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PRODUCTIVITY AND SOCIAL ORGANIZATION

The Ahmedabad Experiment: Technical Innovation, Work Organization and Management

A K RICE

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A. K. RICE

Productivity and Social Organization The Ahmedabad Experiment

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TECHNICAL INNOVATION, WORK ORGANIZATION AND MANAGEMENT

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ACKNOWLEDGMENTS

My very grateful thanks are due to the members of the Ahmedabad Manufacturing and Calico Printing Company Ltd., in whose Mills the work described in this book was carried out, and to my colleagues, both past and present, on the staff of the Tavistock Institute of Human Relations.

The thanks of a consultant to his client for the opportunity to practise his profession must always be implied in any consultant-client relationship. My thanks are due for far more: for the opportunity to carry out experiments in new fields of work; for the deep interest shown by those with whom I have worked and with whom I have waited, often anxiously, for the results of experiments, and for permission to publish the results of our collaborative efforts. So many managers and workers have been involved, either directly or indirectly, in the project that it is not possible to thank them all by name, and I hope that they will accept this acknowledgment of my debt to them.

I must make more personal acknowledgment to some who have been very directly concerned. First and foremost I must acknowledge a deep debt of gratitude to Gautam Sarabhai, the Chairman of the Company, who has gone so much further than a client in his interest in our joint work. I only hope that he has found our many discussions as fruitful and constructive as I have. I am also deeply grateful to his sister, Gira Sarabhai, for her help and encouragement, and I hope that she will be able to forgive me my share in turning her from a sister into an executive subordinate. Ambalal Sarabhai, the former Chairman of the Company and father of the present Chairman, told me many stories of the early days of the Company and of the textile industry in Ahmedabad, stories which I feel deserve a volume to themselves. I am grateful for his interest and help, and for that of his sister, Anasuyaben Sarabhai, the President of the Textile Labour Association, and of her colleague Shankarlal Banker. All of them were very kind and considerate to a stranger to India and to Indian industry.

J. A. Gandhi, former Manager and present General Manager, and Jethalal Thaker, former Works Manager and now Divisional Manager (Manufacturing), carried the main burden of all the early changes; their

ordinary work has been interrupted so much that they have frequently had to put in extremely long hours and to postpone or cancel holidays. They have borne it all with remarkable patience and, even though we have frequently disagreed at the beginning of some new venture, we have always found it possible to work together and to allow our disagreements to make a constructive contribution to the outcome of the experiments. W. F. Titchener, the Financial Controller, and B. V. Bhatt, the Acting Purchasing Manager and now Sales Manager, were appointed later, but apart from the reorganizations they have themselves been involved in, they have also been affected by the reorganizations in other parts of the mill and in particular in the management reorganizations. Their help and especially their friendly and effective collaboration and their willingness to consider ideas, however strange, are gratefully acknowledged.

The Mill Managers, W. H. Date, C. J. Patel, and B. Mitra; the members of the newly-created Development and Research Division, S. K. Dutta, H. V. Bhavnani, B. Sarkar, and members of their staffs; the heads of departments, L. C. Patel, P. S. Trivedi, Spinning and Weaving Masters of the Calico Mills; V. C. Joshi, D. Bhattacharyya, P. M. Desai, and C. P. Caprihan, Spinning Master, Preparation Master-elect, Weaving Master, and Weaving Master-elect of the Jubilee Mills; A. M. Mehta of the Processing Mill; Ramanlal Shah, Company Secretary; S. A. Kher, former Manager, now General Manager, Chemical Operations; and K. S. Dave, Labour Officer, now Joint Company Secretary: all have been involved in varying degrees in the discussions that have taken place and have experienced changes as a result of the work that has been done.

My especial thanks are due to those who took part in the experimental reorganizations of automatic and non-automatic weaving, in particular to C. P. Caprihan who took charge of both sheds during the experimental periods. His technical help, and above all his willingness to try new kinds of organization, were especially valuable. Under the direction of Jethalal Thaker, he was responsible for the erection of the looms, for the selection of supervisors and workers, and not only carried the major technological burdens throughout the experimental periods, but was responsible for the implementation of decisions about social reorganization. The shift supervisors of the automatic loom shed during the period were B. B. Dave, who became Top Supervisor when C. P. Caprihan went to non-automatic weaving, M. M. Bhatt who is now in charge of one of the non-automatic loom sheds, and S. R. Rajguru. The supervisors of the experi-

mental non-automatic shed were V. D. Chiplunkar, who is now in charge of the shed since C. P. Caprihan has been appointed Weaving Master of the Jubilee Mills, G. B. Vyas, and J. P. Patel. I acknowledge their help with gratitude and that of all the group leaders and workers of both sheds who in spite of their frequent misgivings were always willing to state their views and to try new kinds of organization.

My debt to my colleagues is of a different kind. When one works as a member of a group for a long time it is difficult to know where ideas, concepts, or methods of tackling various problems first originate. Ideas that I have now adopted as my own originated in conversations and discussions with my colleagues about my own work and about theirs. I was a member of the team that took part in the Glacier project, and although I have, at various places throughout this book, made reference to Elliott Jaques's account of that project[1] its general influence on the present work will be plain to all who have read it. The particular concepts and assumptions upon which the work described in this book is based have frequently been discussed in the Institute, not necessarily in relation to the work in India, but in relation to other Institute projects as well. I am grateful to my colleagues for the help they have given me in recent years. To Eric Trist in particular, however, I would like to pay a more personal tribute. The original concept of socio-technical systems was his, and it is to him that I have turned very frequently for help and assistance not only with the work, but in the preparation of the papers which preceded the book and in the writing of the book itself. He always gives unstintingly of his ideas, his time, his knowledge, and his experience.

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A. K. R.

2 Beaumont Street

October 1956 London, W.1

[1] Jaques, Elliott, *The Changing Culture of a Factory*. London, Tavistock Publications, 1951.

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PART I

The Project and its Background

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CHAPTER 1

Introduction

PRODUCTIVITY AND SOCIAL ORGANIZATION

This book is an account of the work undertaken by the Tavistock Institute of Human Relations in collaboration with the Ahmedabad Manufacturing and Calico Printing Company Ltd. in India. The work, which falls within the field of 'operational' or 'action' research, has been concerned with the interaction of social and technological change in a textile mill employing over eight thousand workers. Experiments which achieved both social and technological changes were carried out over a period of some three years. Measurements of their effects on each other and on productivity were made.

In 1951 Trist, in a study he made with Bamforth of the longwall method of coal-getting in Great Britain, introduced the concept of a production system as a *socio-technical system*. This concept was later extended to designate a general field of study concerned with the interrelations of the technical and socio-psychological organizations of industrial production systems.[1] Trist and Bamforth showed that the introduction of the three-shift longwall cycle into British coal-mining resulted in the breakdown of an established social system at the coal face.

A new social system came into being, characterized by maladaptive mechanisms, as a defence against the social and psychological consequences of the new technology. The close tie between technological process and sociological and psychological phenomena has also been demonstrated by other workers in both Europe and America. Wilson, speaking at the International Congress of Psychology in Montreal in 1954, said: 'Perhaps the most striking fact about recent work is its independent appearance in

[1] Trist, E. L., and Bamforth, K. W., 'Some Social and Psychological Consequences of the Longwall Method of Coal-Getting', *Human Relations*, 1951, Vol. IV, No. 1.

various countries and centres, and the emergence of similar findings in such studies as are comparable.'[1]

The concept of a socio-technical system arose from the consideration that any production system requires both a technological organization—equipment and process layout—and a work organization relating to each other those who carry out the necessary tasks. The technological demands place limits upon the type of work organization possible, but a work organization has social and psychological properties of its own that are independent of technology. While industrial production systems are, of necessity, designed in accordance with technological demand, there has been a tendency to project the technological into the associated work organization. The assumption is then made that there is only one work organization that will satisfy the conditions of task performance. This has meant treating groups and individuals as though they were machines and has led to what has aptly been called the 'machine theory of organization'.[2] Where, as has frequently happened, the resulting work organization has failed to satisfy the social and psychological needs of its members, their attitudes to task performance have inhibited the full realization of technological potential and lowered productivity.

A socio-technical system must also satisfy the financial conditions of the industry of which it is a part. It must have economic validity. It has, in fact, social, technological and economic dimensions, all of which are interdependent, but all of which have independent values of their own. These need to be taken into account in any reorganization due to change in any one dimension.

In the experiments described in this book attempts were made to take into account both the independent and interdependent properties of the social, technological, and economic dimensions of existing socio-technical systems, and to establish new systems in which all dimensions were more adequately interrelated than they had previously been.

The work with the Ahmedabad Manufacturing and Calico Printing Company Ltd. was carried out in the cultural setting of an old and eastern civilization into which western technology has been introduced only re-

[1] Wilson, A. T. M., 'Some Contrasting Socio-Technical Production Systems in Industry'. A paper given in a symposium on 'The Interaction of Technological and Social Factors in Industrial Production Systems' at the 14th International Congress of Psychology, Montreal, June 1954. The other contributors were John Hemphill, Rensis Likert, and Gunnar Westerlund.

[2] Katz, Daniel, and Kahn, Robert L., 'Human Organization and Worker Motivation', *Industrial Productivity*, L. R. Tripp (Ed.), 1951, Industrial Relations Research Association.

cently, and with only limited impact. Ruth Benedict has said that 'every culture, every era, exploits a few out of a great number of possibilities'.[1] The generality of the findings of the work described in this book is based upon the belief that, in our era, the majority of cultures are endeavouring to exploit the same possibility—the increased productivity arising from the application of technological advance to human effort. While it would be an over-simplification to suggest that the findings of experiments in the interaction of social, technological, and economic change in an Indian textile mill could have unqualified application elsewhere, nevertheless, the limits imposed on productive organization by technological demand and the universal endeavour to exploit the same kind of technology do suggest that the findings may have more than local significance.

THE PROJECT

The Ahmedabad Manufacturing and Calico Printing Company Ltd., more familiarly known as the 'Calico Mills', manufactures finished cloth from raw cotton in two mills, the Calico Mills and the Jubilee Mills, both situated in Ahmedabad. There is also a chemical division manufacturing bulk chemicals such as caustic soda, chlorine, and chlorine products. One chemical plant is in Ahmedabad on the same site as the Calico Mills. Another, now in the course of erection, is in Bombay, some three hundred miles south of Ahmedabad. Throughout the book the Calico and Jubilee Mills will usually be referred to by their more familiar collective title of the 'Calico Mills'. Where reference is made to the Calico Mills, as distinct from the Jubilee Mills, the context will, I hope, make the distinction clear.

Towards the end of 1952, the Chairman of the Company visited the Tavistock Institute in London. He described the immediate problem facing his Company as one in which the introduction of modern machinery and modern working methods was creating social and psychological problems for management and workers, both in their relations with each other and with the trade unions.

His problem was a part of a more general problem arising from the rapid industrial development in India since independence. In Britain, the first country to develop industrially, over ninety per cent of the working population is engaged in industry and commerce and lives in cities and towns. In America the rural population has decreased from fifty to twenty

[1] Benedict, R., *Patterns of Culture*. London, Routledge and Kegan Paul, 1949.

per cent in the past few decades. The industrialization of India is relatively recent. Even today, probably only about one per cent of the population is engaged in modern mechanized industry. Though in such centres as Bombay, Ahmedabad, and Kanpur a textile industry has been established for nearly a hundred years, attitudes towards mechanization and modernization are still affected by the more conservative majority engaged in agriculture and village crafts. The tropical climate, physical conditions, and standards of nutrition all contribute to a belief, widely held in India, that whatever mechanization or modernization of working methods may be introduced, norms of output will always remain lower than in the more highly industrialized countries situated in more temperate climates. While wages are still far below those in Europe and America they have increased considerably since independence. As elsewhere in the world there is strong and continuous pressure from industrial workers for improved standards of living. There has not, however, been any corresponding increase in productivity.

The Chairman of the Calico Mills recognized that changes in working methods and in attitudes towards mechanization would be unlikely to be successful without corresponding changes in the methods and organization of management, and that a study of management structure and behaviour would be a necessary corollary to any study of the workers and work organization. As a result of discussions with the Chairman of the Company I went to India early in 1953 for a short visit to explore the possibility of establishing a collaborative relationship between the Company and the Institute and to allow the members of the Company and myself to have some experience of working together. So far I have visited the mills four times for periods varying between three and nine months. On one visit I was accompanied by a second staff member for six months. Terms of reference have been very broad—to collaborate with management and workers in attempts to solve the social and psychological problems which faced them through changes in methods of work or of management. In practice, this has meant discussion of whatever problem has been urgently confronting the Chairman, other members of management or the workers, and working with them in trying to find some kind of solution. Starting points have been technological, economic, social or psychological—the terms of reference have set no limit either for the Company or for myself.

During the first visit my terms of reference were discussed with the

Chairman and then with other senior managers. It was agreed that I should be responsible directly and only to the Chairman and that, except in any selection procedures in which I might be involved, I would not report on individuals working in the Company. It was also agreed that any managers or workers within the Company could, if they wished, discuss with me, as individuals or as groups, their work, their roles, and their relationships, and that such discussions would be private; that is, nothing would be reported except with their permission. A meeting was held of all ranks of management of the Calico Mills at which the kind of work projected, the methods, and the terms of reference were explained and discussed. The President and leading members of the Textile Labour Association (the recognized trade union) and some technical members of the Ahmedabad Textile Industry Research Association also attended the meeting.

The account to be presented in this book is an interim report of work not completed, and still continuing. Because of the technological, social, and economic changes that will continue to take place in India, as elsewhere, changes will continue in the Calico Mills. In this sense the work will never be completed, and no final report will be possible.

The project was carried out within a consultant-client relationship, in which my primary professional responsibility was to give such assistance as I could to the solution of problems causing concern to the client. For this reason almost the only quantitative data available are the data of normal industrial practice and the qualitative data are such records of events as I was able to make either directly or through the collaboration of members of the Company. Although the work was directed towards specific problems, and specific steps were taken to deal with them, at no time could any of the resultant processes be kept isolated from other contemporary processes. Nor, because of the urgency of the problems, was it ever possible to consider long-term experiments, even had control been theoretically possible. The data available, therefore, are a collection of industrial data and a record of observed events arising from a complex variety of simultaneous processes. The problem has been to relate the changes and the events to each other; the danger that, in the analysis of any one process, the effects of other events and other processes would be ignored.

In subsequent chapters three changes are described, two in different kinds of weaving and one in management. In the first, changes were initi-

ated in the social organization of a production system which had recently undergone violent disturbance by the introduction of a new technology —automatic weaving. The changes introduced into the social organization enabled the production system to settle down by making possible the acceptance of the changes in the technological organization. The changes were implemented as soon as they were suggested. In the second, in weaving with Lancashire looms ('non-automatic' looms in which the traditional method of weaving was practised), technological and social changes were initiated simultaneously and took far longer to be accepted and become effective. In the third, in management, disturbance had already occurred as a result of changes in the social and economic conditions of the society in which the Company existed, and as a result of the changes introduced into the weaving and other production systems. The changes introduced into management took into account the resultant changes in all parts of the Company and provided the opportunity for the whole system to settle down at a more effective level of performance.

ANALYSIS OF THE CHANGES

Changes occasionally occur with dramatic suddenness. More frequently they are slow, difficult to observe and still more difficult to analyse. It is often only possible to observe that change has occurred after it has occurred; then only because some event happens to demonstrate that, at some previous time, a change must have occurred to have made the event possible. In the present account, changes have been divided into phases, the length of each phase being determined by the occurrence of an event which can be related to identifiable change in the process under study. All the known events believed to have had any effect on the process have been recorded. The phases have been related, so far as has been possible, to such quantitative measures as have been available. This has given a 'four-dimensional' record:

a chronological phase sequence of the process;
events directly related to it;
other events less immediately relevant but which can be shown to have had effects;
the quantitative data available.

Thus, the analysis in Chapter 14 of the results of the experimental

reorganization of non-automatic weaving identifies nine phases of length varying from ten to one hundred and four days. Each phase is identified by social or technological changes in the methods of work organization in the first 'dimension'. The second 'dimension' is characterized by events in the experimental shed itself, and the third by events in the mill and in the external environment. These three 'dimensions' are related to each other for each phase, and the quantitative results of efficiency, damage, and cost are then related to the whole.

The same methods of analysis have been used for all three change processes described, but, whereas in the weaving sheds certain quantitative data could be directly related to the changes introduced, in the reorganization of management no such immediately relevant data were available. Some indications of the overall results of the Company are given, and these can, in the sense that management is responsible for overall results, be considered with caution and reservation as related, however indirectly, to the reorganization.

PLAN OF THE BOOK

The book is presented in six parts. The remainder of the first part is concerned with background information about the Company and its setting in Ahmedabad. The second is a brief statement of the concepts and assumptions used in the work of the project. In the third, fourth, and fifth parts, work in three specific areas of company activity is described. Although for the sake of clarity each sub-project is treated as a separate piece of work, all are accounts of parallel activities which overlapped each other not only in time but as regards the people involved in them. I have tried to indicate the interaction between events in the different sub-projects, but, with so much happening at the same time, the events were not always easy to disentangle from each other; unwittingly, some over-simplification may have occurred. In the sixth and final part further consideration is given to the concepts and assumptions used and some general observations are made about the social and psychological demands of machine technology.

CHAPTER 2

Ahmedabad and its Textile Industry

THE CITY

Ahmedabad is situated on the banks of the river Sabarmati, some three hundred miles north of Bombay. It is in the middle of a wide flat plain only a few feet above sea level and is one of the chief cities of the Bombay state. The climate is hot and, except during the monsoon, dry. Day temperatures range between 80 and 118 degrees Fahrenheit and night temperatures between 40 and 85 degrees, depending upon the season of the year. The cool season which starts in November and lasts until February is delightful—warm days and cool nights with little or no rain. After the beginning of February the weather gets slowly hotter and more humid until the monsoon breaks in June or July. During the monsoon, and immediately after, the countryside is a rich and vivid green, but at other times of the year it is brown, dried up, and dusty.

The present city was founded by the Sultan Ahmed Shah in A.D. 1411 on the site of the more ancient city of Ashawal. Legend associates his choice of site with the ferocity of the rabbits infesting the river bank. When they defied his hunting dogs he felt that a place which could breed such rabbits must have virtues which would be useful to his fighting men. Ashawal, earlier known as Karnavati, had been for many years a centre of *Jain* learning and of a flourishing trade in fine, handwoven textiles. Nothing of Ashawal or Karnavati now remains; but the castle, the fortifications, and much of the wall surrounding the city, all built by Sultan Ahmed, still stand—a source both of pride and embarrassment to the present legislators and citizens of Ahmedabad. The wish to preserve the city's monuments is natural and strong but the wall with its twelve narrow fortified gates was never intended for modern traffic. Part of the wall was destroyed by the Maratha invaders in the eighteenth century, some

has fallen down, some has been removed to make roads of access to the city less congested, and some is still falling down. A small part is being repaired and preserved, the rest is being gradually removed to provide space for more useful, if less romantic, purposes. There are still many buildings which date from the fifteenth and sixteenth centuries and the streets in the city itself, except those which have been widened in recent years, are still, for the most part, narrow medieval alley-ways—picturesque but inconvenient.

In its medieval heyday Ahmedabad and its suburbs had a prosperous and thriving population of 800,000. By the time the British arrived in 1818, soon after the Maratha invasion, this had shrunk to a poor and luckless 80,000. The suburbs were dilapidated and abandoned while big game infested the country round the city. By 1942 the population had risen to just over half a million. War-time expansion in the textile industry and the establishment of ancillary industries and of some new industries attracted large numbers of new residents. After independence and partition in 1947 the population was further increased by the arrival of some thousands of refugees from nearby Pakistan. By 1950 the population had increased to nearly a million. No building programme could possibly cope with such an increase, nor could the city services expand at a sufficient rate to meet the demands being made upon them. Six years later, in 1956, building is immensely accelerated; drainage systems have been and are being greatly enlarged; electricity, water, and other services energetically intensified. The problems of growth are gradually being brought into manageable proportions. In the city and surrounding suburbs parks are being created, and along all roads where there is any possible space trees are being planted to give shade.

Driving through the city can be both an art and an exasperation. In the congested streets vehicles of all kinds, cars, lorries, and rickshaws, compete with pedestrians, cows, goats, and dogs for the relatively small passage available, while strings of camels, tied nose to tail and ambling along with regal disregard for other travellers, can make chaos of a busy junction. The confusion is not helped by the continuous hooting and bell-ringing practised by the drivers and riders of all wheeled traffic. That the resultant noise has little apparent effect upon the habits of pedestrians, let alone upon those of the animals, does not appear to discourage the drivers who continue to hoot and to ring even when they have a clear road. To the majority of the inhabitants of Ahmedabad, all life is sacred. Animals

—and, among those who are strict in their observances, even insects—are never deliberately killed. It is perhaps this attitude that accounts for the enviably low road accident rate.

An airport is situated about three miles to the north of the city and the route from the airport to the city runs through the 'Camp' and the Shahibag. They are park-like in appearance; houses of varying size stand in their own grounds and are separated by wide open spaces, some of which are used as a golf course. The majority of the members of the diminishing foreign community, who are mainly employed either in the Electricity Company or are agents for foreign firms supplying many of the equipment needs of the textile industry, live in the 'Camp'. The Shahibag is a residential suburb, where a large number of the millowners and more wealthy citizens live. Their estates are surrounded by high walls, over which can be caught glimpses of large houses and luxuriant vegetation at all times of the year.

Even before independence, Ahmedabad was considered one of the cities of India least under European influence, either architecturally or socially. Ahmedabad, even more than other Indian cities, has become still more Indian since the British left. The greater part of the population still lives in the city under crowded conditions. The climate is such that, in the summer, large numbers elect to sleep out in the streets, and the pavements and traffic islands are usually well occupied from about ten o'clock at night onwards. The capacity of men, women, and children to sleep through the night apparently undisturbed by traffic, pedestrians, scavenging dogs, and insects is remarkable. It is very difficult, however, for those who work at night to get much sleep during the daytime. Some who work in the city or in its surrounding mills live in neighbouring villages and walk several miles each day on their way to and from work. They, at least, can escape from the crowded city, but, as elsewhere in the world, many appear to prefer city life and to be deserting the countryside. However, in an inquiry carried out recently,[1] the majority of workers interviewed expressed the hope that one day they could return to their villages. Retirement gratuities, which are being gradually introduced, may make this hope more realizable than in the past, when few industrial workers appeared able to save, or indeed to keep themselves out of debt.

The streets in the city and suburbs are all tarred, but, so far, only a few of the roads leading out into the country can be anything but deeply

[1] Murphy, Gardner, *In the Minds of Men.* New York, Basic Books, 1953.

rutted tracks—chokingly dusty in dry weather, seas of mud in the monsoon. Buses connect the main nearby villages with the city, but the ruts they leave behind make the busier roads virtually impassable to any vehicle which is not high-slung. Roadmaking, like building, drainage, and electricity distribution, is being pressed ahead, but the problem of supply catching up with demand, as elsewhere in India, is immense.

It was just outside Ahmedabad on the banks of the Sabarmati that Mahatma Gandhi set up his first *Ashram*. The Mahatma, or to give him his full name Mohandas Karamchand Gandhi, known with reverence and affection as 'Gandhiji', did much of his early work in India in Ahmedabad. It was from Ahmedabad that he set out on his famous march in 1933. The *Ashram* is now a place of pilgrimage visited by many thousands annually. Also just outside Ahmedabad, in one of the growing suburbs, is the new Gujarat University which, like other educational institutions in Ahmedabad, is having to expand rapidly to deal with the ever increasing number of students who apply for admission. It is as yet too soon after independence for the greatly enlarged building and other programmes to have had more than a limited effect, but tremendous efforts are being made to deal with the social and economic problems of a growing industrial community.

THE TEXTILE INDUSTRY OF AHMEDABAD

The first textile mill in India is reported severally as having been opened in Broach in 1851 and in Bombay in 1854. The first mill in Ahmedabad was opened in 1861. All the machinery and equipment for the first mill had to travel the seventy-five miles from the port of Cambay by bullock-cart, since the railway did not reach Ahmedabad until 1864. Today with its forty-six thousand looms and nearly two million spindles Ahmedabad is, after Bombay, the second largest textile centre of India, having over a fifth of the looms and just under a fifth of the spindles of the country. The hot, dry climate of Ahmedabad and its location in the middle of a wide, dusty plain make it unsuitable for the manufacture of textiles. Furthermore, under British rule, the encouragement given to the Lancashire export trade led to the imposition of restrictions and duties on the new industry, which were not fully lifted until the 1930s. The growth and success of the industry, despite both the physical and the man-made handicaps under which it worked, must be ascribed, in the first place, to the enterprise of

the early millowners and to their tenacity in the face of difficulties. During the latter part of the nineteenth and early part of the twentieth centuries a strong middle-class of shareholders, technicians, and managers grew up with the industry—a middle-class which has been a great force in the civil and political life of the city ever since.

The first world war gave a great impetus to the industry. Many of the older established mills were expanded and a large number of new ones built. The great slump, the first signs of which were visible in 1922, became acute in 1925 and 1926. It was not until 1930, when the movement for the boycott of all foreign imports became widespread, that the rescue came. The second world war gave renewed impetus, and mills throughout India did well. The benefits to the industry of the expanded war production were however accompanied by some disadvantages. So great was the demand for cloth that virtually any cloth could command some kind of sale, and, since prices and production were controlled, both management and workers lost some of their interest in quality. The working habits of nearly ninety years were temporarily forgotten. The period of control extended for some years after the war. When it was finally ended many mills which had previously specialized in fine cottons and high qualities had a struggle to reintroduce their former standards.

Since the war there have been recessions and minor booms; some mills have had to close down, some have had to discontinue shifts in some departments; but the industry, as a whole, has prospered. Most mills in Ahmedabad had a bumper year in 1948, a relatively poor year in 1949, and after a good year in 1951 another poor year in 1952. Since then the general trend has been for the price of cloth to come down and the cost of cotton and of salaries and wages to increase. Not all mills have been affected equally by these trends, since the cost of different qualities of cotton and the prices obtainable for different qualities of cloth have not varied in the same way. In Egypt, in 1954, for example, the cotton crops were such that the price of some medium qualities rose steadily until it was higher than that of some fine qualities and, at the beginning of 1956, the gap between the prices of medium and fine qualities and the prices of coarse qualities was far greater than is usual. In the same way, the demand for good-quality cloths made of medium and fine qualities of cotton in 1951 was such that prices obtainable rose steadily only to fall heavily as compared with prices obtainable for cloths made of coarse cotton in 1952. *Table 1* gives the published results of a group of the recognized leading

mills of Ahmedabad since independence in 1947. The bumper year of 1948 has been taken as the base year, and cash turnover and gross profit have all been related to the base year at 100.

Table 1. COMPARISON OF CASH TURNOVER AND GROSS PROFIT OF A GROUP OF LEADING MILLS, 1948–1955

Year	*Turnover*	*Gross Profit*
1948	100	100
1949	90	45
1950	96	52
1951	130	81
1952	115	43
1953	116	63
1954	117	62
1955	127	90

During the same period the total expenditure on wages and salaries in the same mills has risen by twenty-three per cent, and the expenditure on raw cotton, which in 1952 rose to a peak of seventy-nine per cent above the expenditure for 1948, has since fallen, due to an increased use of locally grown cotton, to forty-eight per cent above the expenditure in 1948.

The problems of changing the depressed norms of output and rewards in India are complicated by language and caste differences among the working population. Languages are regional and, although Ahmedabad is in the Gujarat, and the common language of all those who work in the industry is Gujarati, it is not uncommon to find three or even four different languages being spoken in the same department of one mill. On one occasion, in a discussion with a group of eight workers, which was being interpreted in three languages, Gujarati, Hindi, and English, it was discovered after half an hour that one worker had not up to that time understood a word that had been said—he came from South India and spoke only Tamil. Caste groups, which are primarily work organizations, run, for the most part, at right angles to language groups, that is, within each language group most castes are represented, and within one caste most languages are spoken. With rare exceptions broad caste divisions have been carried into mill organizations. Spinning departments are usually staffed by members of the Harijan castes, while weaving de-