinois which employ more than 50 persons. The sources of information were the two state directories.¹¹

In consideration of the Harbison and Coleman study, and also since it seemed reasonable to assume that plants in large industrial centers may exhibit different strike characteristics than those in other settings, the Illinois population was divided into two sub-populations: (1) the Chicago area, and (2) all of Illinois except the Chicago area. Hereafter, the Chicago area will be referred to as "Chicago," the remainder of Illinois as "Outstate Illinois," and the combination of the two as "Total Illinois." From each sub-population, 25 plants were selected from each of five employment categories (51-100, 101-250, 251-500, 501-1,000, and over 1,000) for a total of 125 plants from each of the two sub-populations.

The procedure for Iowa was identical, except that since Iowa has no industrial center comparable to Chicago, no geographical subdivision of the population was made. Also, the number of plants selected from each employment category was slightly less than 25 in some cases. The total number of plants was 109.

A factual-type questionnaire was mailed to each plant selected. The questionnaire asked for the number of employees currently covered by labor-management agreements, the number of

strikes of each type which occurred during a 20-year period, and the number of years the plant has been organized, if less than the full 20 years.

The 20-year period from January 1, 1949, to December 31, 1968, was selected for study in order to avoid some of the turbulence which occurred in labor-management relations immediately following World War II. Contrary to the conventional view, strikes occur relatively infrequently; hence, a long-term study is desirable. Also, the longer period aids in reducing the possible effects of business fluctuations for which Rees claims a relationship.¹²

Except for the following modifications, the sampling was random. In the case of multi-plant companies, questionnaires were sent to only one plant in order to avoid contaminating the sample by including plants in which strike activity at one may not be independent from another. Questionnaires were not sent to plants employing less than 51 persons on the assumption that many of these would not be organized.

Findings

Seventy-four and 67 per cent of the questionnaires were returned by the Iowa and Illinois plants, respectively, but the returns were not uniformly distributed over the range of plant sizes. As plant size increased, the percentage of returns decreased. Questionnaires which were incomplete, reported no union, or reported a union-management agreement in existence for less than three years were not used. Table 1 shows some general comparative data.

¹⁰ Richard A. Lester, *As Unions Mature*, Princeton, Princeton University Press, 1958, pp. 105-126.

¹¹ *Directory of Iowa Manufacturers*, State of Iowa, Iowa Development Commission, Des Moines, 7th edition; *Illinois Manufac-*

turers Directory, Manufacturers News, Inc., Chicago, 1967.

¹² A. Rees, "Industrial Conflict and Business Fluctuations," in work cited at footnote 2, at p. 213.

TABLE 1

Percentage of Plants Organized, Percentage Reporting No Strikes, and Average Number of Years Organized

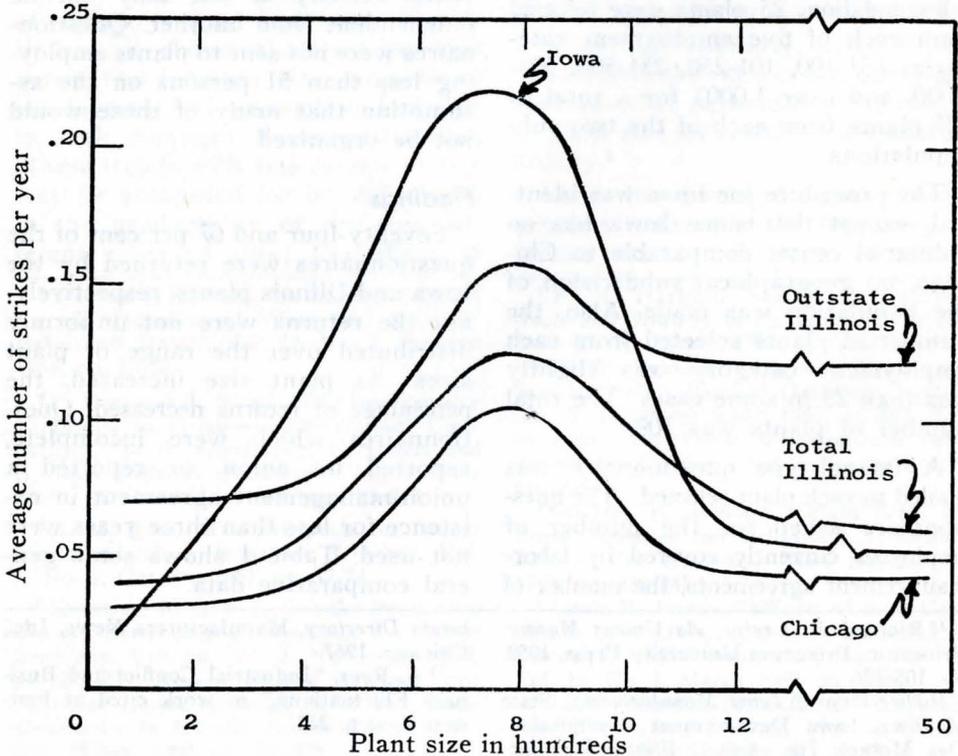
	<i>Chicago</i>	<i>Outstate Illinois</i>	<i>Total Illinois</i>	<i>Iowa</i>
Percentage of plants reporting a labor-management contract	64	74	69	79
Percentage of organized plants reporting zero strikes	61	45	52	45
Percentage of plants with a labor-management contract for 20 years or more	68	64	66	70
Average number of years organized	16.6	16.1	16.4	15.9

Insofar as these data are concerned, Chicago is less highly organized and has fewer strikes than either Iowa or Outstate Illinois.

Bivariate frequency diagrams were plotted with plant size on one axis and strikes-per-year on the other. The

strikes-per-year figure was calculated for each plant by dividing the number of legitimate strikes reported by the number of years a union-management relationship had existed. Figure 1 shows smoothed versions of these diagrams.

FIGURE 1
Average Number of Strikes per Year by Size of Plant and Region



In all cases the relationship is curvilinear over a major portion of the scale. If plant sizes from 50 to 750 are considered separately, the correlation between plant size and strikes-per-year is positive. On the

other hand, for plant sizes from 750 to 1,250, the correlation is negative. For both Iowa and Illinois, the pivot point seems to be at a plant size of approximately 750. Table 2 reports these correlations.

TABLE 2
Correlations Between Plant Size and Frequency of Strikes, by Region¹³

	<i>Plant size</i> 50-750		<i>Plant size</i> 750-1,250
Outstate Illinois	+ .27 (N = 47) (Sig. to .075)	— .32	(N = 9) (Not Sig.)
Chicago	+ .59 (N = 36) (Sig. to .001)	Not calculated N too small	
Total Illinois	+ .32 (N = 83) (Sig. to .010)	— .25	(N = 13) (Not Sig.)
Iowa	+ .63 (N = 43) (Sig. to .001)	— .77	(N = 12) (Sig. to .010)

To analyze the data from a different perspective, the average number of strikes-per-year for each of three plant-

size groupings were compared. These results are shown in Table 3.

TABLE 3*
Average Number of Strikes per Year, by Plant Size Grouping and Region¹⁴

<i>Plant Size</i>	<i>Chicago</i>	<i>Outstate Illinois</i>	<i>Total Illinois</i>	<i>Iowa</i>
Under 500	.029 (29)	.049 (39)	.041 (68)	.038 (36)
500-1,000	.080 (7)	.100 (11)	.087 (18)	.168 (10)
Over 1,000	.065 (4)	.070 (5)	.068 (9)	.045 (10)
TOTAL	.042 (40)	.059 (55)	.052 (95)	.062 (56)

* Figures in Parentheses = N.

¹³ Explanation of Table 2: Referring first to the left half of the Table, the plus signs preceding the numbers (correlation coefficients) indicate that as plant size increased from 50 to 750, the frequency of strikes also increased. We say the correlation was positive. Conversely, for the right half of the Table, the negative signs indicate that as plant size increased from 750 to 1,250, the frequency of strikes decreased—a negative correlation. The magnitude of

the correlation coefficient, which can range from 0 for no correlation, to 1 for perfect correlation, is an index of the degree of correlation.

N refers to the number of plants in the sample; for example, in the lower left hand section of the Table, the term "N = 43" shows that 43 plants were involved in calculating the correlation coefficient of +.63. (See following page for continuation of footnote 13 and for footnote 14.)

Within each geographical area the mean for the "under 500" group was compared with the mean for the "500-1,000 group" to see if the difference was statistically significant. The differences were found to be significant to the following levels: Chicago, .100; Outstate Illinois, .050; Total Illinois, .010; and Iowa, .001. Because of the small N, comparisons between the "500-1,000" and the "over 1,000" groups were not made.

By either method of analysis the tendency is clear. Plants employing from 500-1,000 have more strikes than smaller or larger plants, with the peak coming at a plant size of roughly 750. This characteristic is less pronounced in Illinois than in Iowa and less for Chicago than for the remainder of Illinois.

The purpose in collecting information on wildcat strikes was to insure that the results reported on legitimate strikes were not contaminated by a mixture of the two. However, a brief report on the available information concerning wildcat strikes is of interest.

Referring again to Table 1, we note that roughly half the plants reported zero legitimate strikes. More than three-fourths of these also reported zero wildcat strikes. This suggests that where union and management

are repeatedly able to negotiate contracts without having strikes, there is also a strong tendency that the administration of the contract will be peaceful. However, there were some outstanding exceptions; for example, one plant which reported zero legitimate strikes reported 25 wildcat strikes.

On the other hand, the converse of the above does not seem to be true. When plants reporting one or the other or both types of strikes are considered separately, the correlation between the number of legitimate strikes and the number of wildcat strikes is a positive .17 and .19 for Iowa and Illinois, respectively. Both figures fall far short of statistical significance. Further, there seems to be no significant relationship between plant size and frequency of wildcat strikes.

Limitations and Problems

It is difficult to assess the impact of certain shortcomings in the methodology. For example, with the questionnaire method the respondents, not the researcher, control the makeup of the sample, and the end result may no longer be random. If there is any tendency for respondents to attach the connotation "good report" and "bad report" to the low and high

(Footnote 13 continued.)

Again, in the lower left section, the term "Sig. to .001" is an abbreviation for "significant to level .001," where the .001 is a probability number. It says that, if the correlation between plant size and frequency of strikes is really 0, there is only one chance in a thousand that a sample of plants would show a correlation of +.63 as we found. On the other hand, the .075 in the upper left section says that there are more than seven chances in a hundred of getting the +.27 correlation shown, if the true correlation was 0, a much less significant result.

¹⁴ Explanation of Table 3: For illustration, refer to the far right hand section

of the Table. The figures show that plants in Iowa, employing less than 500 persons, have an average, or mean, number of strikes-per-year of .038. Similarly, for plants employing from 500 to 1,000 the mean is .168. The difference between these two means was analyzed statistically, and the significance level of .001, reported in the main body of the paper, has the same meaning as previously explained in connection with Table 2, that is, if there is really no difference in the level of strike activity between the two size groupings, there is one chance in a thousand that we would get the results shown. The other sections of the Table should be interpreted in like fashion.

frequency strike records, respectively, and further if there is any proneness to report good records while withholding bad ones, then the results could be distorted. The fact that in this sense there were numerous "very bad reports" suggests that it is not a major factor. Also, since respondents were not required to identify themselves, such a tendency should be minimized.

The data were analyzed on the basis of present plant size, but 20 years ago the plants were likely of a different size. We therefore ignored growth which may itself be an important variable in strike frequency.

There is a statistical problem with the strikes-per-year measure for plants reporting zero strikes. A plant reporting zero strikes for a ten-year period does not have the same record as a plant reporting zero strikes for a 20-year period; yet, their score—insofar as this analysis is concerned—is the same. The fact that a high percentage of plants reported union-management agreements in effect for the full 20-year period should help to minimize this error.

The largest plant in the working samples reported approximately 5,000 employees in bargaining units. No basic industries, such as steel, are included, and this factor could be a weakness of the study. Harbison and Coleman suggest that more intense conflict is likely to occur in the labor-management "power centers" which include such industries as steel, auto, rubber, etc.¹⁵

As reported earlier, the questionnaires returned were not uniformly distributed over all plant sizes. The

strike frequency appears to level off for plant sizes above 1,200 (see Figure 1), but because *N* is so small, the reliability of this feature may not be high.

Conclusions

It seems clear that, for this study, plant size—or, more likely, variables related to plant size—is a factor in strike frequency. Labor disputes are, in part, a function of attitudes. In fact, the Revans and Ingham articles strongly suggest that workers' attitudes and behavior are related to plant size.

Revans believes that, as the number of employees increases, management problems multiply; for example, coordination becomes more difficult and communication deteriorates. He sees a "distance" developing between the worker and the supervisor which results in an increase in labor disputes. Revans would apparently predict constantly increasing labor difficulty as plant size increases while we find from this study a decrease for plants employing more than approximately 750 persons.

Knowles found regional differences in "strike proneness," and in the sense that we found lower strike activity in Chicago than Outstate Illinois and lower in Illinois than Iowa, our results would support the idea that regional differences can exist. However, it should be reemphasized that the work of Knowles, as well as that of Revans and Ingham, took place in Britain, and, therefore, it could be a mistake to attempt any generalization for the United States.

To the extent that strike frequency is an indication of "harmony or dis-

¹⁵ Work cited at footnote 5, at p. 125.

harmony" our results would contradict the Harbison and Coleman claim that small- and medium-sized communities are more conducive to industrial harmony than large urban centers.

The fact that Pondy found a relationship between "administrative intensity" and both plant size and productivity suggests that exploring the possibilities of a relationship between "administrative intensity" and strike frequency might be worthwhile.

Woodward found that the ratio of workers to managers and staff for British job-shop industries went from 22 for plants with 400-500 employees to 37 for plants with 850-1,000 and back down to 25 for plants with 3,000-4,600 employees. If this information were portrayed graphically, the curve would have characteristics similar to those of our Figure 1. Perhaps this is just an interesting coincidence, but perhaps not.

Although "union maturity" is difficult to define and measure, Lester lists "age" as one important factor. With some exceptions, the union movement in the United States spread westward along with the development of the country. If, in this sense, we consider the union movement in Illinois to be more mature than in Iowa, then our results are supportive of Lester's theory.

Like much research, this study suggests more questions than it answers. For example, why do plants in the 750-employment range have more strikes? One colleague suggests that, in the face of union de-

mands, small plants capitulate, medium sized plants fight and large plants compromise. We can only speculate. In small plants it is easier to have good communication because there are fewer layers of management between the top and bottom. A form of democratic management or participative decision-making may come about naturally. It may be easier for employees to identify with the goals of the organization. Control and coordination are less complex, thus requiring few rules and procedures. Perhaps it is not until plants get quite large (above 750 employees) that they realize the necessity of establishing some formal apparatus to do what small plants do informally. In this regard, Mason Haire reminds us that as the size of an organization changes, the shape must also change. As the number of employees increases, other adjustments and changes in the organization must take place.¹⁶ Failure to make these "other" changes may be an underlying cause of the phenomenon our data demonstrates.

Other questions of interest are: Why are there differences in levels of strike activity within and between states? Is it related to union maturity and, if so, would it be less for states farther east? That plant managers are interested in such questions was evidenced by their comments and requests for copies of the results. It is unlikely that managers of plants in the 500-1,000-size category are aware of their somewhat unique position. If they were, their own self-analysis might furnish a great deal of information. [The End]

¹⁶ Mason Haire, *Psychology in Management*, (2nd edition), New York, McGraw-Hill, 1964, p. 225.