

Steel Management on Two Continents

Étude comparative de la gérance et de la supervision aux États-Unis et en Allemagne

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Article abstract

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Steel Management On Two Continents

A Comparative Study of Management and Supervision
in the Dortmund-Horder Huttenunion of Germany
and the Inland Steel Company in the United States

Dr. Frederick H. Harbison

A cross national analysis of managerial organization and supervisory personal in order to highlight some of the similarities and contrasts in two industrial societies, U.S.A. and Germany. The following pilot study is limited to operating management and supervision of two steel works.

Introduction

The success of any industrial enterprise is obviously dependent upon the effectiveness of its managerial organization and its supervisory personnel. There are differences in management in different industries and even within the same industry in a single country. But, the differences may be even greater and more significant when comparisons are made on a cross-national basis. In Europe, for example, the concept of the function of management is quite different from that in the United States, as are the variances in the avenues of access to managerial positions.

In order to highlight some of the similarities and contrasts in management in two different industrial societies, the Industrial Relations Center of the University of Chicago undertook this preliminary pilot analysis of managerial and supervisory personnel in two well-known steel companies — The Dortmund-Horder Huttenunion of Dortmund, Germany and the Indiana Harbor Works of the Inland Steel Company, Company, East Chicago, Indiana.¹

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(1) This particular study is concerned with only operating management of the steel works, and does not include such functions as purchasing, sales, finance, or industrial relations.

In terms of total employment, these two companies are nearly the same in size. Inland's Indiana Harbor Works employs slightly over 18,000 persons and Dortmund-Horder Huttenunion has a total employment of about 17,000 persons. However, the steel-making capacity of Inland is 4.7 million tons per year as compared with 2.5 million tons at DHHU. This difference in tonnage capacity is attributable to a number of factors including differences in processes, machinery, ores, product-mix, and even of the products themselves. Both companies, however, have fully integrated steel making operations including blast furnaces, coke plants, steel-making furnaces, blooming mills, sheet mills, and structural mills. Inland has one large works which is nearly two-and-one-half miles from one end to the other. DHHU has two works, one at Dortmund and the other at Horde about 6 miles away.²

The selection of these two companies for this pilot study was somewhat fortuitous. Originally, the German Iron and Steel Federation suggested two companies in Germany. However, for various reasons it was not possible at the time to get the necessary statistical data from the second German company. Inland Steel was selected for two reasons: first, its total employment was comparable to that of DHHU, and second, its management was particularly interested in cooperating in the study. It is understood, however, that it will be necessary to secure information from several additional companies in each country if fully definitive and reliable cross-national comparisons are to be made. A plan has already been developed to extend the analysis to other companies not only in Germany and the United States but also in France, England and possibly the Benelux countries as well. Accordingly, the principal usefulness of this pilot study is to establish the framework for more comprehensive studies.

THE CRITERIA OF COMPARISON

This study was designed to compare the numbers of persons in various levels of management or supervision and the nature of the educational background of those holding managerial positions. Another purpose of the study was to identify trends in managerial organization and in access to supervisory and managerial positions, and to relate these trends to pertinent factors in the technological development of the steel industry:

(2) The main products of Inland Steel are: Steel sheets, strip, tin mill products, bar mill products, structural shapes, floor plate, sheet piling, re-enforcing bars, rails and track accessories, pig iron and coal chemicals.

Management, for purposes of this study, is subdivided into two categories: top management and middle management. In *top management* we include the following comparable positions: 1. The Technische Direktor at DHHU and the Vice President of Steel Manufacturing at Inland; 2. the Direktionen Assistenten at DHHU and Assistants to the Vice President at Inland; and 3. the Oberengeneure at DHHU and the General Superintendent and the Assistant General Superintendents at Inland. In *middle management* the following are included: 1. The Betriebslieter at DHHU and the Superintendents at Inland; 2. the Assistenten at DHHU and the Assistant Superintendents at Inland; and 3. the Assistenten (in Industrial Engineering and Time Study, Metallurgy, Production Control, and Construction) at DHHU and the Senior Technical Staff in comparable positions at Inland.

In *supervision* the following comparable positions are included: 1. The Obermeister and Meister at DHHU and General Foremen and Foremen at Inland; 2. the Vorarbeiter at DHHU and the Assistant Foremen at Inland. At Inland, however, the persons holding these positions are considered to be an integral part of management, and they are not eligible for membership in unions. At DHHU these persons, though engaged for the most part in supervisory functions, are considered to be members of the working class and are eligible for union membership.

The remaining personnel fall into two comparable categories: 1. The Arbeiter at DHHU and the Hourly Paid Workers at Inland; and 2. the Angestellte at DHHU and the Clerical and Junior Technical Employees at Inland.

The comparison of the educational background of managerial personnel is more difficult because of the very great differences in the systems of higher education in Germany and the United States. The diploma from the German Universities or the Technisches Hochschule is quite comparable to the Master's Degree of American universities or engineering schools. But, there is no real equivalent in Germany for the American AB or BS four-year college degree, for it represents a more vocational type of training than broad university training. Thus, the college degree in the United States, though not comparable to the University or Hochschule diploma in Germany, has a higher status in America than the Fachschule certificate has in Germany. For the purpose of the study, nevertheless, we have arbitrarily decided to equate the Fachschule certificate to the College degree. Thus, we have classified the educational background of managerial and supervisory per-

sonnel into three categories: First, those with Master's Degrees in the United States or university degrees in Germany, designated on Chart 1 as "A"; second, those with the American college degree or the German Fachschule certificate, designated "B"; and third, those with no degrees or higher education, designated "C".³

THE RESULTS OF THE COMPARISON

An analysis of the statistical data, set forth in Chart I, brings out some very interesting results. The most significant findings can be summarized as follows:

CHART I

*Comparison of Technical Management in Steel Operations
Inland Steel Company, Indiana Harbor Works, and Dortmund-Hörder Huttenunion,
1954*

POSITION LEVEL	DORTMUND-HÖRDER				INLAND STEEL			
	Total	A	B	C	Total	A	B	C
Vice President, Steel Mfg. (<i>Technische Direktor</i>)	1	1	0	0	1	0	1	0
Assistant to Vice Pres. (<i>Direktions Assistent</i>)	5	4	1	0	4	1	1	2
General Superintendent & Assistants (<i>Obereingeneure</i>)	14	12	2	0	7	1	4	2
TOTAL (Top Management)	20	17	3	0	12	2	6	4
Superintendents (<i>Betriebsleiter</i>)	60	45	15	0	38	1	19	18
Assistant Superintendent (<i>Assistenten</i>)	80	47	32	1	69	18	33	28
Senior Technical Staff (<i>Assistenten</i>)	43	27	16	0	430	20	77	333
TOTAL (Middle Management)	183	119	63	1	537	39	129	379

(3) However, many of Inland's managerial, supervisory and technical personnel have had college training in extension and evening schools and technical institute training. Such training is not reflected in the compilation of educational attainment.

General Foremen & Foremen (Obermeister and Meister)	319	0	0	319	1,044	18	159	867
Leader (Vorarbeiter)	623	—	—	—	112	—	—	—
TOTAL (Supervision)	942				1,156			

Junior Technical & Clerical (Angestellte)	857	×	×	×	1,024	×	×	×
Workers (Arbeiter)	15,800	×	×	×	15,431	×	×	×

TOTAL EMPLOYMENT (All Personnel).....	17,179				18,163			
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Key : A — in Germany, University of Technischeshochschule Diploma ; in U.S., an M.A.

B — in Germany, Fachschule Certificate ; in U.S., College degree (AB or BS).

C — in both countries, no degree or certificates.

First, in top management the formal educational training of the DHHU executives is much greater than that of the Inland executives. At DHHU, 17 out of 20 executives in this category have a university degree, and the remaining 3 have the Fachschule certificate, whereas at Inland, only 2 out of 12 top executives have a Master's degree, 6 have a college degree, and 4 have less than a four year college education. The difference in the number of personnel in the top management category — 20 at DHHU as compared with 15 at Inland — is explained largely by the fact that Inland has one central works whereas the DHHU operations are divided into two separate works and a central administrative office. It is quite apparent that more of the Inland executives have risen from the ranks, without benefit of formal education, than is the case at DHHU. It is also apparent that much greater stress has been given to formal higher education in top management positions at DHHU than at Inland.

Second, in middle management, the formal educational training of the DHHU personnel is again greater than their counterparts at Inland. Three-quarters of the Betriebsleiter at DHHU have a university degree,

and the rest have the Fachschule certificate, whereas at Inland only one superintendent has a Master's degree and only slightly over half have a college degree. In the case of the superintendents the difference in numbers of personnel — 60 at DHHU as compared with 38 at Inland — is probably explained by the existence of the two works at DHHU and by the greater specialization and subdivision of functions at Inland.

The contrasts in the Assistant Superintendent category, however, is not so great. Of 80 Assistenten at DHHU, 47 have the university degree and the rest, with one exception, have the Fachchule certificate, whereas at Inland, of 69 assistant superintendents, 8 have a Master's degree and 33 have a college education. It is apparent, therefore, that Inland is stressing formal education for its junior managerial force and that the trend is in the direction of more education qualifications for higher management positions in the future. The slightly lower proportion of highly trained assistenten at DHHU is to be explained by the great losses of young men in World II, the category of persons who could otherwise have been attending the universities or technisches hochschule. In other words, DHHU would prefer to have highly trained men in these positions if they were available.

Third, in middle management, the number of senior technicians and assistant department heads in departments such as engineering, research, metallurgy, production control and industrial engineering at Inland is much greater than persons in similar positions at DHHU. At Inland there are 430 persons in this category, of whom 20 have a Master's degree and 77 have the college degree. (Of the remaining 333, a large percentage have technical institute training and university extension training, but no academic degree. All, however, are well trained technicians.) At DHHU there are only 43 persons in this group, the majority, of course, having formal university degrees. It is quite apparent that the investment in the so-called technical staff at Inland is perhaps nearly ten times as great as that at DHHU. One may infer from this that the top and middle line executives at Inland have many more assistants and many more trained people to actually perform technical work than do their counterparts at DHHU.

Fourth, in supervision, Inland employs proportionately many more General Foremen and Foremen than does DHHU. This holds true in almost all departments. The ratios of foremen and meister to workers and arbeiter in a few comparable departments are shown in Chart II. The Inland supervisors, moreover, commonly have much greater formal

education than their counterparts, the Obermeister and Meister, at DHHU. Some foremen at Inland have Master's degrees and 15.2 percent have college degrees, whereas practically none of the meister and obermeister at DHHU have any higher educational training. At Inland the college graduate foreman is a relatively recent development and it is to be expected that as these men move into higher management its educational level will be raised.⁴

CHART II

*Ratio of Foremen and General Foremen to Workers
In the Blast Furnace, Coke Plant and Open Hearth Departments,
Inland Steel Indiana Harbour Works, March 1, 1954*

DEPARTMENT	Number of Foremen and General Foremen	Number of Workers	RATIO
Blast Furnace	65	976	1-15
Coke Plant	68	702	1-10.3
Open Hearth	161	2,727	1-16.9.
Total	294	4,405	1-15

*Ratio of "Obermeister" and "Meister" to "Arbeiter"
in the Blast Furnace, Coke Plant and Open Hearth Departments
for Dortmund and Hörde*

DORTMUND

DEPARTMENT	Number of Obermeister and Meister	Number of Arbeiter	RATIO
Blast Furnace	12	605	1-50.4
Coke Plant	—	—	—
Open Hearth	6	296	1-49.3
Total	18	901	1-50

(4) The injection of the college graduate into the foreman occupation has created organization morale stresses, as the non-college man foreman sees his avenues or promotion blocked. This is an area requiring much additional research.

HÖRDE

DEPARTMENT	Number of <i>Obermeister</i> and <i>Meister</i>	Number of <i>Arbeiter</i>	RATIO
Blast Furnace.....	11	538	1-48.9
Coke Plant.....	9	238	1-26.4
Open Hearth.....	10	447	1-44.7
Total.....	30	1,223	1-40.7

Overall ratio of *Obermeister* and *Meister* to *Arbeiter* for the above three Departments of both plants is 1-44.2

At DHHU a greater burden of supervision is placed upon the leader or *vorarbeiter*. The trend at Inland over the last five years has been toward transferring the supervisory functions of the leader to the foreman who is a fulltime salaried member of management. This accounts for the very small number of leaders in the Inland organization, practically all of whom are in mechanical and electrical operations rather than steel production units.

It is obvious that Inland places much greater stress and has a much larger investment in first line supervision than does DHHU. This is perhaps the most striking contrast between the two steel companies.

It is also important to point out that at DHHU the position of *Obermeister* or *meister* is commonly regarded as the highest job to which an *arbeiter*, without formal education, may normally rise. Very few of the *meister* rise into positions in middle and top management. At Inland, on the other hand, it is quite common, indeed it is becoming almost the normal practice, for foremen to be promoted into higher managerial positions. There is thus a much greater degree of upward mobility in the supervisory and managerial hierarchy at Inland which reflects the greater mobility between classes in America than in Germany.

Fifth, there are some quantitative and qualitative differences in the ranks of employees and workers. It is generally conceded that the proportion of highly skilled workers at DHHU is much higher than that at Inland, although we did not gather statistical data to support this view.

This is explained by the greater investment in labor-saving and skill-saving machinery at Inland and also perhaps by the greater extent of supervision over workers at Inland. The DHHU management relies quite extensively on the all-around skill of trained craftsmen who can carry out their tasks with a minimum of supervision.

The statistics show that somewhat more clerical and junior technical employees are used at Inland than are their counterparts — the anges-tellte — at DHHU. Here again the explanation probably lies in the greater use of mechanized processes at Inland, which leads to a proportionately greater investment in so-called "indirect" labor services. It may also be explained by Inland's emphasis on detailed cost control and analysis to determine whether heavy investments are profitable.

Inferences and Conclusions

From this pilot study one may draw several significant tentative inferences and conclusions.

The formal educational training of top and middle management executives is considerably greater at DHHU than at Inland. On the other hand, the educational training of supervision at Inland is greater than that at DHHU. The DHHU executives have far fewer trained technical staff assistants than have the executives at Inland. For this reason a main criterion of successful job performance of the Inland executive is the coordination of the work of a staff, whereas the DHHU executive must himself have broad technical training, and he must also personally supervise technical operations. At Inland, a much greater proportionate investment is made in first line supervision, whereas at DHHU greater reliance is placed on trained craftsman and skilled workmen. What then are the explanations for these findings ?

The representatives of DHHU, who worked on this study who had visited the Inland works at East Chicago, pointed out that Inland makes much greater use of automatic machinery and processes than does DHHU. The greater the mechanization of operations the greater is the need for close supervision and the less is the dependence on the skilled craftsman. The DHHU representatives further indicated that, as they modernize their works at Dortmund and at Horde they will require more meisters with greater technical training at the same time they will need fewer craftsmen as skills are eliminated. In other words, techno-

logical development in the steel industry requires increased investment in and attention to managerial and supervisory development. The DHHU people also stressed the point that greater mechanization and the use of more advanced technology require a much greater number of technically trained staff assistants. Here again, the greater investment in senior technical staff at Inland appears to be related to the stage of technological development and the extent of investment in machinery. One may tentatively conclude, therefore, that technological development in the steel industry requires quite extensive expansion and development of supervisory and managerial personnel and at the same time necessitates rather extensive revisions in the structure and functioning of the managerial organization at all levels.

It would be incorrect, however, to attribute all of the differences in management and in access to managerial positions to technological factors. Other factors undoubtedly are important. For example, the age of an industry or a single company may have some influence on the educational background of executives. When the DHHU works were first built, a very large proportion of the top executives came up from the ranks. One of the reasons for the present large number of Inland executives who have risen from the ranks may be that the company is comparatively new. Another factor is the availability of educational opportunity as it applies to the lower levels of supervision. In the United States more young people proportionate to the total population go to colleges and universities than is the case in Germany. Another factor, of course, is the fairly rigid class system in Germany which does not exist to any comparable extent in the United States.

We should like to emphasize that truly definitive conclusions must wait upon the completion of more comprehensive studies involving a greater diversity of steel companies in Germany, the United States and other countries. These, we hope, will be forthcoming in the very near future.

Yet, even on the basis of this admittedly sketchy pilot analysis, we can safely make some valid generalizations on the potential usefulness of comparative studies of this kind. The managements of both Inland Steel and Dortmund-Horder Huttenunion are agreed that this joint study has had these practical results:

First, each company has benefited from making an inventory of its managerial and supervisory forces. This has served to focus attention

in a systematic way on the problems which each company faced in the selection and training of its managerial organization.

Second, the problems of organization and personnel have been highlighted by the contrasts which come to light in cross-national studies of this kind. For example, after analyzing the findings of this survey, Inland Steel raised the question as to whether or not its investment in supervision might be perhaps too great. For its part, Dortmund-Horder Huttenunion was led to examine more intensively the possibility of training and upgrading more workers from the ranks into managerial positions. For both companies, the pilot study served to stimulate more realistic examination of the assumptions underlying the building of their respective organizations and the processes of selecting and training their managerial personnel.

Third, this pilot study may provide a basis for a more realistic program of visits by German managers to American plants and visits by American executives to German plants. Having such a basis for comparison, the exchange of information and personnel in vital areas such as management training, human relations, and labor relations can be carried on with greater practical benefit to both countries.

Thus, we feel that the extension of this kind of cross-national comparative management study program can be of great long-range and also immediate benefit to the steel companies of the free world. Such a program can be carried on by the steel companies in several countries with the assistance of the steel federations in each country.

In more exhaustive and comprehensive comparisons, questions such as these might be studied:

1. Supervisory selection and training programs.
2. Executive leadership and development programs and procedures.
3. Staff and line relationships in industrial organization.
4. Criteria and procedures of recruiting labor.
5. Labor relations, human relations, and employee welfare.
6. The problems of internal communication.
7. Industry-university relations in recruitment and development of technical and managerial personnel.

SOMMAIRE

ÉTUDE COMPARATIVE DE LA GÉRANCE ET DE LA SUPERVISION AUX ETATS-UNIS ET EN ALLEMAGNE

INTRODUCTION

La présente étude, dans l'intention des auteurs, n'est que la première d'une série amorcée dans le but de comparer les méthodes d'administration des entreprises dans des pays différents afin d'en faire ressortir les similitudes et les dissimilitudes.

L'intérêt principal de ce premier travail consiste dans la détermination d'un cadre d'analyse qui s'avérera utile dans les investigations ultérieures.

Les deux entreprises étudiées appartiennent à l'industrie de l'acier. L'une est allemande; l'autre, américaine. Leur personnel est de même importance numérique et toutes deux sont parfaitement intégrées.

POINTS DE COMPARAISON

Les auteurs ont limité leurs comparaisons aux points suivants:

- a) à l'importance numérique du personnel affecté soit à la gérance, soit à la surveillance (managerial and supervisory personnel);
- b) à la nature de l'éducation reçue par ce personnel;
- c) aux tendances actuelles quant à l'organisation de l'administration et à la faculté d'accès aux fonctions administratives.

RÉSULTATS DE LA COMPARAISON

L'analyse a révélé que:

a) Le niveau d'éducation des officiers administratifs supérieurs et intermédiaires (top and middle management) était plus élevé dans l'entreprise allemande que dans l'entreprise américaine. En effet, dix-sept des vingt allemands appartenant au niveau supérieur d'administration ont un diplôme universitaire, alors que seulement deux des douze administrateurs américains possèdent des qualifications de même nature. Le contraste est encore plus évident au niveau intermédiaire d'administration où 119 allemands sur 183 ont des qualifications universitaires, alors que seulement 39 des 537 américains peuvent revendiquer le même honneur.

b) Par contre le niveau éducationnel des surveillants (supervision staff) est supérieur dans l'entreprise américaine.

c) De plus les officiers de l'exécutif américain ont à leur disposition beaucoup plus d'assistants techniques que leurs confrères allemands (430 contre 43) de telle sorte que le rôle d'un membre de l'exécutif américain consiste surtout à coordonner le travail de ses aviseurs alors que son confrère allemand, aux connaissances techniques plus vastes, accordera plus de temps à la surveillance technique des opérations.

d) Enfin, les américains font un usage plus grand des surveillants généraux (first line supervisors) 319 contre 1,044.

DÉDUCTIONS

Les auteurs proposent quatre facteurs qui expliqueraient ces dissimilarités administratives.

Deux sont directement rattachés à l'entreprise soit, la disparité relative dans l'âge et l'état de la technique de chacune des entreprises. Une entreprise jeune tire des rangs nombre de ses administrateurs, de telle sorte que ces derniers possèdent rarement un degré universitaire. C'est le cas de l'entreprise américaine. Par contre, une entreprise qui a déjà quelques décades d'existence a des chances d'être mieux structurée de telle sorte qu'on peut exiger de ses administrateurs un niveau d'éducation plus élevé. C'est le cas des allemands.

L'avancement technologique plus accentué chez les américains explique à la fois pourquoi leurs administrateurs ont à leur service un plus grand nombre d'assistants techniques seniors et s'occupent plus que leurs confrères allemands de coordonner les activités de ces derniers.

Deux autres facteurs relèvent des structures sociales des pays où sont situées les entreprises considérées et se traduisent par une disparité dans la facilité d'accès à l'éducation et l'imperméabilité des classes sociales. Leur influence sur le niveau éducationnel des administrateurs est assez évidente.
