Co-existence of various scales of production is an important feature of the process of industrialisation. The growth experience of developed market economies reveals that small and tiny units have always been active partners in the process of industrial development and that, despite the rapid growth of the large scale sector, small industry by no means disappears, rather, it invariably grows along with the large scale production.\(^1\) As industrialisation proceeds there is a transformation of spheres between small and large scale production and of the functional relationship between them. The industrial sector would grow bringing in its fold changes in the scalar structure and establishing different types of inter-scale functional relationships viz. complementary, competitive and independent production.\(^2\) In a situation of free interplay of market forces the emerging scalar structure along with its typical functional linkages becomes a vehicle to speed up overall efficiency through the built-in flexibility of the small scale production.

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In the context of a developing country, where the economy operates under imperfect market conditions often leading to a dualistic structure, apart from technology and market, the institutional forces come into play in shaping the scalar structure and inter-scale functional relationship. As has been cogently argued in some quarters\footnote{For example, K.N. Raj, 'Linkages to Industrialization' paper presented in the conference on Development Planning, UN Economic & Social Council (tenth session) Vienna, March 25 to April 1, 1974.} the political economy of the country, as reflected in the asset/income distribution, welfare measures, industrial and other economic policies, determines to a significant extent the product-mix and technology choices. This in turn sets the basic conditions for the scalar transformation with its manifold implications for meeting the developmental objectives. Viewed in the above perspective, a study of the existing scalar structure - the types of inter-scale functional relationships and the modes of scalar linkages embodied in the scalar transformation and the institutional (non-market) forces influencing these changes - become vital to the understanding of the 'economics of scale' in a given economy. The present study is an attempt to study economies of scale in Gujarat's industries in this direction.

1. The process of scalar transformation

In order to carve out a framework to study economics of scale it may be useful to take an overview of the evolitional process of the scalar transformation. In its
historical perspective the transformation in the scalar structure presents the following pattern. As an economy grows the role of different scales of production registers significant changes and consequently changes take place in the scalar inter-dependence. In its simple form\(^1\), the change will emerge through the transition of artisan industry, replacement of household industry, and the development of small scale modern industry along with the large scale production. To illustrate with reference to the consumer goods, the small scale production in the household sector based on handicrafts gradually starts shifting towards mechanised mass-production in the large scale factory sector. The small scale sector gradually assumes the complementary role of producing the intermediate inputs that go into the production of the large scale sector by using modern methods of production and organisation and by replacing artisans by skilled workers trained in the use of modern machinery. It may not be that artisans and household industries disappear altogether in consumer goods but certainly their role gets reduced in importance and undergoes change in terms of the market they cater to. This scalar transformation can be explained mainly by the interaction of changing pattern of income distribution and technological changes accompanying the growth process.

\(^1\) Admittedly, it is hazardous to make generalisations since the pattern of scalar structure depends largely on the socio-economic environment in each country.
In an economy growing systematically on the lines of capitalist modes of production, the increase in income with built-in skewness in the distribution, brings about changes continuously in the pattern of consumer demand. The demand for basic commodities would increase in quantity and would require more standardisation and fineness in quality. Since the decentralised production using traditional technology fails to meet the increasing demand of these consumer goods, the need would arise for mass production using mechanised techniques in the large scale sector. With the use of capital augmenting technologies, continuously being developed under the influence of market forces, the large scale sector would be able to produce relatively finer quality products on a mass scale at a lower cost and would wipe out the small scale sector. Here, it must be noted that it is mainly the demand from the middle income group of the society that gets diverted to the large scale through this substitution effect. And, there still remains in some measure the competition of large scale with the small scale production in sharing the demand of the remaining segments of the society.

With emergence of the large scale production, the role of the handicrafts, household and other modes of small scale production gets reduced. This process however, generates demand for the intermediate inputs that go into the production of the large scale sector, and the small scale production
shifts to fill in this gap. The character of the small scale production, both in its method and modes of production, however, would undergo changes; small scale production would get organised as a miniature of the large scale production, using modern methods of production and employing wage-labour in producing intermediate inputs for the large scale sector. This process is strengthened by the influence of the newly emerging production processes. With the expansion of market, technological development extends the limits of division of labour and introduces those types of production process where scale economies are not important or where, there is a positive advantage in small-scale batch production. Thus, the small scale sector through various modes of linkages flourishes in the production process complementary to the large scale production such as, separate manufacturing operations, precision hard work, simple assembly and finishing etc.

The large scale production, as pointed out earlier, would still have to compete with the small scale traditional consumer products in sharing certain segments of the market. The typical case is the consumers in the very low income group for whom factory made goods may still remain outside their consumption basket. The large scale sector is at a disadvantage in meeting the demand of the very low income strata due to diseconomies of scale involved in marketing
the factory made goods. This segment of the population would still continue to depend on the low quality local-made products in the unorganised small scale sector. Similarly, at the other extreme, there would be the elite segment of the society which requires specialised consumer goods that cannot be produced in bulk in the factory, using mechanised methods of factory production in the large scale sector. Hence, the income effect directs the changes in demand to handicrafts and household products. The small scale production based on handicrafts and other traditional methods of production thus survives more as an independent rather than competitive production, to cater to the demand of the elitist strata of the society.

Thus, at the evolulional process of the scalar transformation is characterised by changes in the scalar structure from the household activities producing basic consumption goods to the rapidly expanding large scale sector still producing mainly the consumption goods while small sector competes through product diversification. In the next stage, the large scale sector generates a stronger stimulent for the growth of small scale units in complementary production leading to vertical scalar integration. This process leads to a stage of mutual inter dependence between the small and large scalar production where, the latter takes a lead to determine the pattern of investment, technology and the product mix. The small scale industry thus almost disappears
in the production of mass consumption goods and only the artisan industry with a very special aesthetic appeal to the sophisticated buyers from the elitist strata of the society survives independently of the large scale production.

The dominant type of inter-scale functional relationship that emerges with the scalar transformation is more likely to be that of complementarity. As industrialisation picks up the momentum and as the sophistication of technology reaches the level where every small specialisation is possible, there takes place disintegration of the earlier continuous processes of production in the large scale into batch productions which can be carried out on a relatively small scale plants for eventual assembly at the large scale. This establishes complementary functional relationship between small and larger scales of production. In the complementary relation there would obviously be linkages of production in an input-output sense of forward and backward nature which are determined technologically. Besides, the institutional environment in which the various scales of production co-exist would also establish financial, marketing and entrepreneurial linkages. The efficiency of small scale production is thus likely to be influenced by the choice of technique (factor proportion), apart from these institutional linkages. Under certain institutional framework it is also likely that certain modes of scalar
linkages develop an enclave type of exploitative relationship as was the case initially in the sub-contracting system in Japan. The economic power in the hands of large scale producers through its control over factors of production, technology and demand, sets the mode of linkages and make a significant impact on the functioning of the small scale sector. The linkage so determined may help in maximising the net output but may also adversely affect the distribution of surplus between small and large scale producers.

The existing scalar structure of production, inter-scale functional relationships, modes of linkages and the relative efficiency of small scale production thus have to be viewed in the context of the structural developments taking place in a given economy. Implicitly, a planned development of scalar structure can be an effective instrument for meeting the development objective of growth and social justice in a developing economy. As has been argued in some quarters,1 the macro-economic planning should be concerned not only with the sectoral plans but also with the planning of the scalar structure, in such a way that various scales of production would grow in a mutually consistent manner so that the dual objectives of growth and social justice can

be simultaneously taken care of. In this context, a quick look at the Indian policy would help us in sharpening the focus of the present study.

The Perspective of Indian Policy

The scalar structure emerging in industries in India, can be viewed mainly as the product of the deliberate choice of the planners. Broadly speaking, the development strategy has been geared to protect and promote the small scale sector. The employment generation potential because of the assumed capital saving and labour intensive nature of small scale technology was the major consideration of the planning policy. The protection to small scale industries was also justified in terms of other development objectives, such as, decentralised industrial structure, better income distribution, mobilisation of latent resources and balanced regional development.

The development strategy in 1960s aimed at rapid industrial growth and assigned an important role to cottage and small scale industries in terms of satisfying wage-goods demand generating surplus to sustain (and possibly increase) investment in heavy industries and to generate immediate employment.

The validity of the protectionist policy to promote small scale industries per se, has been subject to serious doubts. The structuralists argued that in the given
socio-economic conditions the technology-mix in a scalar structure is largely determined by the distortions in the factor market and organisational factors, and not so much by the given factor-proportion of a known technology. The degree of competitiveness both in the factors and the product markets, ownership pattern and impact of foreign capital investment play a decisive role in determining relative market efficiency of alternative techniques of production.\(^1\) The government policy did not however reflect such a diagnostic view and instead continued to tackled the problem only in the context of the employment implications of a given spectrum of technology.

Apart from the employment argument, production in small scale sector is protected in view of the other development objectives, such as creating a decentralised industrial structure to ensure better income distribution, to generate specific types of supplementary employment to agriculture, to develop entrepreneurship on a wider basis and to attain a balanced regional growth. In the light of these multiple roles assigned to the small scale sector, the basic approach, in the policy framework often adopted, has been of the type that 'what can be produced in small scale sector should be so produced'.\(^2\)

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\(^2\) For example, see the *Industrial Policy*, Statement, 1977.
Since early seventies, the role of small scale sector has been revived in the wake of its phenomenal growth in the production of complementary goods to the large scale sector. The approach seemingly was that small scale units would flourish at a higher rate, where they have forward linkages with the large scale sector. But it has been argued that the policy aiming at a systematic sub-contracting system ala Japanese model may turn to be irrelevant in the present Indian situation.\(^1\)

The existing scalar linkages as evolved by the planning policy is in contrast with its objective. This is true in the sense that the objective was for the production pattern in the small vis-a-vis large scale sectors to grow in a complementary relation while, the growth of small scale sector to have taken place with a degree of aloofness without much of a systematic organisational tie-ups.\(^2\) What is perhaps desired in India is planning a scalar structure that ensures a net work of scalar linkage - mainly the financial, marketing and technological - such that it brings small scale units into the mainstream of economic activities. This requires a closer understanding of the pattern and the

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extent of scalar linkages, their implications in terms of diffusion of skill and technology, size efficiency relationship and the distribution of surplus between small and large producers. A thorough investigation of these issues would need to be done for identifying the directions in which the policy framework could be restructured.

Some Missing Links in Research

The Indian policy has indeed evoked considerable research interest. Fact-finding studies tested the economic viability of the assumed employment potential of small scale industries. Several studies identified the problems faced by small scale industries and pleaded for more protection and incentives. Almost all these studies, however, treated small scale industries in isolation to the large scale, or at best only in a comparative static framework, rather than treating the small scale operation as an integral part of the scalar structure of production.

The major contribution of the research came from the interesting debate on the choice of techniques. This debate like the one on the size and efficiency correlates remained inconclusive but pointed out the trade off between

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maximising present employment and future output growth. The research in the area also underlined that it is the relative rather than the absolute size of the firm that is relevant to economic analysis.

The research work in the area suggested that economics of scale should be analysed in terms of the interdependent scalar structure of the industrial production rather than the choice of technique question. Since the pattern of interdependence between size classes differs across industries, the scalar structure can be properly viewed in the light of the functional relationship that it establishes within the industry, and in relation to the rest of the economy. The studies on the scalar structure could, therefore, profitably proceed by demarcating industrial activities on the basis of their functional relationships and then examining the relevant issues of size.

An awareness is thus growing among development economists, that the analysis of the scalar structure, apart from the size, technology and efficiency should pay attention to factors like type of organisation, pattern of ownership and market structure, which largely determine the types of inter scale functional relationships that come into being. The important question in this context are: where from the linkages originate? How do they spread over various scales? And whether this leads to enhancement of surplus generation, and how is it appropriated?

Objectives, Data and Methodology

An attempt has, therefore, been made in the present study to examine the issues raised above in the context of Gujarat. The choice of Gujarat is influenced by the fact that the region has a sustained experience of modern industrial production and an adequate background of entrepreneurship. More specifically, the objectives of the study are:

a) to sketch the scalar structure in a macro framework of the regional economy and to examine its overall growth and its economic characteristics over time;

b) to trace interscale and intersectoral linkages in a functional sense;

c) to reexamine the hypotheses on size efficiency correlates at a disaggregated size-classification of a cross section of firms;

d) to portray a comparative picture of scalar characteristics of registered vis-a-vis unregistered small scale sectors; and

e) to capture the socio-economic implications of a scalar linkages where a modern small scale sector is functioning as complementary to large scale sector.
Unlike the large scale industries, the data base for small scale industries lacks in coverage, details and often in continuity. Various sources of information have, therefore, been explored to suit specific objectives of the study. Information on various economic variables for the industries in small and large sectors is compiled from the National Sample Survey and the Annual Survey of Industries (ASI) respectively, for the period between 1960 to 1970 and 1973 to 1978. The industries are classified at 3 digit level of ASI classification. Discontinuities in the time series arose because no separate information on small (sample) sector was available for the intervening period.

For the purpose of a point of time analysis of size characteristics of small and large scale sectors in Gujarat, the information on various firms belonging to industries classified at 3 digit (NIC) level of disaggregation have been used. This information pertains to the registered factory sector (census + sample) for the year 1977-78. Since this excluded the vast population of unregistered sector in Gujarat, firm level information for the engineering group of industries was analysed for small units which are registered with Small Industries Development Organisation (SIDO). The information pertained to 1972-73.

A two-stage analysis was carried out to identify the different types of functional linkages. In the first stage, the growth correlates of various industries in small vis-a-
vis large scale sectors were identified. Then a detailed examination of linkages in the case of two engineering products was attempted with the help of primary data, collected through questionnaires and interviews. In order to carry out the field study of small scale engineering units, the sample has been drawn from SIDO units. Among the various product groups in engineering industry, two groups viz., textile machinery and diesel parts manufacturing, have been selected on the basis of their relative importance in the engineering industry. The location has been selected on the basis of the maximum concentration of these units in Gujarat that is to say Ahmedabad for textile machinery parts (TNP) and Rajkot for diesel engine parts (DEP) have been selected for the field of study. The analysis is based largely on simple statistical techniques like frequency distribution, ratios, correlation and regression analysis.

Plan of the Study

This introductory chapter provides the framework of the present study. Chapter 2 maps out the structure and the growth of industrial sector in Gujarat and traces out the transformation of scalar structure. The picture emerging for Gujarat is placed against the backdrop of all India setting, traced over the period 1960-78. The analysis highlights the shifts in the share of small scale production
from the traditional consumer goods to the modern intermediate and capital goods. An attempt is made to identify various forms of functional relationships viz. complementary, competitive, or independent production on the basis of the growth rates of various industries in small and large scale sectors in Gujarat.

The main focus of Chapter 3 is on size and efficiency correlates. Examining the size distribution of firms in the small as well as the large scale sector, it studies the relationship between capital, labour and output across various size classes through 'conventional key ratios' in the production function framework. Hypotheses which have been tested in the context of Indian manufacturing sector are reexamined by using firm level data for Gujarat. The 'ratios' across size classes have also been worked out for industries classified in terms of competitive vis-a-vis complementary forms of functional linkages. The analysis of this Chapter is thus oriented towards examining the heterogeneity in the production characteristics of firms within the 'small scale sector'.

Chapter 4 extends the above analysis and looks into the scalar characteristics of unorganised (informal) sector, vis-a-vis, the organised small scale sector in Gujarat. The discussion is confined to the engineering group of industries, where complementary linkages of the small scale with large scale production exist.
Chapter 5 is a somewhat detailed field-based inquiry into the extent and pattern of various types of linkages, viz. technological, marketing and ownership in firms engaged in textile machinery and diesel engine parts manufacturing. The investigation aims to find out how far non-market forces play a role in determining the forms, motivations, strength and outcome of scalar linkages.

The final chapter (Chapter 6) presents a summary of findings of the study and suggests directions in which the policy issues need to be reviewed for the healthy growth of small scale production by establishing desirable forms of scalar linkages.