TECHNOLOGY AND SMALL ENTERPRISES

TECHNOLOGY, AUTONOMY AND INDUSTRIAL ORGANISATION

Edited by
Erik Poutsma
Arnold Walravens

DELFT UNIVERSITY PRESS/1989

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Erik Poutsma
Arnold Walravens

INTRODUCTION

Erik Poutsma
Arnold Walravens

In the results of research and in the policies in the area of new technological developments attention is being drawn in particular to the radical alterations that may concur in the industrial structure, the relations between the enterprises and the labour-relations. In this connection, the central theme involves the changing management methods of the labour organization and of the labourprocess. On the one hand, new information technology would tend to reinforce concentration and centralization, both within the enterprise as well as between enterprises in the industry-column. According to this hypothesis, work in the small-scale independent enterprises would become increasingly dependent on large-scale structures; while on the other hand control-structures of a more decentralized nature would be feasible.

In this connection, the theme pertaining to the relation between new technologies and the increasing demand for the type of work affording greater autonomy and independence, is of importance. However, the question is: if - and to what degree - new technological developments are admitting of realization of such demands or, to the contrary, may serve to precisely thwart this realization by way of centralistic structures. In the contributions that compile this publication, the above theme is expressed in various terms and ways.

SMALL AND MEDIUM SIZED ENTERPRISE AND TECHNOLOGY

Small enterprises are important. Not only due to the fact that there are a great many of them and that, as such, they provide for a substantial part of the employment in Europe, but rather because they are also important in terms of job-creation, for local- and regional job opportunities and for self-employment.

The increasing interest in research and management policy for small- and medium-sized enterprises coincides with the revival of this category of enterprise in the seventies. After a period of concentration and enlargement of scale in which large enterprises obtained an increased share of output and employment, every major OECD country for which data is available generally experienced a lower proportion of employment in large enterprises in the 1980s than at the beginning of the 1970s. For small enterprises matters are reversed, generally having a higher proportion of employment at the end of the period (CEC, 1987).

A great many explanations have been postulated in connection with this development. None of these by themselves offer an adequate elucidation, but each rather represents a specific development to which the development of small enterprise is a reaction. This involves as follows:

(a) relative growth of the service sector and increased relative importance of small firms winthin the manufacturing sector account for a development to a small scale 'service society',
(b) declining international competitiveness of large firms is responded to by contracting out many activities to small subcontracting firms,
(c) the threat of unemployment influencing self-employment growth,
(d) an "enterprise culture" promotion that meets the desire for independence and autonomy and reflects a need to move out of large organisational structures to intrapreneurship and "alternative" small-unit formation,
(e) the development of craft-based industries selling at the top end of the market. These enterprises were able to prosper at a time when there was a sharp fall in demand for those standardized products generally produced in the large firm sector,
(f) new technological developments are of benefit to the growth of small firms rather than large firms because of its flexibility requirements.

The last of the above mentioned arguments, postulating technological developments to substantiate the arising of - and the interest for - SME, should be viewed not so much in terms of an explanation for the interruption and breaking down of the tendency

towards concentration in the seventies, but rather as an explanation for the current utilization of the new technology for a perspective of "small-scale units for production". In recent discussions concerning the consequences of technological development, attention is drawn to these alterations of scale and, essentially, this pubication intends to continue in this vein.

The main characteristics of present-day technologies, i.e. Information Technology, relevant to this topic can be summarised as follows:

(a) Much greater flexibility in rapid model changes and design. Some analysts have referred to this phenomenon as "economies of scope", replacing to some extent "economies of scale". Whereas previous assem-bly line and flow production systems were relatively inflexible and based on the continuous replication of vast numbers of standardized, homogeneous products, the new flexibility permits more rapid changes of tooling and dies, so that small production runs become economic and the prospects for small and medium-sized enterprises are greatly improved, reducing the barriers to entry and permitting major changes in industrial structure;

(b) The capability to link up networks of component and material suppliers with assembly-type firms or with service firms. Equally important, the technology can link producers, wholesalers and retailers. In both cases it is the convergence of communications and computer technology that permits savings in inventories at all levels in the system, especially in work-in-progress, and a more rapid and sensitive response to daily changes in consumer demand (Benetton is an example). Furthermore the new flexibility and speed of communications systems and their links with data banks permit a wider variety of new "Value-Added Networks" (VANS) and new types of information services.

These possibilities of new technology means that it affects not only the structure of the economy in terms of new industries and services, but also the internal structure and management of all enterprises and the relationships between them. It has been pointed out that there is a development in advanced enterprises towards the horizontal integration of R&D, design, production and marketing, as opposed to the traditional Tayloristic pattern of vertical, hierarchical control. In this connection attention is also drawn to new forms of organisation of industrial production and new forms of work organisation.

A term like "flexible specialisation" (Piore and Sabel, 1984) expresses that SME's are interpreted as parts of a system of productive resources, which contribute to the production and application of new technologies, and that the technological changes are more and more understood as endogeneous variables of the economic process. In this respect the specific organisation of SME's turns out to be a precondition of innovation, effectuating the new technology. At the other extreme SME's are interpreted to be under severe pressure of competition in the markets and, effected by new technology, dependend on large organisations. In other words, while it is common to think in terms of effects of new technology upon SME, the reverse direction of causality should also be discussed.

The same holds true for the discussion concerning the relation between new technology and workorganisation. Controversy has surrounded the effects of new technology upon the way the work is performed, notably the skill required of employees and the scope, the autonomy provided for the task. On the one hand, new technology has the effect of regradation of work. On the other hand new technology has been seen as intensifying degradation. An impressive variety seems possible in the ways new technology will affect work organisation. There seems to be no unique implication of new technology in this domain. This view is expressed by the European Communities' Forecasting and Assessment in the field of Science and Technology (FAST) Programme reports in terms of a "fairground" of possible outcomes (CEC, 1982), by others in terms of "design space" and "organizational choice". Managerial attitudes and objectives are proving the key factor in determining the direction of change.

At the same time, rigidities in work organisaton are a serious constraint upon effective utilisation of new technology. Experiences of those enterprises that already put new technology to good use make it clear that innovative systems of work organisation, altered managerial attitudes and skills and new approaches to employee autonomy, are all essential to effective innovation. In some respects SME-workorganisation is seen as a precondition of innovative use of new technology: entrepreneurship and autonomy at the workplace.

QUALITY OF WORK

In a particular way the issue of "small is beautiful" is related to the above mentioned potential of SME's. A frequently voiced proposition states that social developments will gradually culminate to a future situation where the medium- and small sized enterprise will occupy the

central position, while the dominant role on the part of large industry with respect to labour will come to an end in the near future. However, this statement should not lead us to conclude that this would automatically result in better and autonomous labour.

The development towards an increasing number of workers in small enterprises does not, in itself, provide any useful indication with respect to any increase in autonomy in our society. In analysing the problem both the social-economic development and the relation between large- and small enterprises have to be taken into account. On the one hand large industry has lost its leading position where it concerns employment-expansion and production-structure, while on the other hand it continues to fulfil a central part in the technological development (R&D expenditures) and in economic politics in the area of investment (utilization of invenstment-premium and subsidies) and of wage-development (large collective labour agreements stipulate labour terms and conditions for a great deal). On basis of research in Western Germany, Baethge (1986 & 1987) has demonstrated that old comparitive definitions such as "small is beautiful", "large industry may be equated with alienated labour" are in fact rather onesided pronouncements.

His research in industry and services, concludes that where it concerns the West German situation, many large industries in fact offer to their permanent core of employees jobs that are more interesting, more highly qualified and, from a professional point of view, more promising in opportunity than is the case in the majority of the small- and medium sized enterprises. Furthermore, a substantial share of "bad" jobs are found particularly in the small-scale services sector (retail-trade, hotel/ restaurant-business, sanitary services). Notwithstanding possible alterations in the origins of workorganization, i.e. less Tayloristically split-up contents of task to complex, more integrated worksituations (Kern and Schumann, 1984), Baetghe concludes that the development of increased control and regulations has served to restrict the professional autonomy of workers qualified in the various trades to an excessive degree.

Viewed against a background of sharpening contradition between the quality of labour on the one hand and on the other hand the control of the work a cautious and restrained optimism with regard to the effects of decentralization would certainly be warranted. Many seemingly independent branches and sub-branches are however related to the "headquarters" of large organizations to such an excessively narrow degree as a consequence of new information- and telecommunication technology that only remnants of their previous independent existance have survived.

CONTENTS OF THE VOLUME

The theme of this publication may be briefly summarized as follows:

(a) What are the effects of new technolgy upon the independent performance of SME's, its relation with other organisations and its position within the industrial structure? Specific attention is paid to independency as the key factor of small enterprise.

(b) What are the effects of new technology upon workorganisation in SME? Specific attention is paid to autonomy as the key factor in the work performance of small enterprise.

(c) What will be the future role of SME in effectuating new technologies?

The European Perspective

Both SME as well as new technology are important European areas of policy, as is evident from *Otto Kuby's* contribution with which this publication opens. He emphasizes the significance of the small- and medium-sized enterprises in relation to new technology for the European social-economic development. He indicates in this connection the significance of the Special Task Force for the small- and medium sized enterprise of the European Community, that has been established in 1983, also as a concomitant consequence of the European Year of the Small- and Medium sized Enterprise.

In addition, he draws attention to the Special Task Force for New Technology. In the aims and purposes of these Task Forces the innovative role of the Small- and medium sized enterprise, also with respect to new technological development, occupies a central position; however, he directs attention to the significance of policy development on basis of the social aspects of technological development. He stresses the conditions: New technologies run the risk of themselves becoming part of a rigid structure unless they are adapted to the individual and his manifold capabilities. A new "technology ethic" is required so that structural change may be managed in the most efficient- and consensual way possible.

Technology

In the next chapter *Brytting* starts with an attempt at clarifying the concept of "technology". Starting from a broad definition of technology as the tools and methods used in order to solve a commercial task, the

author proposes a three-dimensional classification of technologies reflecting batch-size, softness and labour intensity. The relation between different technologies and firm size is contemplated. It is argued that this relation is vague and weak. Even though the choice of basic technology has strong implications for the degree of centralization, it is difficult to relate the size of autonomous firms to technology. Instead, it is proposed that the explanation of the size of the autonomous firm often is to be found in the self-conception of the owner/manager and not necessarily in matters such as technology and economies of scale. Size is something which is determined - explicitly or otherwise - by the definition of the firm's *business concept* and so is something cognitive rather than contingent.

Autonomy and Industrial Organisation

Schmidt proceeds with the analysis of the chaning position of the small- and medium sized enterprise and of the work within it with the concepts of autonomy, hierarchy, segmentation and polarization in the production- and labour(market) system. He proposes that the analysis of the consequences of technological changes for the structure of labour will be discarded concurrent with analysis of the decisionmaking processes in the enterprise. The workorganization in enterprises may be given form quite independent of other enterprises or may constitute a part of the organization of the work of other enterprises within a division etc. In both instances, the workorganization in the smaller enterprise may be structured in accordance with the principles of either hierarchy or autonomy. In order to elucidate future development, Schmidt introduced three hypotheses, to wit: First, the centralization - hierarchy hypothesis: economies of scale will ensure that the production will become increasingly centralized and concentrated in a limited number of large enterprises, while these large enterprises will organize their work in accordance with the governing principle of the internal labourmarket: hierarchy of jobs and jobcarreer specifics.

Second, the decentralization- autonomy hypothesis: the new technology will ensure that economies of scale can no longer function as a specific determinant. This will prove profitable not only to the small- and medium sized enterprise but to large enterprise as well. The latter will furthermore become aware of opportunities resulting from decentralization of their large-scale production into smaller units subject to their control. In consequence, the division of labour may increasingly be viewed in terms of decentralization and operate in accordance with the principles of autonomy. However, it is also possible that a situation of

excessive dependency may develop with respect to economic decisions on the part of top-management in the large enterprises.

Third, the segmentation - polarization hypothesis: small enterprises become engaged in a competitive battle with large enterprises in the area of availability of labour and other production factors. This has resulted in segmentation of the labourmarket into an internal-, an external and a skilled trade or professional market. Increasing segmentation may result in polarization between groups of "core" employees in large companies and a variety of peripheral group of workers who tend to become concentrated in the small enterprises. Innovation may serve to still further differentiate this segmentation: innovative enterprises tend to organize their work in accordance with the principle of autonomy for the benefit of their core-group employees much sooner than would be the case in non-innovative enterprises. With the aid of comparing empirical material concerning the developments in West Germany and Japan, Schmidt has concluded that in the development of the work-organization in small enterprises, a number of different phases may be discerned relating to the development of application of new technology.

Next, *Benvenuti* introduces the concept of TATE on the basis of experiences in the agricultural sector. This "Technological Administrative Task Environment" he defines in terms of a superstructure, a quasi-organization that imparts form to the specific environment of small enterprises. The agrarian sector is characterized by a plurality of advisory- and supportive agencies. These for the greater part have been established - and are controlled - by public - and private organizations that operate within the framework of legislated principles of law. Scientific institutions provide for the necessary support. The organization-advisory and supportive institutions form as it were a network of formal "agencies" that have, to an extensive degree, assumed responsibility with respect to the historical-, local- (generally individual), informal social environment. This, as far as it concerns the individul enterprise, has brought about a diminishing of autonomy.

Governing institutions and advisory agencies have attained to such a degree of influential power to a point where they, to an extensive degree, stipulate the external- and internal functioning of enterprises. This has resulted in the agricultural sector, in a situation in which sectoral agencies have taken control of the market by way of the allocation of means. This control has gradually developed to additional control with respect to the manner in which people variously manipulate raw materials and products. The means applied to this end included, among others, a scientific basis of support: the "management- and labourconcept", that time and again is emphasized at every occasion that seems to substantiate

the validity of the concept. As a consequence of such influences (or rather as a result of this type of authoritive power) exerted by TATE agencies, the content of both labour as well as management style are stipulated. Benvenuti has demonstrates the validity of his argumentation on the basis of extensive empirical material for enterprises in the agricultural sector.

This TATE concept appears to provide an excellent frame of reference for discussions on the organization and relative autonomy of smaller enterprises and independent or selfemployed workers in other sectors. In an overall evaluation of the results of his study, Benvenuti proposes that the concept of TATE is specifically applicable to such small-scale sectors where:

- it involves a strong dominant position of external systems; and where at the same time
- the technology in the branch is no longer composed of isolated elements, but has become a component part of a networkstructure; and
- where externalization of management tasks simultaneously results in greater pressure on the entrepreneur in order to manage the remaining tasks.

Van Driel and Poutsma consider the significance of recent discussions of the labour process for the analysis of work in small enterprises. The central themes are the control in small companies and the perspective of 'flexible specialisation'. Tentatively they state that with respect to control, the employment relation is more important than the division of work. Control in small companies tends to rely on exclusion or on loyalty taken for granted.

In the discussion of the theme of flexible specialisation, small and medium size enterprise will presumably assume a central role. Flexible specialisation, functional flexibility as a future alternative small-scale organisation form for employment, is an intriguing but barely explored theme. The comments given show that the studies undertaken so far suffer from one-sidedness and limited empirical range. Flexibility understood as a specific form of control, a way of strategic action by the management, need to be tantamount to a multifunctional job content.

Autonomy and independency: cases

Autonomy and craft work

Kankaanpää et al., in their contribution on the subject of the autonomy of workers, both male and female, in the industrial small enterprise in Finland, argue that with respect to the concept of autonomy,

two theoretical traditions are in fact involved. These two traditions on the one hand relate to independence in the sense of economic- and political independence, which is the relevant factor in the instance of entrepreneurial and similar activities. On the other hand it involves a theoretical tradition which emphasizes the autonomy of workers on the job. Indications of this latter tradition may be observed in structural- and radical approaches in particular (Marxist tradition, see Wright, 1979 and Braverman, 1974). Taking as point of departure Braverman's key-publication, attention is focused on the effects of the modern economic system with respect to either the retention or deskilling of craftmanship as well as autonomy on the job.

Kankaanpää et al, on basis of their empirical study, conclude with respect to these effects, that apart from autonomous- and non-autonomous workers of both sexes, a further distinction applies to semi-autonomous male- and female workers. The authors contribution enter deeper into the methodological problems with respect to the measurement of autonomy and arrive at the conclusion that clusers of workers may be grouped along an axis on which the measure of autonomy can be expressed.

The study indicates that the catagory of semi-autonomous male workers in the Finnish smaller enterprises is numerically large. This may lead to the conclusion that there is a structural difference between the autonomy of workers in small enterprise and large industry. A greater degree of autonomy in the work-area of the smaller enterprise ensures the flexible character of the enterprise as a whole.

Economic independence

Triest in her contribution, draws attention to the relatively new phenomenon of woman in the function of entrepreneur and discusses the question whether or not such entrepreneurial activity may be one way by which women may attain to economic independence. The discussion proceeds from an initial proposition that research in this area has not as yet strongly developed and, in consequence, investigations into the relation between women-labour and technology are principally with respect to women in employment-relations. In this respect women appear to find themselves in a weaker position and possessing only little autonomy, a fact that has also been indicated by Kankaanpää et al.

Triest argues that female entrepreneurs are still attempting to integrate two roles into one single perfect combination. They attempt to attain to a reconciliation between, on the one hand, their role in terms of woman and/or wife and, on the other hand the entrepreneurial role. She

points out another perspective of autonomy which she has termed: the "woman-identified-autonomy" approach. It is necessary to take as point of departure the personal-, social- and technical qualifications of woman and to integrate these in a striving for autonomy in the form of independent entrepreneurial activity. In this context, female autonomy refers to the measure of control with respect to their private-, social and economic life. It is precisely the characteristics of femininity (gender) that must serve as a contribution in the striving for autonomy and independent entrepreneurial activity, instead of forming an obstruction. This means that women themselves determine the content of their individual personal- and economic objectives. Triest illustrates this approach on basis of an alternative Dutch training project of women-tradeschools: schools specifically established for (re-entering) women intending to start a business of their own.

Self-management and co-operatives

The striving for independence by way of forms of self-management is not a new occurrence. For example, we call attention to movements that aim at countering alienation in work and humanization and democratization of technology (among others Mike Cooley). Activities of a more coordinated nature, in which also the trade-unions could participate, would create possibilities for latching on to any supposed openings in management- and productionorganization concepts for a "human centered technology".

In his contribution *Thomas* sees the "new wave" of worker co-operatives in the context of the trend towards "autonomization". Data and examples from the U.K. are used to show that there is no general support either for the "optimistic" hypothesis that co-operatives are necessarily able to make humanizing choices about technology or for the "pessimistic" hypothesis that they are completely constrained by technology. In fact, there are cases where co-operatives have been able to take some control over technology and others where the constraints appear to be much heavier. Thomas attempts to develop a framework for analyzing the factors in this "relative autonomy" which either allow or do not allow technological choices. This framework includes the position of the co-operatives as a small firm within its particular branch of industry, the way new technology is applied in that branch, and the potential for identification between job, product and social or political aims. The revival of "alternative" movements are not the only indication that reflection is needed concerning the purpose of the work-organization and the relations within it.

Attention may be drawn to the social policy of the more traditional small enterprises on basis of the socialization of the enterprise. The traditional independent entrepreneur also can no longer avoid, with the introduction of new technologies, paying attention to the subject of worker-participation in the functioning of the enterprise and in the labour process. However, developed forms and models of organization and automation of a more humane kind are rather scarce. As a result of this lack, the introduction of new technologies threatens to negatively influence the social policy in the broadest sense (more than worker-participation alone). This causes social policy to assume the character of an adaptation-policy. So the question is still: what are the perspectives?

Future perspectives

Whether new or old independents, polarization or decentralization, the question remains as to the significance of the small-scale form of working and entrepreneurial activity and what part this form promises to play. The question involves not only whether or not the smaller enterprise represents a "value sui generis", but also if the smaller enterprise may serve as a "potential instrument for (government) policy" in order to attain to renewal of the economic- and social system. If it is true that small-scale industrial activity serves to fulfil a specific function, it will be necessary to also on the meso- and macro level develop policies to this end (both on the national and the European level). In this connection Kuby has also argued along similar lines in his contribution. When viewing the history of policy-programs it can be noted that these have progressively developed from "protective" to "stimulative".

In the various discussions the dominant conclusion indicates that cooperation between smaller enterprises gives rise to both protection as well as stimulation. In this manner it will be possible to lend substance to the relative autonomy of this form of entrepreneurial activity. For this reason, *Sengenberger's* contribution concerning the development of smaller enterprises in relation to industrial organization, proposes that the formation of "cartels and congregations" of smaller enterprises offers entrepreneurs an opportunity of externalizing their internal problems. This "bottom up" strategy of externalization of problems on the part of smaller enterprises in cooperative framework, might well be a competitive strategy capable of being supported by policy. Sengenberger rejects the current policy that is aimed at relative reduction of labour-costs in smaller enterprises. Essentially, his proposition states that policy should place less emphasis on the individual enterprise. Consideration should be given to development of organization-models that will make

cooperation between small enterprises possible and actively promote such cooperation. In this connection, he draws attention to the phenomenon of Industrial Districts.

Vilrokx in his contribution develops the concept of RATO=the relative autonomization tendency in/of organizations. One of the consequences of this autonomisation tendency is the integration of self employed workers with global production organizations. In order to qualify some of the changes in the organization of work and employment, he distinguishes between traditional, new and organisational self employment. He attempts to construct a typology representing the principal relations between the nature of the execution of work and the organisational structure in which the work is executed. Probably the most profound issue emerging in relation to the restructuration process of the work environment described, concerns the way people are (subjectively and objectively) connected to each other, to the organisation and to global society. The growing importance of network structures implied by RATO in all subsystems of society becomes the basic feature of societal and work organisations. This tendency is largely responsible for the shift in social cohesion models we are witnessing. Atomization of work and individualization of social life are the two main factors underlying this process. He hypothesized that the organisation of social integration in such circumstances might well be the core problem future society is facing.

This means that, with respect to labour, autononomization of the organisation-structure leads to flexible networks of new catagories of workers and industrial units: part-time or temporary employment, supply by way of independent labour. New independent labour therefore not only signifies an increase in new independent trades or professions, but rather precisely the coming into being of a qualitatively totally different production-organisation on both the micro as well as the macro level. The production-organisation structures its operation in growing measure in "core"-, "peripheral"- and external activities. This in actual fact means that geographical limitations no longer exist, which will result in a large degree of potential flexibility. We concur with Vilrox's conclusions that in this context independent labour, of necessity, needs to be redefined. This publication may well serve to initiate the discussion.

THE EUROPEAN PERSPECTIVE

SMALL AND MEDIUM-SIZED ENTERPRISES AND NEW TECHNOLOGIES

Otto Kuby

SUMMARY

This contribution investigates the challenge and problems of new technologies, especially those in information technologies and of the organization of our economy in relation to so-called "small and medium-sized enterprises", and in relation to European Communities' policy.

Research shows that large firms initiate technological change more quickly, while smaller firms complete the changeover more rapidly once they begin. This means that the starting point for discussions on implications of new technologies on autonomy differs between small and large.

The Economic and Social Committee has drawn up a report on the social consequences of new technologies in which it has been stressed that, basically, it may be assumed that in themselves new technologies are neither positive nor negative. New technologies can open up possibilities for job enrichment through the integration of tasks combined with appropriate margins of freedom regarding the execution of the work. At the same time, however, new technological systems can also contribute to a radical loss of job content, through the progressive decentralization and increasing standardization of work processes.

In this connection, the Committee has stressed that the position of small and medium-sized enterprises merits special attention in that in attempting to introduce new technologies and accompanying methods, not only workers but also firm owners sometimes have difficulty in adapting and organising the work in an appropriate way.

In this respect two primary points are to be kept in mind:

1. New technologies run the risk of themselves becoming part of a rigid structure unless they are adapted to the individual and his manifold capabilities.
2. A new "technology ethic" is required so that structural change can be managed in the most efficient and consensual way possible.

INTRODUCTION

A major report of the Economic and Social Committee on 'Europe and the New Technologies' provides a useful breakdown of what has been done in and by the European Committee as regards new technological research, its industrial application and the social consequences. In this connection and in the writer's capacity as one constantly confronted with the arguments of both sides of industry, and of those of miscellaneous other interests such as consumers and of politics in general, we will investigate the challenge and problems of new technologies, especially those in information technologies and of the organization of our economy in relation to so-called "small and medium-sized enterprises" (SME), and in particular handicraft industries.

In so doing the following questions should be taken into consideration:

1. Why are small and medium-sized enterprises at the centre of much discussion today?
2. How can SME and new technologies usefully combine?
3. What are the broader consequences of new technologies on living patterns and working conditions?
4. What are the main relevant points of the European Action Programme on SME and subsequent developments?
5. What is the position of the European Economic and Social Committee in these respects, notably as regards the social consequences?

DICUSSION ON SME

Turning to the first question, in the late sixties and early seventies there was a great deal of theoretical literature and a variety of political programmes dealing with Committee industrial policy which showed a commitment to increasingly large and centralized industrial units. Under the banner of the "American challenge" it was urged that more profitable and dynamic large undertakings should be established to measure up to the new dimension of the Common Market and the demands of international competition (the pressure for innovation in both products and processes). The underlying principle was that highly centralized large undertakings would be best equipped to carry through such innovations, and thus to contend with the demands of international structural change, on account of their higher profits, better financing facilities and the wider markets for their products. The Community industrial (promotion) policy framed to this end combined two objectives, namely the encouragement

of high-technology industrial sectors and the giving of aid to quite a number of ailing low-growth sectors.

The incentive for a technological restructuring of industry in general, and SME in particular, was reduced by relatively cheap commodity- and energy imports and by a relatively liberal immigration policy which reduced the upward pressure on labour costs by bringing in workers from low-wage countries. Consequently, there was no major discussion at the time of ways of giving appropriate stimulus to the intermediate sector of the economy, which has the function of applying and expanding the technological contribution of advanced large undertakings. Since 1973-74 the situation of SME in Europe has been the focus of increasing attention from the Community's political organs. The main reason for this practical shift in emphasis in industrial policy objectives and target groups would seem to be the SME sensibility to economic fluctuations, as borne out dramatically in the recession that hit all Member States between 1973 and 1975. In view of the SME economic and social importance in the Member States, many arguments militated for adjusting individual national policies and the economic instruments available to the Community Institutions to take greater account of the problems of such undertakings. In September 1981 the European Commission organized a research seminar on the relationship between technology, capital and labour. Frank Wilkinson of the University of Cambridge presented a paper on Scale of Production, Technical Change and Employment. In his analysis of the organization of our Western economy he arrives at the same general conclusion: that up to the seventies there was a strong tendency towards large-scale production, with a growing interest in large industrial organization. Small firms had been increasingly relegated to residual categories. Technical progress also had a bearing on firm size. Wilkinson continued to explain that the primary employment sector was concerned with the large firms operating capital-intensive modern technology and offering high wages and secure employment prospects and requiring a high degree of specific skills, whilst the secondary employment sector, with declining industries required low levels of skills. In the seventies the consensus amongst economists and social scientists about trends in industrial structure and organization broke down. There was growing evidence of SME creating jobs and of the re-emergence of more flexible markets and a movement away from inefficient monopolistic structures.

The first energy crisis of 1973 made us reflect on energy saving and new technology. Confronted with the economic crisis of 1973-75, labour-market and industry's social scientists undertook research and found that small-scale enterprises are more job-creating than large enterprises, a fact that now seems to be self evident. Last but not least, there was a merger

process in all European countries and in the United States which brought to the attention of politicians that in a free Western style competitive economy the small and medium-sized enterprises have to play their role in competing with big business.

Apart from their function in stimulating competition we should keep in mind that these small and medium-sized enterprises have a high market flexibility and an important role in the education and training system in each of our countries (two-third of school-leavers in Germany receive training in a small or medium-sized enterprise).

SME AND NEW TECHNOLOGIES

We now turn to the second question dealing with the extent to which new technologies support the movement in favour of small enterprises. Did or does new technology, such as computerization, microchip technology and information technology, contribute to production on a small scale? To what extent did democratization in the economy, as favoured and claimed by trade unions (which demanded rights for workers and their representatives on the shop floor), promote the subcontracting of work, with the result that at the present time in the automobile sector for example, only 50% of parts in a car are produced by the manufacturer and the other half are produced by subcontractors? Where is the cause and where the effects? One thing is widely acknowledged: that new information technologies made it possible to decentralize the production processes of large enterprises.

In order to clearly comprehend why SME are now a major topic of discussion, we have to consider the patterns of demand for new technologies by enterprises. A recent public poll of 120 German top managers published by a consulting company in Munich indicates that companies with 500-2000 employees are less ready to use new technologies than either smaller or larger companies. These findings are contrary to a study done by Larry Fenster published by the National Commission for Employment Policy in Washington which shows that large firms initiate technological change more quickly, while smaller firms complete the changeover more rapidly once they begin. A second finding by Fenster among some eight others, seems significant: while size differences among firms are a major reason for the differences in the speed of initiating technological change, government policies which encourage size differences (i.e. in favour of either small or large industry) will not quickly increase the rate of diffusion. These findings (by Fenster) have been confirmed by a study of the Verein deutscher Ingenieure (German Society of Engineers) which was carried out in Germany, France

and Britain in *1983*. It concludes that in all three countries, the larger the enterprise the more widely new technology is used in manufacturing processes (the use of micro-electronics in products is very limited in the three countries and accounts for about 3% to 4% of total manufacturing industry). In total manufacturing industry in Germany only 50%, in France not even 40%, and in the UK 47% of firms use micro-electronics in production processing.

But time series would show there is a continuous process in the wider use of new technologies. Politicians now understand the importance of small and medium-sized industry in our economic system and this is why we have to consider the implications of new technologies.

CONSEQUENCES OF NEW TECHNOLOGIES

This leads us to the third question of our theme, pertaining to the broader consequences of new technologies.

It is surely a salutary objective to make a living on one's own responsibility to the extent that one is intellectually and physically able to do so. We should strengthen the independence of persons who participate in political life and in the economic professional organization.

Now within this logic we have to examine what can possibly be done to increase and strengthen SME. It must be stressed in this connection that we are no longer living in a classical 19th century situation where self-employment was clearly an "independent" means of earning a living. For there are now tendencies for large companies to close certain departments only in turn to re-employ the same workforce as so-called "self-employed" persons dependent on subcontracting for the same services previously provided within the firm. This does not necessarily mean a new "independent" producer/entrepreneurial position. In the automobile industry, for example, subcontractors are often obliged to enter into the information network of the producing firm, which implies high investment in new technologies, so that information technologies can be connected with the main producer. The small entrepreneur has to be flexible in his production according to orders placed and he may be obliged to maintain stocks in close proximity to the producing firm. Practically, the small producer subcontracting to the large firm has to behave as a production department of the large firm, while profit- and loss operations are for his own account.

What does independent work autonomy mean in this context? With the aid of the new technologies on the possibilities of managing this development through decentralization and quality control circles in large enterprises one might come to the same efficiency, i.e. quality of products,

and to the same job satisfaction as would be the case in smaller independent working units. It is of course understood that the giving of state benefits to an SME entrepreneur is not an end it itself but is done with a view to the part such an entrepreneur can play in the change in the organization of our economy, in particular with regard to job creation, autonomy and independent work. In this area also, scientific research is needed.

A second point might be that large scale industry as such gives us more assurance as to the protection and security of the worker and of the environment in general. It is on the one hand a question of the knowledge of the cost/benefits of our production and the consumption and the danger for the human being. On the other hand it is a question of control: here the ways are split; big industry is more likely to be controlled in respect to environmental pollution and the protection of employees at the workplace, whilst small enterprises more often are not. This major question of cost-effectiveness, its calculation and its management through new technologies (particularly as regards working conditions) is one which indeed requires careful consideration. As to the question of the use of new technologies, in particular information technologies: it is no longer a matter of what are the effects on employment, on industrial structures, on power, on our society and its organization. Our discussion up to this point already indicates that there is no alternative to this economic direction and we now have to investigate the consequences and search for the best possibilities within the general direction. In this connection we must keep in mind what history has taught us in respect of the first economic revolution in the 19th century. It started off with the invention of steam power and consolidated the organization of society into nation states. It was not just certain professions and branches of production which were rendered totally obsolete; the whole structure of society was changed, simply by the provision of better means of production and thereby more income and greater concentration of power, together with a major migration to the cities. At that time the distinction was made between industrial and rural areas. The old joke of a farmer coming into a city and not recognizing a motorcar or a tram, dates from fifty or a hundred years ago. Today it is new technology which takes their place. The political direction of things has changed as it did in the first industrial revolution. The feasibility of easier movement and the construction of railways initiated, or at least aided, the construction of modern nation states, like Italy and Germany, not to mention the United States of America.

One might examine the increasing consolidation of power and see how modern technologies (not just the atom bomb, but especially the so-called new technologies and control possibilities via satellites) have

changed our world in respect to military conflict and military strategies, not forgetting cultural values. What are the predictions with respect to our so-called culture in the application of new technologies and especially the information technologies, like telecommunications and so on? Obviously, everyone has to make his own judgement as to the balance to be kept between favourable new technologies (both as regards small and medium-sized and large industries) and other objectives of life: safety for all and for the individual, health, the protection of the environment and the progress of democratic society as a whole.

EUROPEAN ACTION PROGRAMME ON SME

What has been done at a European level regarding SME and new technologies? The Economic and Social Committee, the official European consultative assembly representing employers, workers, farmers, consumers and some 15 representatives from small businesses and cooperatives, has announced on several occasions that the particular problems of SME and new technologies should be looked into. So, too, has the European Parliament. These activities culminated in the declaration of 1983 as the European Year of Small and Medium-Sized Enterprises and Handicrafts, for which the Committee (with contributions from the European Commission and the European Parliament) organized the opening conference, and the Parliament (together with the Committee and the Commission), the closing conference. It was quite natural that one of the big issues to be discusses at the opening conference was that of new technologies applied to small and medium-sized enterprises and within the Action Programme adopted at the closing conference mentioned above, the chapter on innovation and new technologies was one of the most important.

After this European Year for Small and Medium-Sized Enterprises it took three years to get the Council of Ministers to adopt an Action Programme for small and medium-sized enterprises along the lines of that adopted at the closing conference in December 1983 in Strasbourg.

This Action Programme enumerates the important issues which are needed to favour the environment for SME. It mentions the role of independent entrepreneurs in our society. A project is envisaged to promote the spirit of enterprise among young people and to promote self-employment. The same aim existed when the Commission proposed the so-called local employment initiatives programme, which was intended to create small-scale independent jobs in local communities. Let us consider two major aspects of this Action Programme.

We have, first of all, the completion of the internal market. Surely SME which do not have the market knowledge to export and which are limited to small-scale production should profit from the removal of fiscal and other barriers. But on the other hand, they must also expect stronger competition in their traditional markets. Here flexibility, also in the application of new technologies, is needed. In this perspective crossborder cooperation is a necessity to meet the challenge of the internal market today.

Another important aspect of Community policy notable in view of the internal market is the existence of so many different national measures in favour of SME. They consist of tax benefits, of credit facilities at advantageous rates, information systems, etc. which often conflict with the competition or subsidy rules of the EC. New action in this field might help particular SME but are harmful for the completion of the Internal Market which is of benefit both to industry as a whole and to the consumer. But care must be taken with regard to the limits to benefits granted to SME. The Internal Market is too important and cannot afford to be imperiled.

Secondly, in order to facilitate access to new technologies the European Communities have adopted a number of programmes which help SME to make use of these new technologies. These initiatives include:

- The programme for the extension and integration of European business and innovation centres which goes back to the early eighties and for which there is now a sequel.
- The so-called COMET programme which supports the flow of information between research institutes and industry, in particular small and medium-sized enterprises, and uses multipliers like technical transfer advisers who can best show and advise SME on the application of new technologies experience. (It is not necessary to repeat the fact that large enterprises, multinationals like Philips and Siemens, have their own means of communication with research institutes in addition to their own research centres).
- There is strengthening of cooperation between SME and research and innovation projects of the Community.
  Programmes which should be mentioned here include ESPRIT with respect to information, RACE with respect to telecommunications, and BRITE with respect to the new technologies in conventional industries. The DELTA project is also highly relevant to SME, since it provides opportunities for start-ups and innovative companies to enter a high-technology application at a formative stage and favours the development of a learning support infrastructure providing easy and flexible investment by the user, thereby

reducing entry barriers for continued education.

- The promotion and innovation and technological cooperation among SME: here the Commission wanted to support the infrastructure for the innovation of technology transfer through transnational cooperation between innovation consultants, SME and the previously mentioned technical centres (SPRINT programme).

It is not necessary to draw a complete picture of the numerous activities of the European Communities in the field of new technologies and in that of small and medium-sized enterprises since this information is available in the ESC publication on New Technologies; however, it should be mentioned that -in the middle of the nineteen eighties- the Commission has created two "task forces" with horizontal responsibilities, one for looking after SME and the other for New Technologies. The SME task force in particular, it has to examine each Commission proposal (Regulation, Directive, etc.) for repercussion on SME and the evaluation is made part of each Commission text.

THE ECONOMIC AND SOCIAL COMMITTEE AND SOCIAL CONSEQUENCES

In conclusion we will look into the question as to the position of the Economic and Social Committee, notably with regard to the social aspects of technological development. In this respect, the Economic and Social Committee has drawn up a report on the social consequences of new technologies in which it has been stressed that, basically, it may be assumed that in themselves new technologies are neither positive nor negative. It is the way in which they are applied and used by people that give them positive or negative aspects. This report questions whether with the new forms of production using new technologies we are moving towards centralized or decentralized forms of production and work organization. Is there a real optional choice of model? What is the perspective for small enterprises and independent work in this context?

It would undoubtedly be prudent to refrain from giving an answer to this question for it would seem that only in a limited sense does one have any real opportunity to decide for or against new technologies or certain production methods (in this connection we refer to earlier remarks concerning the size of enterprises using new technologies). Discussions about international competition of enterprises show right away that, for example, in discussing the regulation of genetic manipulation and its repercussion on mankind, no arguments are put forward for regulation, because other countries have no such regulations and, were we to have

any, we might not be competitive. These are truly the right questions to put, however we have to verify, with the help of science, wether or not the answers are correct and capable of leading politicians into the right direction and making the right decisions. What we need is clarity in the factual options and here the political- economic- and physical sciences all have something to say.

From a general perspective, the Committee has stressed that new technologies must help to:

- promote quantitative and qualitative economic growth,
- facilitate the satisfaction of the material necessities of life,
- promote progress while remaining socially acceptable,
- meet justified ecological demands,
- satisfy non-material needs (creativity, solidarity, social participation),
- safeguard and create new jobs and incomes,
- improve working conditions,
- provide goods and services and finance social tasks from the profits.

On structural changes, the Committee has stated that technological change offers a real opportunity for a net increase in jobs if the entire economy is geared to an increase in demand, stimulation of production (and not just productivity), changes in working time and the integration of technological rationalization in all sectors.

Subsequently, the Committee has further noted that new technologies can open up possibilities for job enrichment through the integration of tasks combined with appropriate margins of freedom regarding the execution of the work. Work structures that make use of these possibilities to increase employees' scope for action make new demands on versatility, adaptability and willingness to change so that new requirements are set for management, such as the creation of multifunctional work stations and the setting up of flexible manufacturing facilities and systems.

At the same time, however, new technological systems can also contribute to a radical loss of job content, through the progressive decentralization and increasing standardization of work processes. In other words, whilst new margins of work freedom can be created for management, there is also the risk of boredom and de-skilling. Much depends on the form of integration and the social skills and training which accompany such structural changes. In this connection, the Committee has stressed that the position of small and medium-sized enterprises merits special attention in that in attempting to introduce new technologies and accompanying methods, not only workers but also firm owners

sometimes have difficulty in adapting and their financial resources are often insufficient to cover the investment required.

Moving to the specific question of "independent" work at a home terminal, the Committee has noted the experts' forecast that by 1990 about 20% of all office jobs in the USA will have been shifted to private households. It has also taken note that surveys of home workers in the USA have indicated that 56% would prefer to continue to go every day to a place of work outside the home. In general, increasing social isolation is to be feared in addition to the already mentioned de-skilling of work.

Furthermore, the Committee has argued that home work can involve a considerable increase in social risks for those concerned. If home workers have the status of self-employed persons, they are not covered by labour- and social insurance legislation; also, they have to reckon with both liability and entrepreneurial risks. On the other hand, positive aspects of such home work would include greater individual freedom as regards the timing of work and the possibility of making adjustments to suit the workers' own requirements.

In conclusion, there are two primary points to be kept in mind:

1. New technologies run the risk of themselves becoming part of a rigid structure unless they are adapted to the individual and his manifold capabilities.
2. A new "technology ethic" is required so that structural change can be managed in the most efficient and consensual way possible.

Arguments for and against SME to be taken into consideration with regard to new technologies, autonomy and independent work:

Positive arguments

+ create new jobs, increase production, productivity and in general competitiveness,
+ provide experience as entrepreneur may form democratic courage needed in our society of mass-movements,
+ job satisfaction for the entrepreneur, more than just the income advantages, in comparison with a dependent job; questionable: sub-contractors.

Negative aspects

- job satisfaction of dependent workers in SME is questionable. In medium-sized or large enterprises quality work circles up to

participation might arrive at the same job satisfaction for all participation in the production.

- security at the work place and the larger environment are better observed and controlled in medium-sized and large enterprises; in larger enterprises the opportunity exists to internalize social costs, for example internal medical system.
- basic education and training are equally well done in small or medium-sized enterprises than is the case in larger enterprises. With respect to new technologies, larger enterprises are better equipped for training and retraining.

TECHNOLOGY

SMALLTECH-HUMANTOUCH

Is there a special technology in which small firms are competitive?

Thomas Brytting

SUMMARY

This paper starts with an attempt at clarifying the concept of *technology*. Starting from a broad definition of technology as the tools and methods used in order to solve a commercial task, the author proposes a three-dimensional classification of technologies reflecting batch-size, softness and labour intensity. The relation between different technologies and firm size is contemplated. It is argued that this relation is vague and weak. Even though the choice of basic technology has strong implications for the degree of centralization, it is difficult to relate the size of autonomous firms to technology. Instead, it is proposed that the explanation of the size of the autonomous firm often is to be found in the self-conception of the owner/manager and not necessarily in matters such as technology and economies of scale. Size is something which is determined -explicit or otherwise - by the definition of the firm's *business concept* and so is something cognitive rather than contingent.

INTRODUCTION

There exists an enormous amount of data, pointing out *size* as the prime determinant of organization structure (Blau & Schoenherr, 1971, Pugh, 1976, Routamaa, 1985). Size is also often seen as fostering innovation behaviour (Schumpeter, 1934, Maidique, 1980), motivation (McClelland, 1965) and autonomy and freedom (von Hayek, 1959, Beckrus & Roos, 1985). The sheer size of the small firm sector of the economy accen-tuates the question of small scale advantages.

We all know that small firms constitute an important part of the organized economy. In Sweden about 50% of all privately employed people work in firms with less than 200 employees (1). Obviously small firms have some kind of comparative advantages over large firms, at least in certain segments, or ...?. It is often said that small firms are best suited to work in the labourintensive service sector, or that small firms are extremely efficient when it comes to production of tailor-made products; that they have an extraordinary capability to mobilize and motivate managers, employees and customers. Is this true? What are the small scale's advantages and were do we find them?

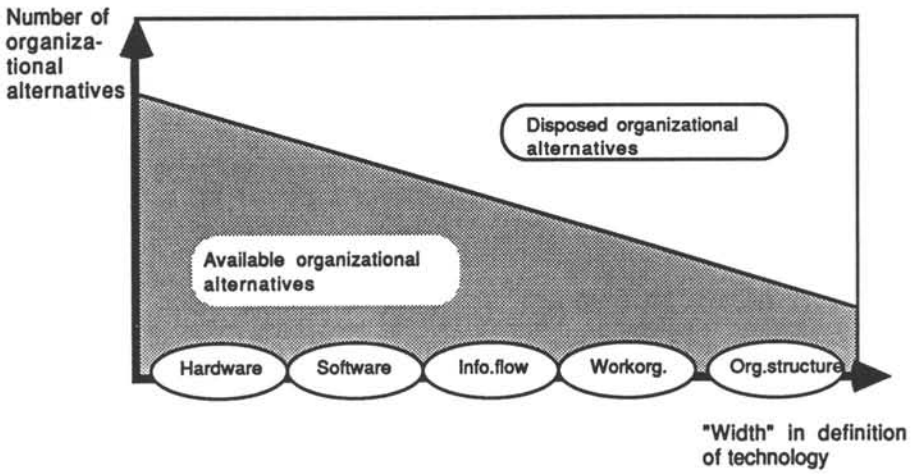
Questions like these are normally answered with words like flexibility, high motivation and niche-monopoly. If so, small firms will become more and more common as the technological development evolves, as the level of education and ambition in the workforce increases, and as consumer markets become increasingly differentiated. Considerable interest is given to the role of new technology in this respect. On the one hand, smaller and cheaper machines of different kinds and the implementation of microelectronics, might release small scale advantages (Schumacher, 1973), while on the other hand, increased automation might benefit centralized control and so lead to larger hierarchical structures (Braverman, 1974).

TECHNOLOGY - A CERTAIN WAY OF SOLVING A PROBLEM (2)

If small firms dominate within a certain technology then, obviously, this fact gives us a clue to the question of small scale advantages. However, "technology" is not always used in a rigorous manner. Sometimes we talk about robot-*technology* aiming at a special kind of machine. In other instances we discuss new information-technology, meaning a whole range of computerbased information systems. Finally, we also talk about process-*technology* or assembly line-*technology* referring not only to machines -hardware and software- but to the whole socio-technical character of the workorganization. For the sake of clarity

therefore, it may be useful to define the concept of technology on a continuum ranging from hardware on one side, to organization structure on the other (figure 1). Depending then on where on this continuum one chooses to define technology, different social or organizational features will be included in the definition.

Fig.1: Connection between definition of technology and freedom to choose organizational forms.



The relevance of this discussion is obvious if we, for example, regard the question of technological determinism, i.e. does technology have certain inherent effects - either good or bad - on social systems (i.e. on autonomy, work satisfaction, work content or size etc.)?

If we choose a definition at the far right on the continuum (i.e. assembly-line technology), we have included social characteristics already in our definition of technology (i.e. rigid regulation of work pace, strong interdependence between work stations, high specialization in work tasks etc.). Naturally, from that very broad definition, it is easy to argue that this particular technology indeed has very specific social effects. If we on the other hand choose a much more narrow definition of technology (e.g. micro-electronics) it is much more difficult to asses the social implications (The International M.E.S.S. Group, forthcoming), and even more so if we consider the rate of technical change today.

Nevertheless, a frame of reference will be adopted here in which different socio-technical characters in the workorganization constitute different conditions for organizational size. In the question; "Is there a special 'technology' in which small firms are competitive?", technology is defined in a rather broad way - at the right end of fig. 1.

Technology is a specific system of production i.e. the tools and the methods we today use in order to solve a specific commercial task. (3)

It is obvious that by using technology in this broad sense, I do not address the issue of whether a special kind of machinery or equipment is specially suited for small scale firms. I do not address the specific (and important!) area of "appropriate" or "intermediate" technology i.e. the question of local small scale, low-resource machinery (Schumacher, 1973). Instead I include also organizational - i.e. behavioural and cognitive - aspects in the analysis. Are there combinations of tools and methods that suit small firms especially well?

"Smalltech" is a form of doing business that combines the machines' and the small scale's possibilities to solve business problems.

Naturally, different technologies give rise to different conditions for the division of labour, coordination of activities and motivational structures i.e. the design of organizational structures. In order to analyze this relation in more detail, we need a classification of technologies.

A CLASSIFICATION OF TECHNOLOGIES

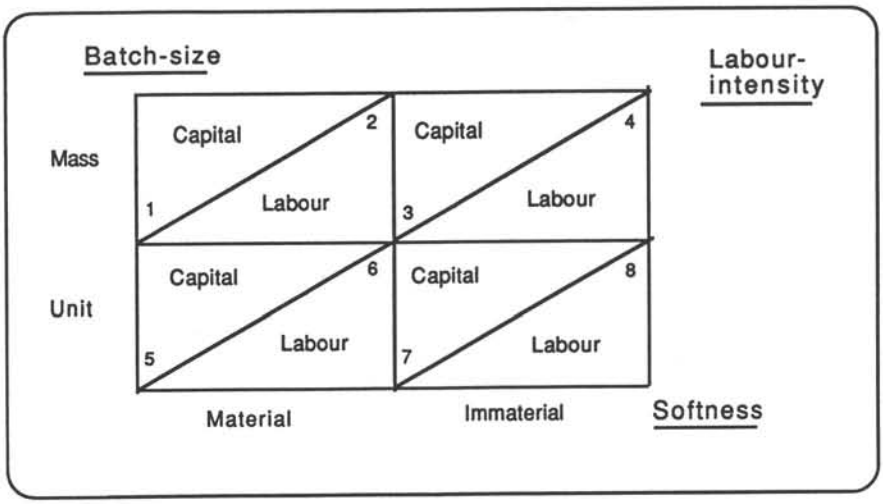
Using the broad concept of technology defined above puts the discussion in line with authors like Woodward (1965). Her classification of technology is based on a continuum that represents increased batch size. Her five systems of production are: unit- and small batch production; large batch with unit production; large batch- and mass production; large batch with process production; and process production, in order of "increasing technical complexity and control". (4)

The major weakness with Woodward's classification, for the purpose of this article, is that it only regards companies within the industry sector. Since many small scale businesses operate within the service sector we need a classification that reflects the different conditions also for these companies. It is therefore necessary to add to Woodward's *batch-size dimension*, a dimension we might call the *softness-dimension* of technology ranging from material to immaterial production.

In an earlier study it was found that small locally-based businessmen in many instances have a much more difficult position, compared with larger firm representatives, when it comes to seeking external financial resources (Brytting, 1988a). The reason is that the

formulation and formalization of investment proposals involve considerable costs (actual, opportunity and mental) for a small entrepreneur but not necessarily for a division manager who already operates within a formalized environment. The critical degree of capital inherent in the technology - or to put it differently - *the labour-intensity dimension* of technology is, therefore, a third important factor that might help to explain the distribution of small firms within the economy. In summary then, a three-dimensional classification of technology can be constructed, reflecting batch-size, softness and labour-intensity.

Fig. 2: A three-dimensional classification of technology



One extreme would be the firm engaged in capitalintensive massproduction of material things using automated processproduction (box. no.1) e.g. certain subcontractors in the automobile industry. The other extreme are those firms that produce tailor-made immaterial services using a labour intensive system of production (box. no.8) e.g. management consultants. A provocative observation is probably that we can easily find typical small firms within all boxes, something which will be discussed below in further detail.

Fig. 3: Some examples of smallsize technologies

1. Capital-intensive Massproduction of Material things (e.g. some subcontractors producing components)
2. Labour-intensive Massproduction of Material things (e.g. bakeries, small assembly firms)
3. Capital-intensive Mass production of Immaterial service (e.g. hauliers)
4. Labour-intensive Massproduction of Immaterial service (e.g. actors, retail stores)
5. Capital-intensive Unitproduction of Material things (e.g. specialized manufacturers producing prototypes)
6. Labour-intensive Unitproduction of Material things (e.g. handicraft, construction)
7. Capital-intensive Unitproduction of Immaterial service (e.g. leasing-firms, financing firms)
8. Labour-intensive Unitproduction of Immaterial service (e.g. consultants, lawyers)

A discussion around the content of all the 8 boxes would lead too far; instead I will concentrate on one single dimension at a time.

BATCH-SIZE

One fundamental organization design dilemma is the trade-off between the full utilization of available resources, mainly human based competence, and the minimization of coordination costs. A full exploitation of human competence demands an individual adjustment of all structures and processes in the organization, since people have different competence profiles. The coordination costs of such a design, as well as the design cost in itself, will probably be quite high.

On the other hand, minimization of coordination costs and design costs, would require behaviour in the organization to be totally predictable and that most behaviour were standardized, something that would contradict individual adjustments and autonomy. If behaviour was standardized and predictable, it would be possible to coordinate many

individual activities with a minimum of administrative costs. One might say that both autonomous units and autonomous work rules implies higher coordination costs. Every attempt to standardize workroles must be weighed against the costs of aforementioned opportunities (non-utilized resources), and every attempt towards individual adaption of workroles must face the increase in design- and coordination costs.

It can be hypothesized that small firms and relatively autonomous organizational units have a greater possibility than large firms to adjust workroles to individual demands and yet maintain a relatively cost effective coordination. The reason is two-fold.

First, in the small firm there are only a few people or units to coordinate and the pressure to standardize is, therefore, not so pronounced. Moreover, few people implies low turnover of staff (at least in absolute figures) and so low costs for training and socialization. Secondly, in the small firm or in the autonomous unit monitoring, processing of information, and the giving of corrective orders are integrated both timely and physically into one single person; the owner/manager or unit manager. It is, therefore, possible to solve the information, communication and decision-making problems without delay and without formal and costly administrative systems.

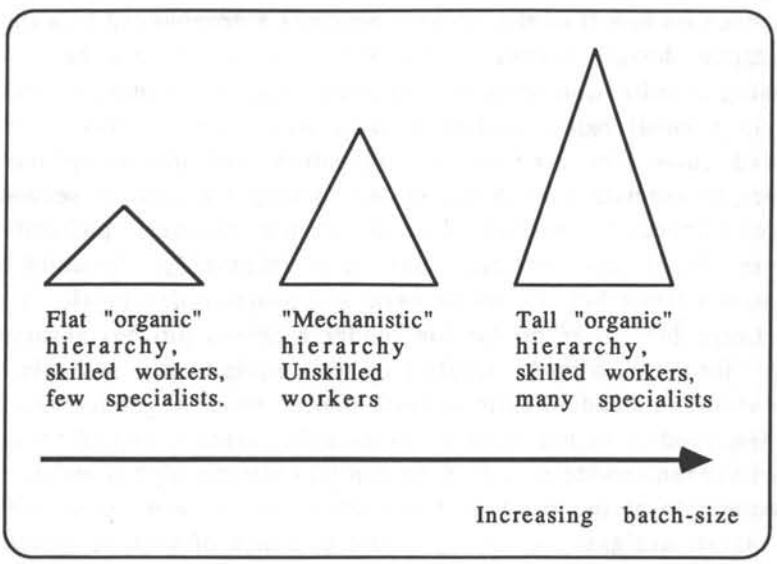
Small batch-size production makes it difficult to set up specially designed equipment or dedicated standard operating procedures, but demands a much more flexible system of production. Of course this also has implications for the design of work roles. Broad knowledge, skills and competence on behalf of the workers becomes a pronounced focus for the organization design. However, this also implies - as we have seen - increasing coordination costs and therefore smaller and more autonomous units. In a small batch production it is also easier to relate not only overhead costs like maintenance, inventory and marketing but also revenues to specific workshops, thereby giving the first or second line manager a chance to overlook their unit from a "business" point-of-view. However, is it *not* obvious that this necessarily demands small autonomous firms but it does demand and promote decentralized structures. Large batch-size production (under a *ceteris paribus* assumption) allows for specialized single-purpose equipment, manuals, and procedures, and standardization of information from the production. Large batch-size production has often led to the substitution of capital for labour, even within the service sector. If the capital costs are high it makes a high utilization rate of the equipment necessary, and so work roles are, to a large extent, designed according to the demands of that equipment and not according to the competence of the workers. This standardization and specialization of work roles makes it easy to coordinate many people at

low cost and so allows for larger organizations.

These low coordination costs, due to standardization of work roles, are however not an advantage unique for the large-scale production, but something that also the small firm can exploit. There are several small firms operating with highly standardized work organizations producing large batches, while high capital costs (rather than large batch sizes) might be a situation where large scale businesses have comparative advantages due to financial economies of scale (Brytting, op.cit.).

Woodward (op:cit.) found that the different functions within the organization differed in importance along her technology scale. In the unit-, small batch production firms, the R&D-departments seemed to have a crucial position. She also noted that in these firms the relations between different functional departments were very close and frequent. In the large batch- and process production firms there were much more strict borderlines between departments. Their activities were clearly separated from one another. The most crucial position in the organization was held by the production department in the large-batch technology and by the marketing- and maintenance departments in the process technology. Some of Woodward's findings are summarized in the following figure:

Fig. 4; A summary of some results from Woodward (1965)



However, these characteristics were not related to size. They were found in both small and large firms. Woodward (op.cit.) found no significant relationship between firm size and system of production. Also the ASTON-group (Pugh, 1976) analyzed the relationship between specialization, "workflow integration" (a dimension similar to Woodward's) and the size of the organization. They did find a very strong relationship between size and role specialization (correlation of 0.75) as expected from the discus-sion above. However, they found no relationship between workflow integration and size (correlation of 0.08). On the whole, the relationship between batch-size and firm size is unclear. It should be mentioned though, that both Woodward and ASTON studied firms with more than 100-150 employees and so missed out the very small firms. In my own experience though, a lot of small firms operate very large batches, often as subcontractors. On the other hand, there are several large firms producing tailor-made products or services.

SOFTNESS OF PRODUCTS

This dimension ranges from material to immaterial products and aims to capture the differences between production of things and production of services. Somewhere in between pure things and pure immaterial service (e.g. management consulting) lie activities like repair and maintenance, transport, and retailing which certainly involves material things. Without going to deep into the definition of service, we might say that a high degree of softness in the products of the company (again under a *ceteris paribus* assumption) is accompanied by the following characteristics;

- Direct face-to-face meeting between consumer (client) and producer
- The personality, or other individual features of the client has a large impact on the "production process"
- It involves a high degree of two-way communication and information processing
- The "product" itself is intangible i.e. it cannot be held in stock, transported or demonstrated in advance. Consumption and production is interrelated.

From this list, we might conclude that a high degree of softness demands a certain amount of social competence among the workers and high discretion in their work tasks.

Normann (1983) coined the concept "the moment of truth" to describe the situation where the individual service-producer meets the individual client, and where the company itself no longer has any control

over what happens. He argues that this lack of control over "the moment of truth" is constitutive for the service sector since the service producer often is physically outside the company.

Technologies that involve uncontrolled "moments of truth", probably demand "full resource" work units (Galbraith, 1977). These autonomous units contain in themselves necessary resources and authority in order to carry out the "moment of truth" without having to contact the central authority, central warehouse etc. 5) Instead of talking about the service industry as labour intensive, Normann prefers the concept; "personality-intensive" industry. This means that a very large part of the management's effort has to be directed towards human resource management i.e. recruitment, compensation, development and support of human competence. The lack of actual control over behaviour makes it necessary to communicate thoroughly the goals and image of the company to the work force. Each unit manager and each employee has to be well acquainted with the company and its culture. In the non-service industries, on the other hand, the attention has to be directed towards financial- and technical issues which normally are centralized activities. The crucial success factors are simply not the same and their locus of control within the hierarchy varies.

If this is true, we should expect to find a dominance of small firms within personality-intensive industries for two reasons. First, firms in these industries rely on employees with a high level of discretion in their work tasks. Small firms are probably superior in getting every single employee to understand the essence of the company and so act in a way that benefits the company as a whole. Secondly, since they are supposed to have superior possibilities to design work roles according to individual competence profiles, the small firms should be able to act smoothly in a personality-intensive industry.

Unfortunately however, personality-intensity is not reflected in the available statistics but demands a much more detailed classification of firms which has not yet been made. Another difficulty is that softness or personality-intensity certainly demands a large amount of employee discretion and maybe also decentralized units but not necessarily small autonomous firms, a distinction that is not reflected in the statistics. From available data we might however be able to draw some tentative hypothesis. In light of our discussion so far, we might expect to find small firms in industries like social service, hotels, retail, consultation etc. In these small units, work roles can be individually designed and adjusted, yet still able to coordinate at reasonably costs.

Small firms are frequent under these headings. This has been documented in several studies.

The relative importance (%) of small firms in different industries, Great Britain 1963 (The Bolton report)

	Numbers employed	Numbers of firms
Miscellaneous services	82	99
Hotel- and catering trades	75	96
Retail trades	49	96
Road trades	36	85
Building and construction	33	92
Motor trades	32	87
Wholesale trades	25	77
Manufacturing	20	94
Mining/quarrying	20	77
Total	31	93

Fig. 5: The relative importance of small firms in Great Britain 1963.

The relative importance of small firms in different industries, Sweden 1982 (% of numbers employed)

	Numbers employed
Miscellaneous services	72
Hotel and retail trades	67
Transports and communications	67
Building and construction	58
Banks, consultancy etc.	53
Electricity-, gas-, waterpower	48
Mining	39
Manufacturing	37
Total	53

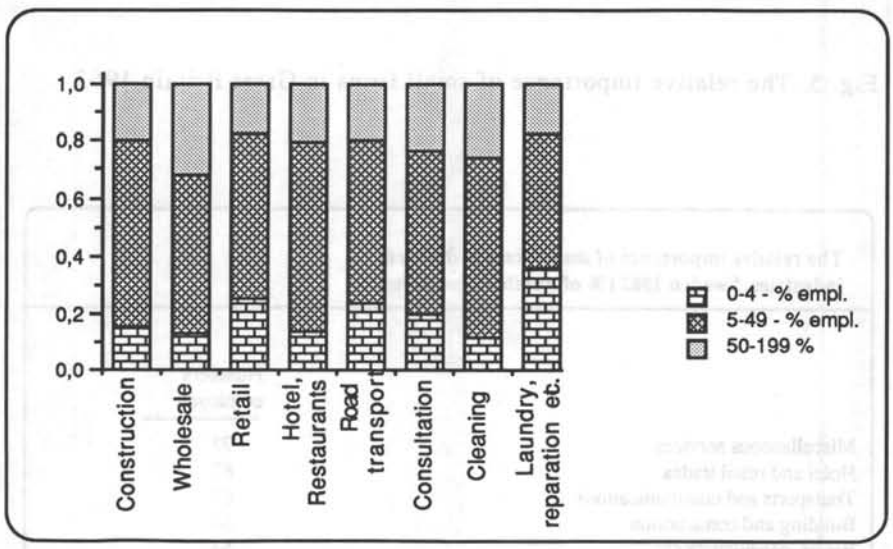
Fig 6: The relative importance of small firms in Sweden 1982

From figure 5 one gets the impression that small firms have their largest share of total employment in the service industries and especially in those with a very "soft" characteristic, like hotel and retail trades. "Hard" industries, like mining and manufacturing, seems less common for small firms.

This pattern from the Bolton Report (Bolton, 1971) is repeated, though definitely less pronounced, in a more recent report from Sweden (SHIO, 1984) (fig. 6).

Unfortunately these data are very crude. For example, even though we know that firms with less than 200 employees are common in "miscellaneous service",that tell us very little about the possible fit between firm size and utilized technology - between scale and personality-intensity. The figure below gives a slightly more detailed picture (fig. 7).

Fig. 7 Distribution of small firms within the service sector (SHIO, 1984)



Here we see that within the population "small service firms", very small firms (with less than 5 or with 5-49 employees) have a strong position in the sectors labeled: Laundry, Repairs etc. Retail, Road transport and Consultation.

Once again one gets the impression that the small scale dominates or is frequent in certain "soft" sub-industries. It is however difficult to draw

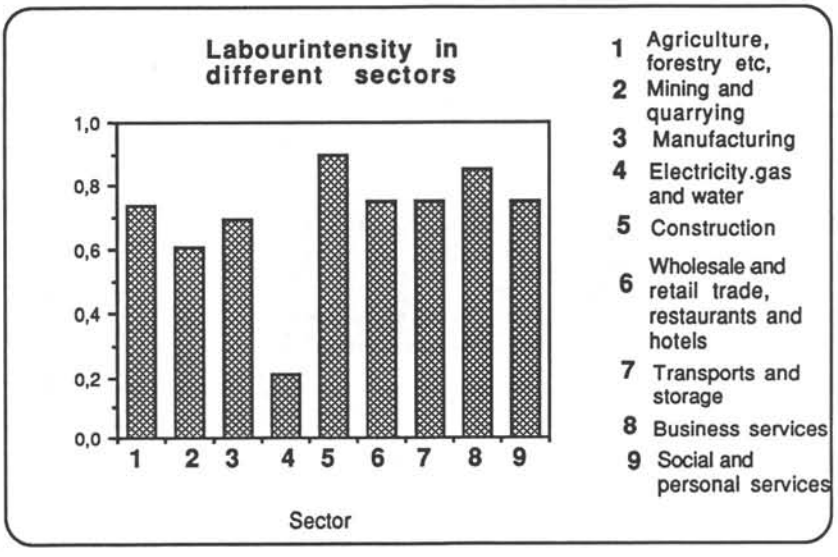
any conclusion about what the least common *technological* denominator is that could help us understand the fit between technology and scale. Probably, it is not so much the degree as the *type* of softness (like "personality-intensity") that is of importance.

One suggestion could be that small firms are frequent in soft industries with very low barriers to entry. Obviously many service industries can be entered without heavy capital investments, professional skills etc. It might be argued though that this characteristic is not related so much with softness as with capital versus labour intensity, which is my third technological dimension.

LABOURINTENSITY

Labourintensity is in this paper treated as a separate dimension of technology not necessarily related to "softness" or "batch-size". Normann (op cit) opposes the general opinion that service can be characterized as a labour intensive industry. In fact, he argues, correctly, that a large part of the service industry is actually quite capital intensive e.g. airtransportations, banking etc. This can be seen in the figure below (fig. 8) 6).

Fig. 8 Labourintensity in different sectors, measured as total labourcosts in relation to total value added (SCB 1986)



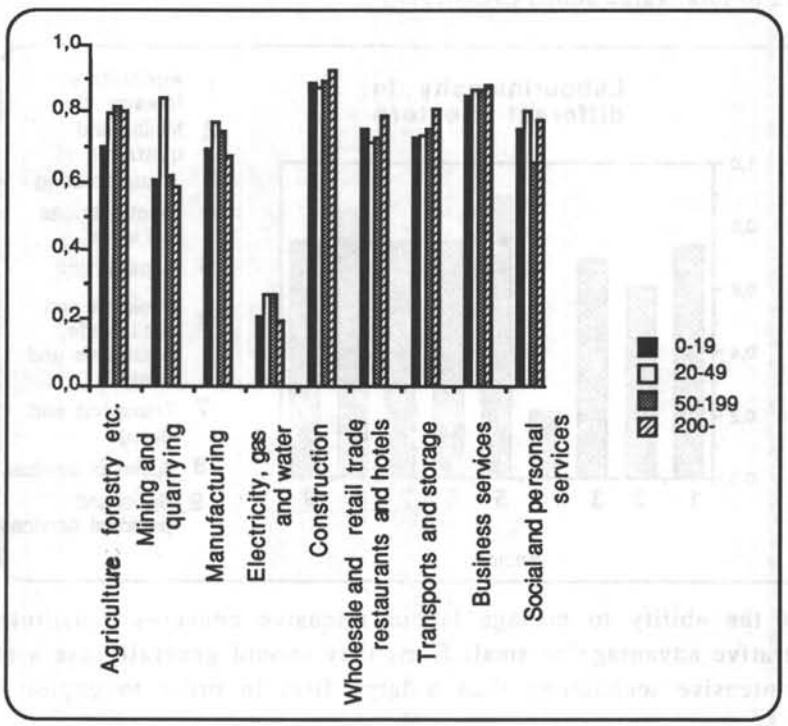
If the ability to manage labour intensive concerns constitutes a comparative advantage of small firms they should generally use a more labourintensive technology than a large firm in order to exploit this

advantage, or they should seek out those niches within a specific sector where labourintensive technology is most appropriate.

I have also argued that the small firm has a comparative disadvantage when it comes to raising external financial resources (Brytting, 1988a). The communication with banks etc. often involves a kind of culture shock. The financial environment demands of the entrepreneur to follow financial rules i.e. to use increasingly abstract- and quantitative information and focused strategies, something that might contradict the entrepreneur's own experience of successful behaviour. Unit managers in larger companies are constantly operating within a financial environment of this sort and are therefore already adapted to these rules. The result is that small autonomous firms either do not get necessary funds or have higher financial costs, and so is less frequent in capital intensive industries.

One way or the other, we would expect to find that small firms have a more labourintensive activity. This seems not to be the case. Within each industry sector, the small firm shows more or less the same, or even lower labourintensity than the larger ones (see fig. 9).

Fig.9 Labourintensity in Sweden 1984, different sectors and different firm sizes (SCB, 1986).



One might once again argue that it is not so much the amount or degree of capital as the *type* of projects that lead to the communication problems just mentioned. Even projects with a high capital/labour ratio can be easy to finance externally - even for a small company - if they can be easily translated into abstract quantifiable data. Capital intensity per se might therefore not necessarily imply small scale disadvantages. However, the lack of experience in information, ideas and visions, in financial terms, might be disadvantages.

TECHNOLOGY AND THE DEGREE OF CENTRALIZATION - A SUMMARY

It is hard to see any clear correlation between technology and firm size. The only empirical support so far has been the observation that small firms are frequent in some "soft" industries like laundry, repairs, consulting etc. Apart from the fact that this observation is based on rough data and has to be studied in further detail, it is questionable if the industries where small firms are frequent can be ordered on a scale reflecting increased softness. It might be more appropriate to talk about certain segments within the heterogeneous service industry where small firms are common. It has been argued that it is not so much the degree as the type of batches, softness and labourintensity that influence the size of the firm. To use simple scales, like the ones used here, is obviously a too crude instrument to be able to catch the essential features of the small firms.

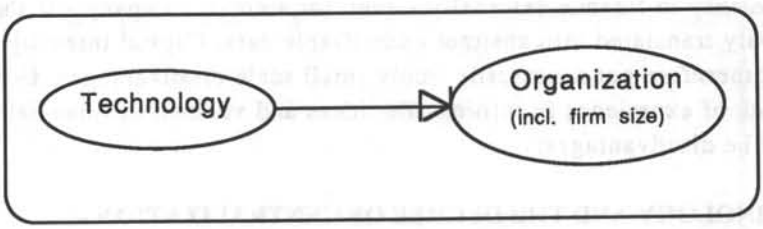
What the discussion has shown is that the choice of basic technology to some extent determines - or more appropriately, includes - the degree of autonomy in organizational units, but not necessarily the optimum size of the independently owned and managed firm. At least, decreasing batch-size and increasing softness are both dimensions of technology that demand increasing autonomy on behalf of the local business units. As to increasing labour intensity *per se* it is difficult to see the connection either in terms of size or degree of centralization. This conclusion together with an awareness of the extreme heterogeneity among small firms, leads us to the difference between the degree of centralization and independence.

INDEPENDENCE - DETERMINED BY THE BUSINESS CONCEPT

- A suggestion for future research.

So far in this paper, technology has been treated as the independent variable and size as the dependent variable. However, technology *per se,*

Fig. 10 A causal representation of the relationship between technology and firm size.



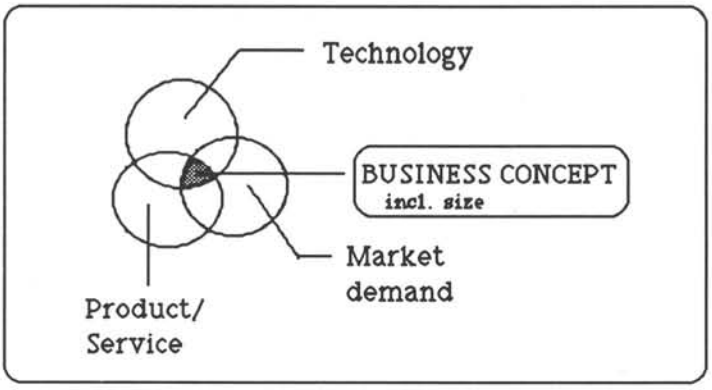
as defined and analyzed in this paper, did not suffice to identify the small firm segments or domains within the economy. It can very well be that a more detailed definition of technology can provide us with a better understanding of this problem. Preoccupation with technological explanations might however lead into a dead end (Child, 1972, Löwstedt, 1985). Instead I suggest that we take another route.

If asked whether their firms have market potentials for growth, about 2/3 of the small business owners (< 20 employees) in Sweden answers "yes" (SHIO, 1986). Despite of that, only half of those who perceived these potentials actually planned to grow. Many small business owners seem to experience a level of business that is satisfactory. Davidsson (1987) has made a thorough analysis of growth willingness in small firms and verifies the conclusion that the willingness to pursue growth varies considerably between small firms: "Concern for employees and the fear of loosing control appear to be the most influential growth deterrents". Personal characteristics like the wellknown "Need for Achievement" (Mc. Clelland, 1965) has also explanatory value in this respect.

Findings such as these, suggest that firm size cannot be explained solely with structural factors like technology or market size. There seems to be a subjective element included. Perhaps we have to include in our models personal characteristics and beliefs as well. Therefore, instead of searching for a causal relationship between technology and organization size, I propose a more cognitive frame of reference (Löwstedt, 1985). In such a cognitive approach, technology is just one feature in a more general conception of the firm and of its market. I suggest that the term "business concept" could be used as a starting point.

A business concept is a holistic conception of a market opportunity and an idea of how it can be exploited or commercialized. A *problem* is defined as a market demand perceived by the entrepreneur, and the *solution* is

Fig. 11: A schematic representation of "business concept" as a combination of market demand, product/service and technology



his/her suggestion for a suitable product or service that fits this demand. *Technology is an idea of how to implement the solution-7).* It has been said earlier that the technology concept could be said to include - rather than to determine - the degree of centralization. Likewise, the business concept can be thought of as including the size of the firm.

"Smalltech " then is a way of looking at market opportunities and shall not be confused with a certain type of machinery of "technology". In the mind of the entrepreneur, these things (demand, product and technology) together makes up an integrated piece of reality. A certain technology is an integrated part of a business concept. A change in technology does not "cause" a change in size but is in itself an indication that the business concept has changed. The implication of this frame of reference are several: Firstly, if we want to promote small firms it is not enough to develop new pieces of technology for small firms. It is also necessary to develop theories and models of how business concepts arise and how they are institutionalized.

Secondly, the frame of reference presented here has a lot in common with the strategic choice perspective (Child, 1972). The management chooses its own environment and so also some of its contingencies. The size of the independent firm can accordingly be regarded as a result of a strategic choice. This means that we should direct more research towards strategic decision-making in small firms. Special attention should be paid to how business owners experience size and growth, and to what extent their freedom of choice is restricted in that respect.

Thirdly, many small firms operate as subcontractors under conditions that resembles rather a closely tied division. "Small firm" is therefore

no longer a distinct concept since it cannot differentiate between different degrees of autonomy. A suggestion for improvement might be to define small firms as: *firms that choose and formulate their own business concept.* The combination of demand, product/service and technology into a business concept is a formalized program, or a "quest" for the firm. The right to define this combination is an exclusive characteristic for the autonomous firm.

NOTES

1) In this article I measure size as the number of employees. Attempts to use alternative measures of size (turnover, valueadded etc.) have shown that the distribution of companies becomes more or less the same (Byström et al, 1971), indicating that number of employees would suffice.
2) The following arguments draw partly on the discussions in Brytting 1988b, and in Brytting & Löwstedt 1986.
3) In the following, the word "production" is used to describe the process of creation of both material products and immaterial services.
4) Within these five classes she also identifies 11 subclases. These subclasses are however not included in this present analysis for reasons of simplicity.
5) Even though one might like to add that there are also firms engaged in the production of tangible things using a system of production that somewhat inhibits control over the "moment of truth" (building operations, fishery, farming, etc.) this lack of control definitely describes a special management situation in the service industry.
6) Looking at the figure though, it might be more interesting to turn his argument around and to say that while service is a labourintensive industry, this doesn't mean that other industry sectors are not! Also the manufacturing and construction sector are industries with a rather high labourintensity.
7) Technology is then understood in the broad sense adopted in this paper which also includes organizational features.

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AUTONOMY AND INDUSTRIAL ORGANISATION

TECHNOLOGY, HIERARCHY AND AUTONOMY OF WORK IN SMALL SCALE ENTERPRISES

Karl-Heinz Schmidt

SUMMARY

Considering various theoretical concepts like the labour process analysis, the class structuration and work organization approaches and the general systems analyses, the mutual relations of innovations and work organization, especially the varying degrees of work autonomy in small scale enterprises, are investigated. The hypothesis being applied, the "centralization-hierarchy", the "decentralization-autonomy" and the "segmentation-polarization" hypotheses are confronted to empirical data on the social structure of the labour force, self-employment, work organization as to the size of firms and on the expenditures of small scale enterprises for innovations, research and development. Several countries are compared, mainly Japan, United Kingdom and West-Germany. The results are summarized by describing different phases of the impact of new technologies on the work organization of small scale enterprises. Moreover, the dynamic aspect of the relations of innovations and work organization is considered by regarding segmentation - polarization - depolarization - decentralization cycles, incorporating the mutual effects of new technologies and work organization in the small scale enterprises.

THE PROBLEM: TECHNOLOGICAL CHANGE AND WORK ORGANIZATION IN SMALL SCALE ENTERPRISES

The impact of technological changes on the volume of production, employment and investment has been analysed with different results. Even less transparent are the interrelations between technological changes and the work organization in small scale enterprises. Does the technological change determine the work organization, or does the work organization predetermine the type and the diffusion speed of the technological change? Is there more hierarchy or more autonomy of work being realized in small scale enterprises in the long run?

Answering these questions means to point out the relations between innovations and the organizational structure of firms, the aims and attitudes of the management and the market performance of the enterprises. Moreover, it is necessary to analyse the interde-pendence of the innovations and the changes of the economic and social status of the entrepreneurs, managers and employees, the changes of the qualifications of the employees and the development of the work conditions in the small scale enterprises. Different concepts explaining the relations of technological changes and work organization are to be considered. As Poutsma (1987) pointed out, the labour-process approach being applied to SME, describes technology to be the means to guard autonomy. Latest research demonstrates that autonomy is an important aspect of working in SME - to entrepreneurs and to employees - with the employees appreciation being associated with their involvement and participation in the company (Poutsma, 1987).

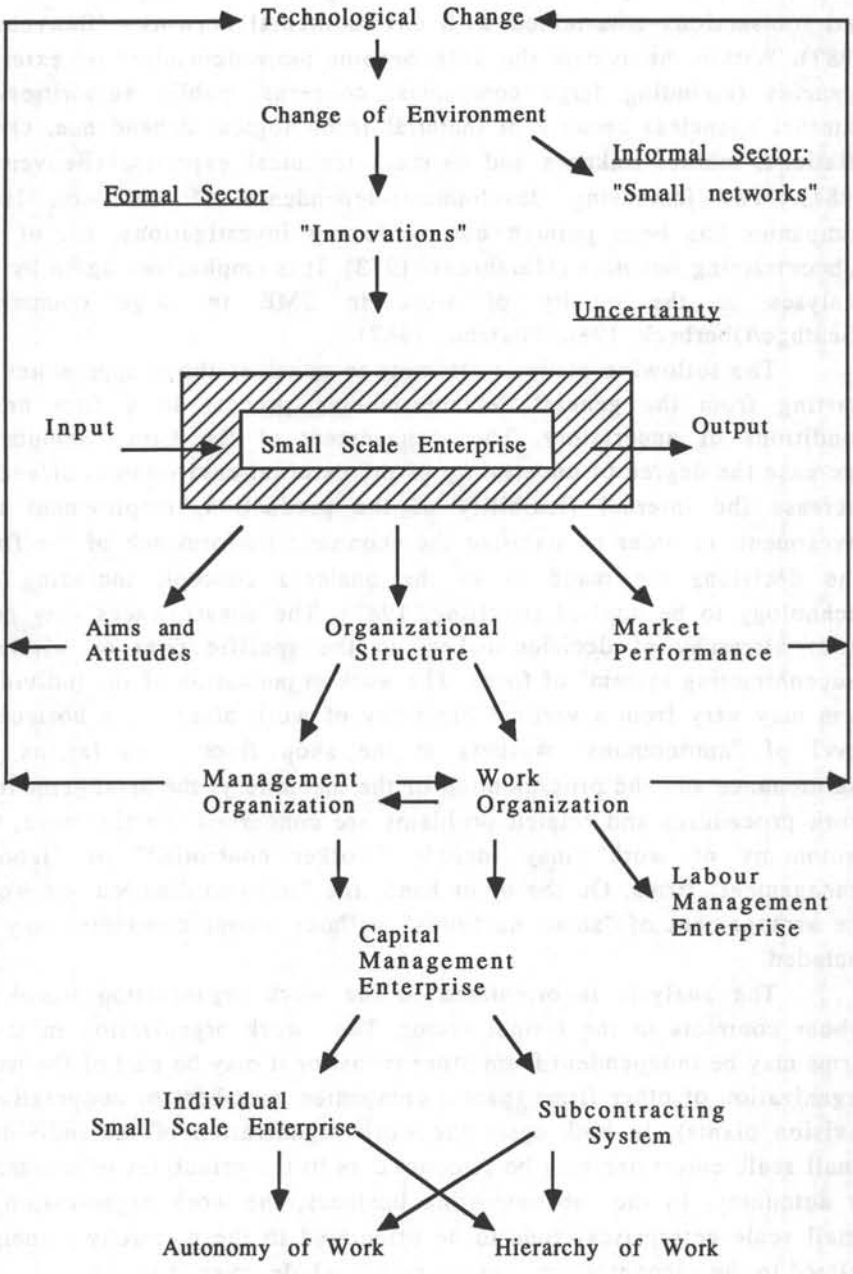
Starting from the concept of work quality and management control, the "internal" autonomy (workers can solve the problems of their work places on their own) and "external" autonomy (workers have some influence on the planning and production criteria) are distinguished (Christis, 1986, see: Poutsma, 1987). Also, the working conditions, work relations, terms of employment and work content are identified as determinant factors of the autonomy of work (Kern/Schumann, 1984; Sorge et al., 1982,1985; Baethge/Oberbeck, 1985). Leimu et al (1986) found, that - comparing analyses by Giddens (1973) and Kohn et al (1981) - three factors are associated with work autonomy in small firms: the industrial branch, the gender and the skill of small firm workers (Leimu, 1986). But the availability of skills does no longer guarantee a qualified work place. Even highly skilled workers are in danger of being dequalified by technological changes, this being part of the segmentation of the labour force (Schmidt, 1984).

Also various approaches being based on the general systems theory have been applied, like the "TATE" concept (Technological-Administrative Task Environment), according to SME may be interpreted as elements of an open SME-environment system or of a system of bonds and transactions entertained with environmental networks (Benvenuti, 1987). Within the system the SME become more dependent on external agencies (including large companies, concerns, public authorities or external agencies) because of material technological dependence, credit relations, market linkages and external technical expertise (Benvenuti, 1987). The increasing development-dependence of SME on large companies has been pointed out by former investigations, f.i. of the subcontracting business (Marahrens, 1973). It is emphasized again by the analyses of the quality of work in SME in large companies (Beathge/Oberbeck, 1986; Poutsma, 1987).

The following analysis attempts to consider those approaches by starting from the general decision-making process in a firm under conditions of uncertainty. The management of the firm attempts to decrease the degree of uncertainty of the external environment or/and to increase the internal flexibility of the production, employment and investment, in order to stabilize the economic performance of the firm. The decisions are made as to the business concept, including the technology to be applied (Brytting, 1987). The consequences may be a strict hierarchy of decision-makers in the specific firm or within a "subcontracting system" of firms. The work organization of the individual firm may vary from a vertical hierarchy of work places to a horizontal level of "autonomous" workers at the shop floor - as far as the maintenance and the programming of the machinery, the arrangement of work procedures and related problems are concerned. Furthermore, the "autonomy of work" may include "worker controlled" or "labour-management" firms. On the other hand, the "self-coordination" of work, the arrangement of "small networks" without labour contracts, may be included.

The analysis is orientated to the work organization based on labour contracts in the formal sector. The work organization in those firms may be independent from other firms, or it may be part of the work organization of other firms (parent companies, members of cooperatives, division plants). In both cases the work organization of the individual small scale enterprise may be structured as to the principles of hierarchy or autonomy. In the subcontracting business, the work organization of small scale enterprises tends to be orientated to the hierarchy principle related to the subcontracting system on the whole, even if in the

Table 1: The Impact of Technological Change on the Small Scale



individual small scale enterprise the autonomy principle is realized at the shop floor. Consequently, the following analysis deals with two types of hierarchy versus autonomy of work: (1) in the independent small scale enterprise, and (2) in the small scale enterprises being components of a subcontracting system.

HYPOTHESIS, DEFINITIONS AND DATA

Though the decisions of a firm on the technologies to be applied are understood to be part of the business concept of the company (Brytting, 1987), the work organization of small scale enterprises may be influenced by technological changes according to different hypothesis:

(1) According to the centralization-hierarchy-hypothesis an innovation increases the economies of large scale production, and it tends to centralize the production. The large enterprises allocate labour according to internal labour markets, including ports of entry, mobility ladders and hierarchies of jobs and work places at the shop floor.

(2) The decentralization-autonomy-hypothesis points out that innovations tend to decentralize the production by reducing the average- and marginal costs per unit of production at a small production volume. Therefore the small scale enterprises will grow as to their number, input and output. But large enterprises also will benefit from these innovations: they will get an incentive to decentralize the production into small division plants, small production lots and diversified production volumes. The consequence will be a more intensive competition of independent small firms and small division plants of large enterprises. Also, the diversification of the production may be increased, but the concentration of capital will be increased as well, especially by the vertical integration of small firms into the network of the decentralized large enterprises. Following from this, the work places may be arranged as to the principle of "internal" autonomy at the shop floor, but without "external" autonomy: they may turn out to depend on the economic decisions of the top management of the large enterprises.

(3) The segmentation-polarization-hypothesis means that the labour force is divided into separate groups being characterized by different qualifications, renumerations, job careers and employment patterns. At least two, in some countries even three or more segments of the labour market are distinguished, like the internal-, external- and craft labour markets in Germany (Biehler/-Brandes, 1981; Sengenberger 1978, 1987). While the internal and external labour markets are widespread in large enterprises, the craft labour markets are the main allocation

mechanism of labour in small and medium enterprises. Following from this, increases of the labour market segmentation - induces by innovations - may end up with the polarization of the labour force: the "core" employees and the "periphery" employees, expecially in large enterprises. Simultaneously, the employees of the small scale enterprises may be polarized by innovations: innovative small scale enterprises may than non-innovative firms. This hypothesis is to be checked especially as to independent firms and subcontracting companies, regarding not only the work organization at the shop floor but also the decision-making process on the whole.

Concerning the definitions of the analysis, the term "small scale enterprise" (firm, company) will be applied to enterprises of less than 100 employees per enterprise, whereas the small and medium sized enterprises include firms employing up to 500 persons. The "technological changes" cover a variety of product and process innovations including the diffusion process. As to the interpretations of "hierarchy" and "autonomy" of work the above remarks are valid for the following analysis. The "work organization" covers the economic and social status of the workers and the arrangement of the work places and work conditions in a company. The data of the study have been collected through case studies and surveys referring to various countries like Japan, United Kingdom and West Germany and by selections from the official statistics on the labour force and employment.

INTERRELATIONS BETWEEN INNOVATIONS AND WORK ORGANIZATION IN SMALL SCALE ENTERPRISES

Self-employed and employed persons in the production sectors

In order to quantify the mutual relations of the innovations and the work organization, the changes of the social structure of the active population must be considered. For example, in West-Germany the total number of self-employed persons decreased from 3,3 mill (1960) to 2,4 mill (1985) with an additional decrease of the collaborating family members from 2,7 mill. (1960) to 0,9 mill. (1985). During this time period the number of employed persons increased from 20,3 mill. (1960) to 22,2 mill. (1985). This structural change has taken place in most industrial countries. Concerning West Germany three facts should be emphasized (Institut für Arbeitsmarkt- und Berufsforschung, BeitrAB 101, 1986):

(1) The relative share of self-employed persons out of the total active population did not decrease any further in West Germany since 1980, instead it was expanded from 9,0% (1980) to 9,4% (1984), this being

the effect of a decreased active population and of a nearly constant absolute total number of self-employed persons;

(2) the relative share of the self-employed persons in the specific sectors of the economy related to the active population of the non-agricultural sectors are marked by large differences; in West Germany the relevant share of the manufacturing sector decreased, however it also decreased in some subsectors of the service sector, f.i. in trade and transportation (Statistical Yearbook of the FRG, 1960 ff).

(3) the dynamics of the self-employed persons and enterprises is more intensive than is expressed by the stocks of enterprises at specific dates; in West Germany, especially in the state of Northrhine-Westfalia the number of market entrants exceeded the number of market exits only since 1980 (Der Bundesminister für Wirtschaft, ed., 1986, p.53). But the persistence of "start up" enterprises is very low, especially in the service sector and in those activities, which can be operated at a low level of capital investment.

Self-employment and innovations

The statistical data do not indicate the relationship of self-employment and innovations directly, but they demonstrate the expenditures for innovations and for research and development with respect to the number of employees per enterprise.

Making use of those data, the small scale enterprises turn out to be less active than large enterprises where it concerns process innovations and the financing of research and development expenditures, yet more active in respect to product innovations. Consequently, self-employment may on the one hand be interpreted in terms of organizational structure and a type of work-organization unfavourable to process innovations, while, on the other hand, it might turn out that through the introduction of new types of innovations - especially those of microelectronics and the related forms of decentralizing new technologies - small scale enterprises may get an opportunity to increase their competitiveness through additional process innovations.

Yet, the available surveys point out that small enterprises continue to invest less in the new technologies than is the case with large firms, though the relative share of small firms investing in research and development has increased in West Germany mainly after 1975 (Table 2).

Similar empirical results are available for other industrial countries. According to a study by J. Northcott et al., the proportion of users of

microelectronics rises steadily with increasing company-size in Britain, Germany and France (Northcott, J. et al., 1985, p. 22). The smaller firms are presumed to be less aware of the political scope for applications and to

Table 2: Expenditures for Research and Development according to the size of enterprises in West Germany 1969, 1975 and 1981

Number of employees	Year (%) 1969	1975	1981
Less than 100	0,2	0,5	4,6
100 - 499	1,5	2,0	8,6
10.000 and more	77,4	66,2	58,0
Total	100,0	100,0	100,0

Source: Der Bundesminister für Wirtschaft, Hrsg.: Unternehmensgrößenstatistik 1985 - Daten und Fakten, Studien-Reihe 50, Bonn 1986, p. 206.

have lesser technical- and financial resources for exploiting the opportunities to innovate. The same tendency has been emphasized in Japan: the rates of introduction of "mechatronics" are lower in the small- and medium enterprises than in the large enterprises (Small and Medium Enterprise Agency, MITI, 1986, p.77). Also, the percentage of research workers of the total employees in SME has been increasing, but the rates of increase have remained at a lower level than is the case in the large enterpri-ses (p.79). The primary conclusion that must be drawn from these data is that the SME must overcome the lack of research- and engineering personnel as well as the lack of information and capital funds. This statement holds valid also for the majority of the small scale enterprises in Western Countries (Tables 3a) and 3b)).

Hierarchy-increasing effects of innovations

The creation of hierarchies is an organization mechanism being applied mainly in bureaucracies of the public sector and in large enterprises. But hierarchy-increasing management decisions related to innovations are also reported to occur in small scale enterprises. They concern different organizational fields of the enterpri-ses: (1) the demand for labour at

Table 3a): Product- and process users of microelectronics by size of enterprise (percentages of manufacturing enterprise) in Britain 1), West Germany and France 1983

Size of enterprise	Britain	W.Germany	France
20 - 49	32	36	28
50 - 99	44	51	39
100 - 199	59	66	49
200 - 499	70	72	70
500 - 999	86	88	85
1000 a.m.	96	94	94
Total	47	51	38

1) United Kingdom and Northern Ireland;
Source: Northcott, J. et al., 1985, p. 57

Table 3b): Introduction of Mechatronics Equipment in the Manufacturing Industry of Japan - status 1986 -

Percentage of enterprises	small and medium enterprises %	large enterprises %
	- NC machine tools -	
Introduction:		
- 3 or more years ago	14,6	43,2
- in past 3 years	8,0	16,0
- will happen within 3 years	2,3	1,2
	- CAD equipment -	
Introduction:		
- 3 or more years ago	3,8	11,8
- in past 3 years	12,1	31,3
- will happen within 3 years	14,0	9,8

Source: Small and Medium Enterprise Agency, MITI:
Small Business in Japan 1986, Tokyo 1986, p.78;

the external labour markets or at the craft labour markets, (2) the allocation of labour by mobility ladders of internal labour markets, (3) the diversification of remunerations and of working conditions, (4) the development of skills and capabilities of selected employees by additional training and schooling.

Table 4: Changes in the structure of employment in small and medium enterprises (excluding public bodies) in Japan 1974 and 1982

Type of work	1974 %	1982 %
Specialized and technical work (+)	5,9	7,8
Managerial work	4,7	4,7
Clerical work (+)	12,1	12,5
Sales work (-)	22,4	20,9
Skilled and production line work (-)	37,5	35,2
Simple work (+)	3,6	4,6
Services (+)	11,8	12,6
Others and unknown (-)	2,1	1,7

Source: Small and Medium Enterprise Agency, MITI: Small Business in Japan 1985, Tokyo 1985, p. 59

In Japan the effects of the introduction of mechatronics equipment on the labour demand of small and medium enterprises is reported to experience a "reshuffling of personnel" (Small and Medium Enterprise Agency, MITI, 1985, p.59) resulting in an increasing proportion of specialized- and technical work and decreasing percentages of sales, production-line work and simple work (Table 4).

The introduction of office automation had the effect of increasing the volume of computer-related work, engineers and sales activities. Furthermore, SME require "... human resources with diverse capabilities possessing the expertise and skills in extensive fields, both management and sales, more than large enterprises do" (p.63). But the SME complained about shortages of adequate manpower in the field of computerization and mechatronics. Therefore, the Japanese SME-Agency of MITO recommended that SME should make efforts towards creating work environments which enable the workers " ... to display their abilities" (p.68). The japanese SME attempt developing their human resources primarily by (1) on-the-job-training (OJT) (2) internal transfers of workers, (3) quality-control-circles (QC's), and - only recently to an increasing extent - (4) off-the-job-training (Off JT) and (5) schooling activities by public institutions. While OJT, QC's and internal transfers are practised in small scale enterprises to a considerable degree, they send less employees to Off JT and educational activities than is the case with large firms; however the small innovating companies do so with greater frequency than holds true for traditional small establishments.
The effects of the development of human resources on the internal work organization of the innovating small scale enterprises are twofold:

(a) The diversification of the qualifications of the employees is increased; entrepreneurs, managers, engineers, assistant technicians, salesmen, clerical personnel, skilled craftsmen, semi-skilled and low skilled workers differ as to their tasks, working conditions and periods of employment;
(b) the tasks of workers are rearranged in order to increase their skills, responsibility and flexibility; the workers are required to function as "core" workers of the firm; they are trained to become completely responsible for the programming, the operation and maintenance of "their" machines, the needed raw materials and to some extent even the complementary personnel; they also are expected to be active members of the QC's and to advise the management.

The innovations enforce the hierarchy of work organization also in the subcontracting firms. The hierarchy then consists of the top-management of the parent company on the top of a "pyramid" and of the

management and personnel of different levels of subcontractors below. It may happen that the decisions on innovations, working conditions and employment are no longer left to the entrepreneur and management of the individual subcontracted company, but restricted rather to the top management of the parent company. This is the case of total economic dependence of the subcontractor on the parent company. On the other hand it happens that the subcontracting company is independent from the parent company as to the decisions on technology, personnel and investment, because the subcontracting company sells to various parent companies and to anonymous customers in the open markets. Yet, on the whole, the innovations tend to increase the hierarchy of responsibilities and decision-making in the sub-contracting system and, consequently, in the work organization of the affiliated small scale enterprises.

This tendency may be recognized also from empirical data on small scale enterprises, especially small subcontracting companies in the United Kingdom and West-Germany. Similar tendencies may be noted in Italy also, especially with respect to the relations between public authorities and small enterprises (Benvenuti, 1987). But even though the subcontractors - primarily in West Germany - complain about a growing dependency, and an increasing pressure exerted by the purchasing companies on prices-, timing- and quality of the deliveries, the input-output-relations will, nevertheless, be intensified as a consequence of the continuing innovations.

Yet, the innovations are also connected with autonomy-increasing effects. Apart from that, they follow from certain changes of the work organization.

Autonomy-increasing effects of innovations

Different causes and forms of an increasing autonomy of work are observed in the small scale enterprises of the manufacturing sector in Japan, the United Kingdom and West-Germany. The primary forms are as follows:

- At the shop-floor level of the small scale enterprise the autonomy of work is increased to the degree that the programming activities are reintegrated with the production- and maintenance activities at the work places of the production workers;
- consequently, the demand for qualified production workers being familiar with the programming, operation and maintenance activities of the new machinery is increased; this may explain the "lack of skilled labor" - in spite of the increasing unemployment of low-skilled labor - to some extent.

- At the enterprise level the autonomy of work is increased by innovations to the extent that the programming, operation and maintenance activities are managed by the personnel of the specific enterprise - either by the creation of new work places or by making use of external institutions (data processing companies, advisory boards, research institutes, cooperatives).
- At the level of cooperating firms like the subcontracting systems the autonomy of work is increased by the innovations to the extent that the subcontractors get more responsibility concerning the entrepreneurial decisions on the technology and the related investment financing. In Japan, the subcontractors tend to make use of the technology assistance being offered to them by the parent companies. In Europe, the small scale enterprises prefer the advice offered by external institutions or by the advisory boards of small business organizations. Similar differences between the subcontractors in Japan and Europe turn up in the fields of investment finance, production planning, warehousing and marketing. Yet, the European countries differ as to the interest of small scale enterprises in the autonomy of work:

Table 5: Structure of unemployment in West-Germany 1976 and 1986

Unemployed persons	1976(%)	1986(%)
Germans	91,9	88,1
Foreigners	8,9	11,9
Salaried persons	42,7	37,2
Workers	57,3	62,8
Skilled craftsmen and salaried persons in specialized activities	43,8	40,1
Low-skilled persons	56,2	59,9
Age structure:		
less than 20 years	11,4	7,3
20 - 55 years	76,7	80,2
more than 55 years	11,8	12,5

Source: Bundesanstalt für Arbeit/Institut der deutschen Wirtschaft: Zahlen zur wirtschaftlichen Entwicklung der Bundesrepublik Deutschland 1987;

- French enterprises are characterized by more intensive hierarchies than their German counterparts (CEDEFOP, 1979, p.6);
- British enterprises are noted to recruit more engineers and technicians with microelectronics expertise from external sources than is the case with German enterprises (Northcott, J. et al., 1985, p.82);
- British enterprises are particularly noted for their practice of consultation with the workforce/unions (when microelectronics were at first introduced) to a larger extent than is the case with German and French enterprises (Northcott, J. et al., 1985, p.84).

Though the data base of the relevant studies turns out to be rather small, the empirical results demonstrate that the small scale enterprises in Europe have problems with the application of the new technologies, but that they do not rely on the help and advice of their purchasing companies or competitors in the markets. Furthermore the autonomy of work is concentrated outside of the small scale enterprises, but with a feedback to the small firms:

- the decentralization of the production process of large companies by
  . the reorganization of the production process in division plants or in independent small scale enterprises;
  . the decentralization of work places in home production systems;
- the substitution of labor by capital may increase the unemployment rate with respect to low skilled labor in particular; this tendency may be concluded from the West-German statistical data (Table 5); following from this, unemployed persons may change from the formal sector to the informal sector in order to search for some activity being not organized on the basis of a labor contract but giving the subjective feeling of "productivity" and of "autonomy" of work.

Segmentation - Polarization - Cycles of Work Organization and Employment

Reviewing the available empirical studies on innovations, research and development, labor and employment, it may be concluded that the effects of innovations on the work organization of the small scale enterprises should be investigated and interpreted within a dynamic framework of a medium or even longterm period of time. Also, it should be considered, that technological changes turn out to be the effect of changing structures of the work organization and that they might have effects differing from those of former technological changes (Sorge, A. et al., 1982, p.159). The following model of different phases of the impact of new technologies on the work organization of small scale enterprises may be considered

relevant for a dynamic analysis of the mutual relation of innovations and work organization in small scale enterprises:

Phase 1:
- Application and diffusion of new technologies in small scale enterprises;
- skilling and deskilling of labor;
- making use of data processing centers and centralized word processing offices;
- centralized decision-making;
- hierarchical work-organization;

Phase 2:
- Polarization of upskilled and deskilled labor;
- technologically aggresive and traditional management in small scale enterprises;
- diffusion of subcontracting business with the effect of expanding hierarchies of decision-making and work-organization;

Phase 3:
- Expanding diffusion of the innovations at reduced costs in special fields;
- reintegration of programming, production and maintenance activities at the shop floor;
- depolarization of labor in the production process;
- diffusion of data processing technologies and capabilities in a growing number of crafts and professions, thereby contributing to the development and structural change of existing crafts and professions

Phase 4:
- Increase of the demand for recurrent education, training, research and development;
- decentralization of production and work organization;
- from hierarchy to autonomy of work by means of the new technologies;
- simultaneously the centralization of decision-making and the polarization of labor may be intensified to the extent that centralizing new technologies are applied

The available studies on the impact of new technologies on the human resources and employment of the small scale enterprises indicate that, presumably, the structural changes involving the work organization will not be limited to just one single direction. Instead, the development of the work organization in the small firms might be marked by segmentation - polarization - depolarization - decentralization - cycles. Of course, it will be difficult to quantify the time periods and the intensity of the various phases of the cycles.

CONCLUSIONS

The foregoing interpretations of the empirical data and theoretical approaches are employed to indicate the mutual relation of the application of new technologies and the changes of work organization in the small scale enterprises. The segmentation-polarization-depolarization-decentralization-cycles turn out to be a pattern of labour processes and company development connected with cycles of hierarchy and autonomy of work. This will concern two levels: (1) the work organization in the individual small scale enterprise, and (2) the work organization in the cooperative firms, like the subcontracting system. To the extent that the decentralization of work places is connected with the centralization of economic and technological decisions, the resulting autonomy of work is of an "internal", instead of an "external" kind, which might enlarge the participation of employees in the decision making process of the firm.
The international comparison of the work organization in small scale enterprises furthermore indicates, that national differences of the degree of centralization of decision-making will be continued to some extent, though the cycles of polarization and depolarization will be realized in the prospective ways.

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THE AUTONOMY IN CONTEMPORARY WESTERN COMMERCIAL FARMING AND THE EMERGING OF "TATE"

Bruno Benvenuti

SUMMARY

In order to emphasize a specific development concomitant with the scientific rationalization of farming, the concept of TATE (Technological-Administrative-Task Environment) was coined. TATE expresses the forming, around the farm, of a quasi-organization functioning as an active structuring element of the empirical set-up of farming. In fact, the superposition of a growing share of synergetic effects that can no longer be exactly traced back to external Agencies and regulations, forms increasingly the new problem to be faced, practically and conceptually, while dealing with the farm business of today. Some empirical results from a research programme in progress are utilized in order to indicate some methodological problems connected with TATE and its functio-ning. The question as to the possible application of the new heuristics to the analysis of the non-agrarian small- and mediumsized business is investigated. This possibility appears to be, in principle, fairly reasonably present whenever the business concerned does not have the power to sensibly control or influence the technological- and administrative environment of its specific sector of activity.

INTRODUCTION

A relatively recent but rapidly effective development in western farming is the emergence of a tightening network of all kinds of public and private formal institutions (agencies as well as regulations) exercising a strong directive influence upon both the daily organization of work and the specific development pattern of the farm firm. That is to say that specific sectors of the "external" formal social organization are transformed into dominant guiding principles within the farm enterprise even if, formally speaking, the latter remains an autonomous entity.

On the empirical level, the growth of this organizational network "around" the farm is quite evident. However, methodologically- and analytically speaking this phenomenon confronts the research worker with a series of problems, some of which will be touched upon in the following pages. In this connection the concept of TATE (Technological-Administrative Task Environment) was developed some ten years ago as a substantial heuristics which, since then, has been used also by various colleagues in empirical investigations in Italy, The Netherlands, Peru, Northern Ireland and South Benin.

THE ANALYTICAL AND PRACTICAL PROBLEM

Before starting the exposition of some major aspects and findings of that strand of research it should be made clear that TATE is in no way to be viewed as a kind of a historical-, universal- or perennial category for, in fact, it is clearly a product of what we commonly call the scientific rationalization of society. In other words, the degree of "presence" (empirical finitude) of TATE as a normsetting-, legitimizing entity and as structuring principle for the production process of the farm business is differentiated according to time and space. Even though the relations between the business firm and its operational environment as a whole have been studied intensively in non-agrarian sectors, in agriculture such relations have hardly been studied at all. If and when they are studied, they are, even today, approached in a sectoral way, i.e. mainly as "integration" into one particular segment of this environment (viz. co-operative organizations; vertical integration; etc.). But, mostly, the environment is still absent from the studies of the farm firm or, at most, it is used as a catchword (everything that "does not fall within" the formal boundaries of the farm). This environment is mainly seen as an informal entity, randomly structured, not actively intervening with the farm and not actively planning its own policies with regard to the latter. However, in our part of the world, this by now has become the stereotyped image of

an agrarian world dating back several decades.

Comparatively speaking, the operationally relevant environment of the modern farm consists, in fact, decreasingly of the sphere of the so called primary relations, and increasingly of that of the secondary relations. In other words, it is to an ever lesser degree formed by the farm family, the neighbourhood, the colleagues and friends, etc. and is instead more and more exclusively formed by:

a) a complete aggregate of formal organizations;
b) with which the farmer, with growing frequency, maintains exclusively formal relations;
c) intervening with a growing share of segments of the production process and its related choices;
d) and doing so more and more in a deliberately "zweckrational" way;
e) and where, finally, the participating institutions and organizations, directly or indirectly, co-ordinate one another's policies concerning farm matters.

The overall result of this development is, that such an - organizational aggregate finishes by confronting the farmer as an integrated cluster or quasi-organization (1) (2) which, for the time being at least, functions as an active-, structuring element of the empirical set-up of farming. Obviously this does not mean that TATE is a monolithic "block"; on the contrary, not even FIAT, PHILIPS or GENERAL MOTORS are monolithic blocks. Nevertheless, the whole operational environment of the farm firm comes to consist of tightly interconnected and interdependent facts and processes - "structures" and "flows", if so preferred, so as to form a causal texture of a particular type, i.e.:

1st: a texture wherein the farmer remains involved to an unprecedented degree through technical-administrative modalities and procedures, i.e. through a sort of social relations that generally can be influenced only very slightly, if at all, by himself; and

2nd: from which his own farm undergoes a constant normalization and co-ordination. This is why this new environment has been termed Technological-Administrative Task-Environment. This concept is to signify that, functionally speaking, the new environment, directly or indirectly, finishes by constantly re-defining to a high degree the professional tasks that are supposed to be executed in a farm business. And, culturally speaking, it signifies that the farm has to function and be structured according to rules that are no longer produced by the family or the local community, and that amount to a fundamental change in the type of social relations "required" for ensuring the success of the business.

At first sight, nothing new. However, as businesses can be built upon different types of logic, and hence on different types of social relations, all

imposition of new social relations implies radical consequences for the qualitative and quantitative composition of a whole section of the national human resources, stock of knowledge, territorial and political organization.

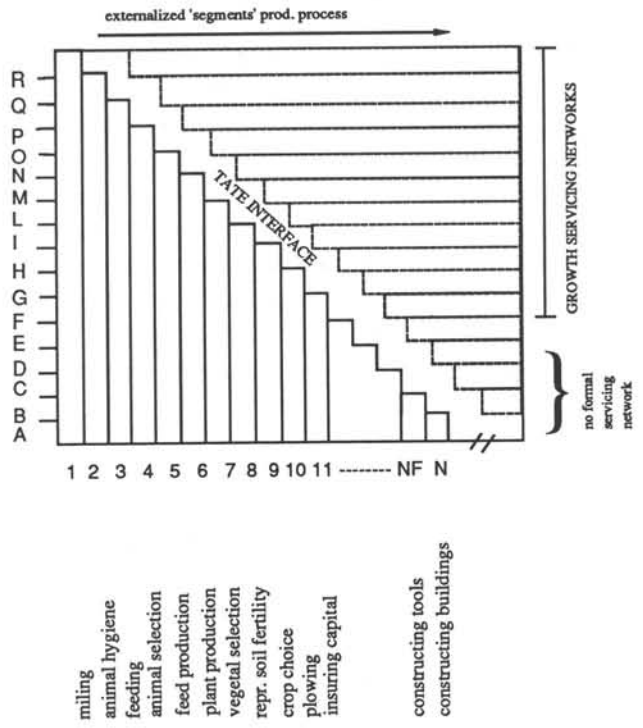
Of course, the effects of TATE are not obtained in a mechanistic way; they will not occur automatically if the farmer does not collaborate with the quasi-organization. However, the latter disposes of several orders of means to have him internalize its own rules and exercise TATE-oriented self control. Though the types of farm dependencies upon this new sort of "external" environment are indeed manyfold, cognitive dependence is well on its way to become the decisive variable in the process.

Figure 1 summarizes the normal development trend experienced by a farm under the influence of a growing and tightening "external" network of servicing Agencies. Fundamentally, it expresses a steady tendency towards externalization of functions and/or segments of the production process to environmental Agencies (sometimes also improperly called "destructuration"). But it expresses also three further typical characteristics of the scientifically guided farm-development model, apart from the steady increase of external dependence:

a) the farm ceases to be a place of recoursive operations and 'eigenvalues' and becomes an heteronomous system; the ground logic of its operations is no longer one of internal coherence, external correspondence becoming paramount; its openess to the environment is no longer limited to its structure, regarding increasingly also its organization. Hence the (farm)system's identity and specificity tend to gradually disappear;
b) the farm becomes increasingly mono-functional, specialized as it were, "around" a central effect or result: milking, producing one-day chickens, fattening calves, etc. This means that the farm in question tends to become mono-modulated by the carrying technology of a given merceological branch of the agricultural production;
c) as a consequence, the farm becomes also increasingly vulnerable to the turbulence either directly produced by the TATE Agencies, or mediated by these from the vagaries of the macro-level.

It may be assumed, that all this is perfectly comprehensible. Of course, each of the former effects can also be at least partly imputed to each separate means by which the environmental Agencies can "steer" the "behaviour" of the firm (i.e. the conduct of the farm labour). However, the fact is that such results are now more and more frequently the synergetic product of the new environment. We may even go so far as to say that TATE as a concept begins to show its analytical fruitfulness as

Figure 1: (from Benvenuti Angeli, et al., 1984)



soon as the synergetic effects originating from the environmental Agencies become a normal, and perhaps even gradually growing, feature of what formally remains defined as the "span of control" of the farm operator.

Functionally speaking then, this is what makes a statistical aggregate of formally separate Agencies become a quasi-organiztion. And it is relatively easy to realize that this share of synergetic effects increases at least proportionally - or probably even more than that - with the increase of system-interweaving of the environmental networks. The superposition or fusion of these effects is, in fact, increasingly the new problem to be faced practically and conceptually.

Viz., a common example of the first type derives from the fact that the various farm tasks imply automatically a continuous coordination. However, the externalization of any of them (say, fodder provisioning; animal selection; etc.) transforms the externalize element into a no longer manipulable "given factor" for the farmer. The consequence for the latter is an accrued material and psychological necessity to intervene and adapt

the remaining partial tasks. Thus, a step-wise process of compulsory adaptation sets in, culminating into:

a) accrued managerial rigidity for the farm concerned, and
b) a general "colonization of the living space" of same, since the remaining sectors of TATE have also to be taken into account in the process.

From the conceptual point of view TATE has first to be distin-guished operationally from the "remaining part" of society, which is only partly a purely definitory matter. If the concept has to express an empirically existing entity where "structuring of action" (in Giddens' terms) takes place, then both the allocative and the authoritative power of this entity must be at least approximately indicated. Secondly, the relevance (for "structuring") of possible synergisms must be shown. And thirdly, also the collaboration of the interested farmers must be ascertained.

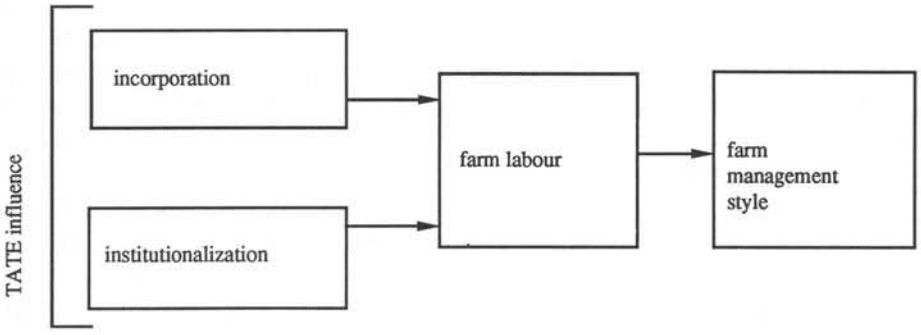
A FEW RESULTS FROM EMPIRICAL RESEARCH WORK

Though the pieces of research using the TATE concept are by now a dozen, we shall refer here to only three of them representing respectively, the initial, the "central" and the (provisionally) last phase of the research programme.

The first empirical results, passably encouraging for the value of the TATE heuristics, were based on the hypothesis that the growing recourse by the farm to the external support networks should in the end manifest itself (also) in a growing normalization and standardization of the farm produce, i.e. in a generally reduced variability of same. This hypothesis was checked very roughly by first examining the course of the standard deviation of the yearly national agricultural production aggregate along the time dimension. In the Netherlands, during a period of 35 years, this deviation has diminished from 4.33 in 1923/24 to 2.18 in 1969/70 (Benvenuti 1982b). The same procedure was, then, repeated with respect to the space dimension. The aggregate production variations obtained in Italy in the years 1970 through 1980 were compared for the four main national regions (Islands, South, Centre, North). The standard deviation (average) shrunk in that same period from 8.77 in the south of the country, where the TATE quasi-organization at the time had a lesser degree of finitude, to 3.05 in the North, where it was already clearly more "present" (Benvenuti 1982c). Farm labour does not acquire its shape in a vacuum, as holds true for every type of labour. The second study recalled here involves the linkage, at microlevel, between formulation of goals, structuring of labour activity on certain specific principles versus others, and the relations entertained with the task environment by the farm management. During the fieldwork carried out in 1982 over a stratified

sample of 316 farms of the Po valley in Italy as a part of a doctoral dissertation, Bolhuis and Van der Ploeg (1985) developed two operational concepts: "incorporation" and "institutionalization", which were jointly assumed to match at least the core of a farmer's professional relations to TATE along material and normative dimensions (figure 2). Furthermore, operationally speaking, de facto these are similar to Giddens' concepts of "allocation" and "authorization".

figure 2



Incorporation into the market structures "en amont" 3) of the farm firm was defined by means of eight different analytical indicators, each expressing separately the degree of incorporation achieved by the farm in question into a distinct input market. On these bases it was possible to calculate the total degree of incorporation of each farm 4).

Institutionalization relates to the degree to which the operator systematically consents to the external definitions and sanctions (sometimes prescriptions in formal terms) of his operative way. To this end, objective indicators were developed at three different levels: a-critical acceptance of external information and advice (INST 1); external prescription on investment choices (INST 2); external definition of tasks and task execution (INST 3).

The degree of farm incorporation, on the one hand, and, on the other, the degree of conformity to external normative prescriptions by the farm operator concerned turned out to be significantly related to differences in the level of craftmanship and intensity of farm style observable amongst farmers operating under the same ecological and socio-economic conditions (this particular focal result has been confirmed so far by the subsequent studies, with some variations correlated to the degree of

substantial content of the local TATE). Application of these two concepts as "independent" variables to the sample as a whole indicated the existence of two diametrically opposed management styles (Extensive and Intensive). Comparison of the farms concerned showed that these styles did not, as generally thought to be the case, depend upon farm size or anthropological characteristics such as age, education, early or late adoption of innovations, etc. but mainly on the two aforementioned degrees of incorporation and institutionalization with respect to the environmental Agencies, and on b) the synergisms thereof, realized in the organization of the production process of the farm. Such effects were observed in a number of ways; however, due to a lack of space the results of path analyses are shown in diagrams I and II. Annex 1 factor analysis (oblique rotation) of 20 managerial characteristics from the farm sample ERSA plains. These are based on the outcome of factor analyses applied to 20 separate farm management traits from a group of 75 dairy farms in the Po valley. The factors isolated thereby (cfr. Annex 1) fall within two categories, part of which describe scale dimensions and relationship, the rest describing the intensity of the management strategy applied on the farm. In a nutshell, the Intensive farmers displayed a high level of craftmanship, as a result of which a higher than average functional autonomy from the local TATE Agencies could be realized, neutralizing their reciprocal effects to a substantial degree. In contrast, the absolute priority attached to market conditions by their extensive management style colleagues as a yardstick for choices, produced an operational organization of their farms resulting visibly from externally originated cumulative effects. Hence, high organizational openness to TATE was correlated positively with "entrepreneurship" as actually defined by the TATE-Agencies, enlarging scale relationships of the business and lowering unified yields of same.

Instead, partial openess to TATE was correlated positively with craftmanship and growing unified yields of the business. The result of this particular piece of research-work seems to raise the question of the future of craftmanship and managerial skills in agriculture if the support networks continue developing their present policies. We will again refer to this matter indirectly in the final example. Here we may add that the operators less integrated into TATE and applying an intensive managerial style, displayed an uncommon dedication to their own notion of "proper farming" (so much so that the Authors speak of the pursuit of a substantial rationality in this connection). They try not to delegate the intellectual- and directive functions to external agents. We are confronted in this connection with two conditions that would seem difficult to reproduce in today's farming. In any case, Bolhuis and Van der Ploeg

underline that their work seems to indicate that, contrary to the commonly held belief, entrepreneurship and craftmanship express rather opposing qualities. Since, currently, the Extensive farming style is rapidly spreading throughout Italy headed by the Agro-Industrial Establishment, it would seem worthwhile to summarize its most prominent characteristics as follows:

- pronounced market orientation;
- higher than average externalization of segments of the production process to TATE Agencies;
- higher than average commercial dependency upon TATE Agencies for farm inputs and technology;
- high- and a-critical acceptance of external norms, prescriptions and technology;
- lower than average productive diversification;
- lower than average possibility to "play" with diverse technologies and productive patterns (i.e. higher internal organizational rigidity).

Prior to moving on to the final example, it should be interjected that four more pieces of empirical research related to the TATE problems have been carried out in Italy. All of these indicated that the effects of high levels of TATE dependency are evident: as a consequence of increasing institutional inter-weaving, the greater the rigidity of farm management, the more explicitly farm-development strategies become *less* defined as an autonomous operation to be carried out in the domain of production and reproduction (i.e. in the field of the farm activities proper), while these strategies become *more* defined in terms of a search for an increase in the system interweaving and in the simultaneous adaptation of inner farm relations to outside parameters (viz. more recourse to loans in order to enlarge the scale of operations; more technical assistance to lower production costs, etc.). Conclusion: farm adjustment and evolution cease to be a result of internally produced material progress and intellectual insight, and become a function of specific changes in -and adaptation to- external parameters.

We prefer to illustrate the meaning of some very first-hand and rough data coming from a study which is still unfinished. They give a rather good insight in how - i.e., through which paths - the influence of the TATE Agencies upon the farm management grows.

We interviewed a sample of 353 northern Italian farm operators. The sample consisted of 95 dairy farmers, 99 vinegrowers and 159 fruit growers. Here it is possible to quote some provisional average figures, as they have just come out of the first run from the subsample of the fruit

growers. The respondent was asked to indicate the source of the idea, information or criterion he had used to justify the innovations (technical or otherwise) adopted on the farm since 1980. In this way a total of 22 different categories of choices were identified. The present figures show that the influence of colleagues and neighbours is surprisingly low: it barely reaches 2.3% of the cases, but it has completely disappeared in no less than 1/3 of the total. The influence of family members is surprisingly low as well, amounting to 12.3% as an average. However, it still reaches values of as high as 47.6% for changes in the cultivated acreage, 32.1% for changes in the heavy mechanical equipment and 26.2% in deciding the density of fruittrees per acre. That is, the family seems to maintain a fair amount of voice in choices pertaining to investments affecting the farm future for long periods of time. Yet, these concern only three categories of choices out of 22. Three quarters of the decisional categories (16 out of 22) have, since 1980, been conditioned or even entirely determined by TATE. That is to say, the latter is - at first sight - only acting upon the seemingly "a-political", technical or nominally tactical choices. In fact, environmental Agencies have been the most important decisional factor in 79.6% of the choices concerning harvesting times; 73.6% of those concerning the selection of plant clones; 71.7% for the choice of the organization and the type or irrigation adopted on the farm; 71.2% for the type of organization given to pest control. On the whole, the Agencies' influence as most important decisional factor averages 41% of the farmers' choices.

It must be stressed that the former figures are just averages and that, furthermore, they concern the most "technologically advanced" subsample out of the three. However, they do show a trend as follows:

1) In agriculture technical progress, as administered by TATE, means an increasing fragmentation of the farm management (and control) into a series of seemingly separated technicalities to the detriment of the "weight" of the strategic choices or the choices pertaining to the organization of the business as a whole, i.e. TATE penetrates the farm not only by way of the front-door.
2) Once the preceding figures will be cross-tabulated against the degrees of "acculturation" of the farm operator to TATE, the functional significance of the latter will be further increased in very many instances. Viz., once a fruit grower has freely chosen a given Agency as furnisher of farm inputs, the technical choices concerning the way of using that input will be increasingly dependent on the monitoring of the Agency in question or on related segments of the quasi-organization. Furthermore, by paying attention to the most TATE-dependent types of choices, one will realize that such choices "cut" deeply into the management since they represent the definition and

the organization applied to specific production and re-production segments of the farm. Finally, it may be supposed that also a certain share of the "independent" farm choices nevertheless conform to the Agencies' expectations. Thus, by distinguishing this group of choices into TATE-conforming and TATE-alternative, and by adding to the former subgroup of choices the TATE-dependent ones, it might appear that in the province in question the global influence of TATE upon the choice-behaviour of the fruit growers has been decidedly paramount.

3) In the rest of Italy, the organization of the farm sector in this particular province is often admired as a true "guiding image" (Leitbild). So, where are the problems? The point is that - contrary to the philosophy by which TATE publicly legitimizes itself -:

a) the entrepreneurial functions have been "diffused" over the whole range of Agencies composing the quasi-organization (though in different measure);
b) gradually, but quite clearly, TATE seems to take over also the managerial functions, while at the same time;
c) the craftmanship of the producer concerned is undermi-ned through the progressive simplification-with-standardization of the TATE conform tasks. These become more and more purely taylorized, as is illustrated by the newly introduced concept of management by exception.

> This concept was formulated in The Netherlands by institutions of applied agronomic research, as IMAG, striving to develop complete automation of dairy farms. The idea, then, is to have the farmer play an active role in those moments when an error indication is generated by the computerized system. However, this actually means - at its best - to reduce this role to those occasions. That is to say that the guidance of -and control over- the normal process of production is allocated to the computer (alias the technician designing the soft-ware), while the farmer functions as such only when something goes wrong in the system. But, as current research already points out, this "becoming active" of the farmer mostly means only his rushing to the telephone in order to call for the intervention of the technician (viz. climate regulation in absence of adequate labour force; "follow-up damages" as defined by the insurance com-panies; etc.) (5).

d) As a consequence, it may be assumed that here it is the very

quality and professional competence of a whole category of independent workers that might be at stake in the near future. That is, independent farm work might be rendered impossible not only from external causes but, through its dequalification, also from within. Here we hit on a central issue, since it is clear that the maintenance of the specificity and the very individuality of the farm operation requires an organizational semi-closure of the farm as a system (this being exactly what Bolhuis and Van der Ploeg's Intensive Farmers succeeded in achieving quite deliberately thanks to their high level of craftman-ship. See pg. 10).

CONCLUSIONS

The question remains as to what may be the possible application of the TATE heuristics to the study of non-agrarian SME. Since still very little is known about TATE and nothing at all about the latter type of business, this is indeed an intriguing question. Even from the present short exposition one may infer that farming under TATE conditions seems to contradict Ashby's theorem of requisite variety: as Figure 1 shows, the more complex the farm environment becomes, the less differentiated becomes, on the contrary, the farm business. It may be assumed that the same applies presently also to some other sectors of economic life, even if we ignore the extent of the phenomenon. In any case, some hypotheses may be formulated:

1) First of all it may be assumed that the applicability of this new heuristics is logically linked -to a large extent- with whether or not in a given branch of economic activity a quasi-organizational environment has already emerged. The conditions for this emergence, in their turn, are probably branch dependent. As to farming, in each European country farmers unions, large national or regional cooperative systems, the Ministry of Agriculture, the scientific institutions and technological industry, etc. tend to form a tightly knit interweaving of material and moral interests and power structures, clearly favouring the emerging of synergetic effects at various levels of analysis. But also more generally speaking, we take for granted that the systemic character of our society seems decidedly to be increasing in most cases. For how long, and to what extent therefore become purely empirical questions in this case.
2) A second class of similarities could be found in those business branches where managerial rigidities show up due to the fact that the technology of the branch does not consist any longer of a mere juxtaposition of separate pieces or tools, becoming instead increasing-ly

substituted by compounded technological chains or systems. Thus it is the latter (the whole) that determines both the place of the component parts within its context as well as the manoeuvering space that is left to them. This is not meant to imply that any kind of technological determinism sets in; rather two other matters are involved. The first is that technology has its own built-in code, like a language (in fact, technologies resemble -or become increasingly, languages) and that, hence, if technologically well fitting systems are created, by the same token various kinds of syntaxes are also created that do not allow for much deviation in the "semantics" of the technology in question. Therefore the command of the business will be limited by the technological system adopted, even if the latter is wholly internal to the business (originating a situation which, in many cases, is abbreviated as the "supertanker effect"). However, in particular for small businesses a second, even more relevant fact is, that very many technologi-cal systems simply cannot be wholly internal to the business organization. On the contrary, most of them are explicitly created for the purpose of interconnecting different organizations and Agencies. *Then it becomes a question of power.* In fact, both the type of the technology that is socially created and selected, and the way in which it is socially applied depend on processes of social influence. Thus it may be assumed that the steering rigidity of a business employing only a limited segment of a wider technological system should develop more or less inversely proportional to its power of dictating the syntax of the system in question. More generally speaking, technological syntaxes become - in Gidden's terminology - structuring principles upon which certain actors are, historically speaking, in a position to exert greater authorization and/or allocation-power than others.

3) A third condition probably favourable to the adoption of a TATE heuristics should be found whenever in small business - single or as a branch of activity - a fragmented and standardized task execution is diffusing and increasingly dependent upon external norms and professional knowledge. The same may be said to apply in case of increasing externalization of partial business tasks or segments to outside Agencies. Actually, this condition is a special aspect of the former case; however, here the focus is put on the professional knowledge system.
There may still exist small business branches where the craft is essentially based on know-how and skills mainly developed by the family tradition, or in any case based on a specific "art of locality".
However, it is not currently known whether, like in agriculture, special

fields of activity can be identified where this type of professional knowledge is being rapidly substituted by externally originated notions and externally developed technology and work procedures. In such cases the use of TATE should prove more analytically rewarding than otherwise.

4) Finally, continuing along the same line of thought, the TATE heuristics should prove rewarding in those sectors of activity where formalization and institutionalization actually characterize the interaction between small business firms and external Agencies. It might be that this is a condition still applying less generally in the wide variety of small-business relations than in present day western farming. There might exist new developing portions of the tertiary and quaternary sectors that, on the whole, escape formalization. However, a sensible degree of formalization and standardization is unavoidable if activities or products are to suit growing masses of population. Thus the case must, apply also to a given share of the small and medium-sized business sector. Formalization and institutionalization are the core characteristics of administrative activities. And, like technology, administration too is -or becomes- a special language.

Therefore, in summary, generally speaking the use of the TATE heuristics for analytical purposes should prove rewarding in all those cases where the formally independent actor to be studied deploys his economic activity within the context of a quasi-organization, of which he can neither control nor sensibly influence the technological and administrative syntaxes.

NOTES

1) It is more correct to say that from the observation point of the farmer, TATE appears as a kind of quasi-organization, i.e. an entirely-institutional environment showing de facto a very high degree of linkages and of concomitance or censecution of action (even if often in opposed directions).
   Measures to be taken with respect to the farmer are increasingly prepared on an inter-agency basis, consultation, strategy, etc. Thus, for the interested farmer a measure of this kind appears as the product of an intra-TATE coordination of action (which often is even legally prescribed). This type of environment consists, therefore, no longer of mutually unrelated facts, but of chains of mutually causing/influencing processes. Per analogy one could therefore orthodoxly call TATE a quasi-organization. In fact, keeping in mind that each organization is characterized by the presence of a structure, a function, and a culture:
   a. the structure of the quasi-organization comes automatically to the fore in the sense that - beyond a given degree of integration of the branches of the networks - around the farm there forms a clearly "filled" complex of limitations and causalities impinging upon the development "direction" of the farm, a complex of which the farmer himself is clearly aware;
   b. the "function" results from the fact that all the agencies and measures with which the farmer must reckon have at least one principal effect in common i.e. the regulation of the process of production through a normalization of the productive activity of the interested actors;
   c. finally, each organization has an own symbolic order ("culture"). In our case the latter is to be seen in the obvious presence, amongst the personnel of the interested agencies, of commonly shared primary normative and interpretative elements and attitudes concerning local agrarian developmental issues. (Benvenuti B. and H. Mommaas 1985).
2) In each situation the research worker must decide what environmental components are to be seen as relevant for the chosen class or group of social actors. But, of course, guide-lines for observations have been developed. Thus, where it concerns the general categories of social agents composing TATE in a aggregate way, the following aspects have to be taken in consideration:
   - the customers or buyers of the farm produce;
   - the suppliers of technology and capital in their various forms;
   - the institutions and authorities holding regulatory power concessing access to the soil and its use for productive purposes;
   - the competitors of the firm, both in the markets for resources and among those handling goods and services produced;
   - other various regulatory bodies including governmental agencies, local public agencies and producers unions and associa-tions;
   - the institutions and systems of professional information and scientific research applied to farm development problems;
   - the furnishers of labour inputs.
     (B. Benvenuti, 1975b, p. 503).

3) Farm incorporation into the market structures "en aval" was not translated into indices since it was judged that in the region where the field work took place this dimension would not dis-criminate between farms, the latter belonging -to the same degree- to the group of commercial farms.

4) In the region (Emilia-Romagna) it proved possible to distinguish eight different markets on the input side (see below). The degree of incorporation per market and per farm was obtained by calculating the ratio of externally purchased amount compared with "total input" for the resource in question. Viz. incorporation in the feeder market is expressed by the formula:

$$\frac{\text{concentrated feeds and fodder purchased}}{\text{totally consumed feeds and fodder (purchased + produced)}}$$

Table: averages and standard deviations of eight indicators of incorporation in the sample Emilia-Romagna

		plains		mountains	
market for		M%	(s)	M%	(s)
labou	11	9,1	(22,8)	0,1	(0,4)
custom work	12	30,7	(28,5)	10,0	(12.5)
credit, short term	13	4,6	(16,3)	1,9	(10,4)
credit, medium term	14	11,1	(50,5)	3,4	(10,8)
credit, long term	15	2,4	(3,4)	2,4	(7,6)
soil	16	28,7	(37,8)	20,2	(30,2)
fodder and feeds	17	43,8	(18,2)	37,8	(16,7)
cattle	18	7,2	(9,0)	7,6	(11,1)

(Bolhuis, E. en J.D. van der Ploeg, 1985).

5) That is why there is a great ambiguity about the substan-tive meaning of the concept of "skilled work". Our data indicate that a definition of skilled work is presently spreading in European agriculture, which contradicts the common notion that "skilled" corresponds to "autonomous" work.
That is to say, though the fruit growers of our sample are formally (statistically) classified as autonomous "entrepreneurs", -functionally speaking their substantial status shifts sensibly "downwards" towards that of "semi-autonomous" (and, in given cases, "non-autonomous") workers in terms of Kankaanpää (Kankaanpää et al. in this volume).

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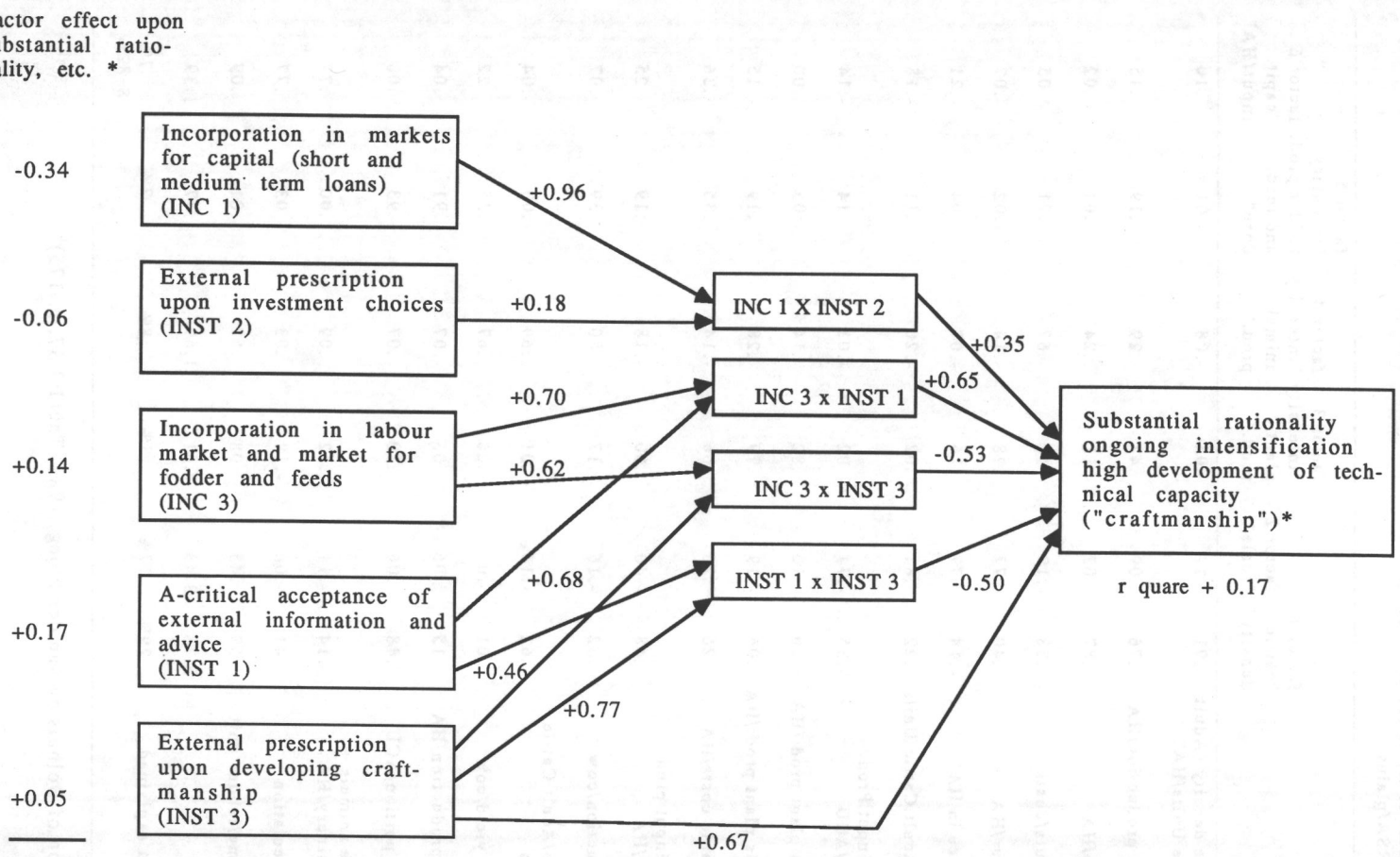
annex 1 factor analysis (oblique rotation) of 20 managerial characteristics form the farm sample ERSA/plains

variables		factor 1 "cattle density"	factor 2 "scale"	factor 3 "intensity plant prod."	factor 4 "intensity animal prod."	factor 5 "intensity fodder prod. and feed. dose"	factor 6 "capit. input/HA"
N10	Cattle density (Adult Cattle Units/HA	.91	.14	.03	-.08	-.01	.10
W38	Total production/HA	.76	.09	.47	.29	.19	.15
N47	Saldo/HA	.87	.02	-.11	.24	.01	.02
N49	Outputs/costs	.38	-.12	-.18	.67	.21	-.05
N1	Labour/HA	.40	-.77	.28	-.14	-.02	-.07
W8	Surface in HA	-.14	.77	-.16	-.07	.04	-.21
W14	Nr. Adult Cattle Units	.22	.81	.02	-.20	.11	-.18
N44	Tot. input Prod. Fact./ACU	-.35	-.74	-.02	-.01	.14	-.14
W36	Costs plant prod./HA	-.16	-.10	.82	.14	-.05	.00
W39	Yields plant prod./HA	-.06	-.19	.79	.28	.19	.15
N39	Variable costs/HA	.26	.26	.66	-.14	.35	.36
N22	Tot. input prod. Fact./HA	.48	-.40	.60	-.18	.19	.25
N4	Production/cow	.32	-.16	.17	.80	.39	-.07
N48	Saldo/Adult Cattle Units	.62	-.14	.01	.69	-.03	-.04
W42	Milk yield/cow	.01	-.01	.06	.67	-.35	.22
N37	Feedproduction/HA	.15	.06	.06	-.07	.91	.04
N38	Feed portion/ACU	-.48	-.06	.10	.07	.93	.00
N2	Value animals + machinery/HA	-.14	-.11	-.12	.09	.00	.77
N3	Depreciation	.41	-.06	-.18	.03	.03	.77
N50	Income/labour unit	.59	.45	.08	.57	.01	.09
Own value		5.78	3.43	2.61	1.69	1.47	1.39
% variation explained		29%	17%	13%	8%	7%	7% S=82%

(translation of Bolhuis en van der Ploeg, 1985, Tabel 3.37, p. 175)

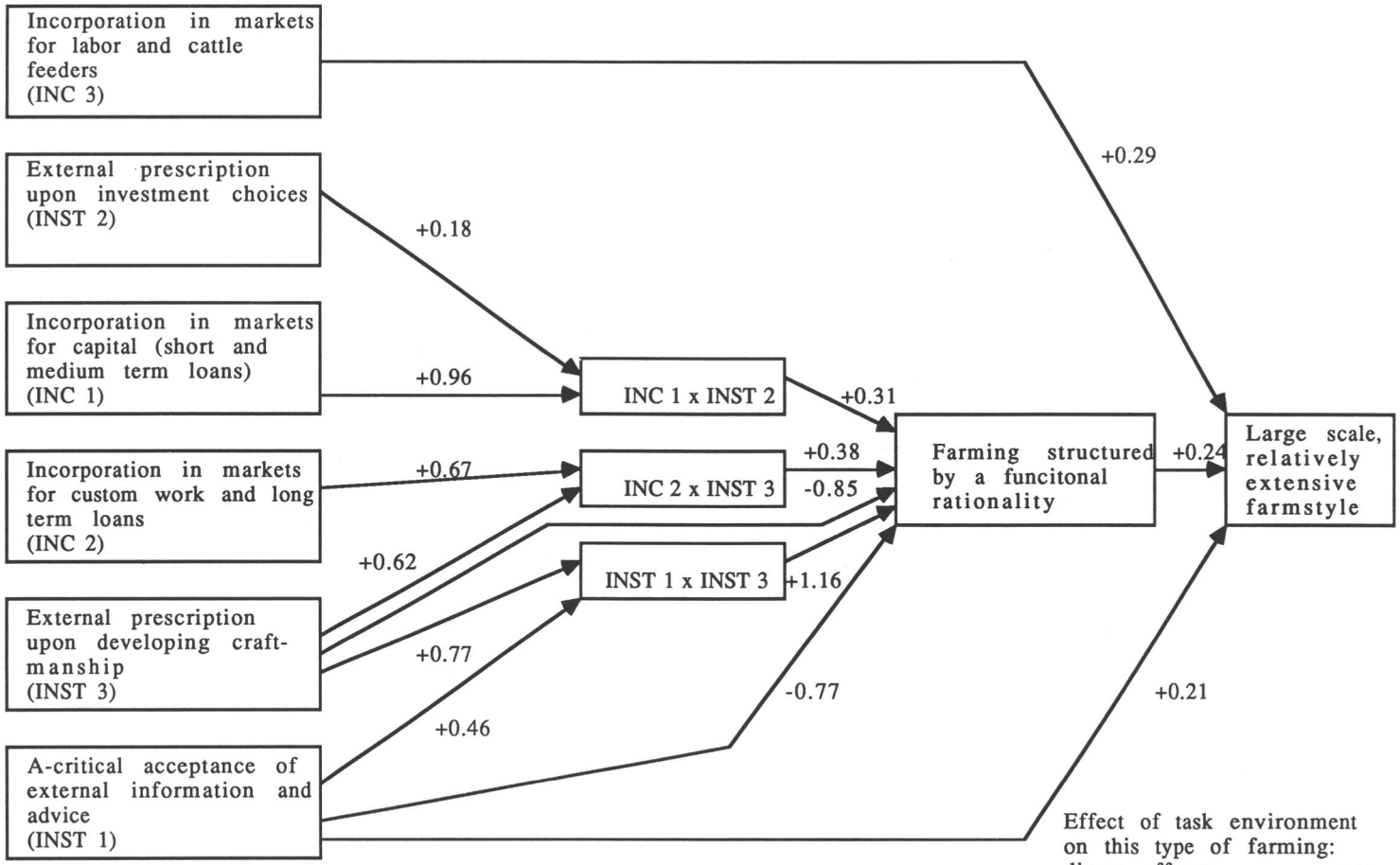
Path Diagram I: The effects of incorperation and institutionalization upon relatively high degrees of functional autonomy and increasing unitary intensity of farming (I-calculus).



Total Effect + -0.04

(translation of Bolhuis en van der Ploeg, Tabel 3.35)

Path Diagram II: The effects of incorperation and institution upon scale and low intensity of farming (E-calculus).



(translation of Bolhuis en van der Ploeg, Tabel 3.38)

Effect of task environment on this type of farming:

direct effects	+0,29
indirect effects 0,64 x 0,24 =	+0,21 +0,15
Total effect	+0,65

SME AND CONTROL: AUTONOMY FOR FLEXIBILITY

Henk van Driel
Erik Poutsma

SUMMARY

This chapter considers the significance of recent discussions of the labour process for the analysis of work in small enterprises. The central themes pertained to the control in small companies and the perspective of 'flexible specialisation'. Tentatively it is said that with respect to control, the employment relation is more important than the division of work. Control in small compa-nies tends to rely on exclusion or on loyalty taken for granted. In the discussion of the theme of flexible specialisation, small and medium-size enterprise will presumably assume a central role. Flexible specialisation, functional flexibility as a future alternate small-scale organisation form for employment, is an intriguing but barely explored theme. The comments given show that the studies undertaken so far suffer from partiality and limited empirical range. Flexibility understood as a specific form of control, a way of strategic action by the management, need not be tantamount to a multifunctional job content.

INTRODUCTION

A recurrent question in research and policy is how far automation changes the labour process. Some argue that automation tends to enhance the management control of the labour process, and hence leads to narrower tasks, impoverished human contacts at work, and diminished autonomy of the individual worker. In other words, automation dequalifies and polarises. Others maintain on the contrary that automation may spell more autonomy and more individual task control, leading to richer tasks and the requalification of functions.

It has been put forward that new technology developments are of benefit to the growth of small firms rather than large firms because of its flexibility requirements. In this connection attention should also be drawn to new forms of organisation of industrial production and new forms of work organisation. A term like "flexible specialisation" expresses that SME are interpreted as parts of a system of productive resources, which contribute to the production and application of new technologies, and that the technological changes are more and more understood in terms of endogeneous variables of the economic process. In this respect the specific organisation of SME, especially concerning autonomy and flexibility, turns out to be a precondition of innovation, effectuating the new technology.

The subject of this chapter is a partial theme, namely, the changes made in the control regime for the sake of flexibility; our conclusions are primarily based on the results of case studies. First, we will describe how small companies organise control, explaining the meaning of flexibility in small-scale enterprises. We shall verify how far a new production concept, called 'flexible specialisation', is being adopted. Next, the changes in the control regime due to new technology are identified, and comments given on the flexible-specialisation model.

This chapter is based on results of a research programme undertaken jointly by the Economic Research Institute for Small and Medium-size Business and Delft University of Technology. The object of the research was to explore the implications of new technologies for the quality of the organisation and the work in small-scale production units. To that end, a quantitative analysis was made of data collected for the purpose, and a qualitative analysis of nineteen case studies from various business sectors.

CONTROL AND NEW PRODUCTION CONCEPTS

Control types

'Small is beautiful' is the idea that penetrates many studies of the labour process in small-scale enterprise. The thesis is then that labour relations are more harmonious in small than in large companies, because allegedly the interests of employed and employer run parallel and social harmony prevails (Bolton, 1971). Reference is made to the relatively high work satisfaction and the relatively slight absenteeism in small enterprises, and to the absence of social unrest by way of labour conflicts (Van Ginneken, 1986). However, that thesis has been criticised for its weak definition of the notions involved and the limited empirical basis of the investigations (cf. Curran and Stanworth, 1979, 1981; Rainnie, 1985; Goss, 1988). The "harmony myth" appears to spring largely from the absence of open labour conflicts (Scott and Roberts, 1988). However, "Workers in small firms do not escape the deprivations of the capitalistically organised enterprise nor are their relations with their employers magically rid of the contradictions of interests and outlook which inevitably surround economic activities in our society" (Curran and Stanworth, 1979: 337).

'Labour-process approach' is the collective term for (neo)marxist-oriented theories on qualitative changes in the quality of work. In that approach, the focus is on technical and organisational changes in the labour process, defined as the process in which people exert their work capacity in several ways for the production of goods and services. The publication of Braverman (1974) marked the start of a series of investigations and theoretical discussions. The labour-process approach rests on the assumption that the labour process is essentially affected by actions of the parties involved (management and employed persons) within and outside the firm. However, the final labour process must not be regarded as the result of the actions of arbitrary (groups) of actors driving for a random string of interests. Actions and results occur in the context of societal relations, presumably reflecting the capitalist production method. The often contradictory interests of management and employees governing their respective actions express themselves in the contractual relation. Essentially, employers buy the working power of people hoping for an adequate performance (application). The performance has to be exacted, so to speak, and the management thus has a political motivation to control the labour process and the recruitment of labour to the best of his ability. In that vision, to manage is "to control the labour process and workers' behaviour", and therefore a question of

power. And to organise the labour process is not only an economic or technical matter, but also a matter of control by the management. That reasoning is called the "control thesis".

In the present labour-process discussion the 'interplay' of technique, labour and organisation is understood as a process of structuring. Within the structural marginal conditions of the labour organisation in question, this process is largely governed by the (strategic) actions of management and staff with respect to the present and the desired constellation of technique and labour. The transition from the notion of 'direct control' to that of the 'interplay' of strategic actions by the parties concerned has been marked by what could be termed the 'Braverman-Friedman-Burawoy line' of discus-sions within the labour-process approach.

Braverman considered first and foremost how the labour process is guided and supervised by management. In his vision, taylorist work division structures the labour situation (in particular the work content) in such a way that workers have no say in the organisation of their own work, a procedure that is indicated as 'autonomy destruction'. Braverman saw in the erosion of the work content and the degradation of workers' qualifications in American manufacturing industry the reflection of managers' drive for control.

Friedman found, besides the type of control observed by Braverman, an entirely different strategy used by managers to induce given groups of workers to display the required application. Indeed, well-skilled workers are often granted a high degree of autonomy ('responsible autonomy') to enable them to solve unexpected problems in the production process by drawing upon their knowledge and skills. In his view, there is a strategy of autonomy regulation as well as that of autonomy destruction.

Burawoy wondered why workers, in spite of their rather tedious and unpleasant work, nevertheless co-operate largely of their own free will towards management objectives. His explanation is that the workers's consent to the organisation of the labour process is obtained ('manufactured') by compulsion and incentives exerted through a set of rules (about (work) consultation, work conditions, etc.). This type of control can be used to destroy autonomy (limiting workers' freedom) as well as to regulate autonomy (allowing workers some space to organise their own work).

Apart from the distinction between autonomy destruction and autonomy regulation, the discussion of the labour process has led to a distinction between personal control and technical/bureaucratic control. Personal control is direct supervision by the entrepreneur or manager in person. Technical/bureaucratic control is the result of technical and organisational mechanisms and practices (division of work, automation,

standardisation).

The above presentation of the types of control distinguished in the labour-process approach does not include an analysis of any resistance workers might put up to escape control. Yet, undoubtedly, measures of control inspire attempts at escape. Here we will merely remark individually and collectively, the employed develop counter strategies. On the individual level, avoidance seems a likely counter strategy. To capitalise on management's "dependence" on the skill of their staff is another. On the collective level, workers' strategies concentrate on influencing the organisation of the labour process. The support of a trade union enhances the workers' chance of succeeding in that respect. We know for a fact that in small and medium-size enterprise, where the organisation degree is low, that last chance is poor.

A new production concept: flexible specialisation

The control types mentioned in the previous section occur side by side, but newly developed production concepts presuppose priority for either one of them. Moreover, the types of control have to be viewed in their own temporal context; they have specific effects on the quality of the work. A new concept developed by Piore and Sabel (1984) and Sabel and Zeitlin (1985) pays specific attention to the significance of small-scale enterprise; it is called 'flexible specialisation'. Whenever flexibility comes under discussion, work in small companies and by self-employed tends to be presented as a 'new' way of working, which is not only more competitive (more flexible towards markets), but also opens prospects of more autonomy. And apparently, specialisation in flexibility, or flexible specialisation, is what counts on the markets of the future. The perspective of 'flexible specialisation' is largely based on the alleged flexibility of new technology. Flexibility on the basis of reprogrammable machines and robots makes it possible to manufacture a whole range of products within a single production. The increasingly fragmented sales markets and flexible technology pave the way for the introduction of a new, non-taylorist (that is, not much divided) labour organisation, calling for flexible work schemes as well as flexible workers. A craft-like way of working would thus be revived. The authors cited above see in the renewed fragmentation and decentralisation of production and the revival of the small-scale sector the economic solution for the situation ensuing from the stagnation of mass production. By traditional economic principles, the market dictates this restructuration. Mass markets of standardised goods are saturated, and quality has become more important than price. In the ensuing crisis, an alternative technological

paradigm may break through, offering chances of a "second industrial divide".

Sabel and Zeitlin in particular relate the trend towards flexible specialisation to the growing role of the small-scale sector as an alternative for mass production (Sabel and Zeitlin, 1985) and as the type of organisation needing a minimum of hierarchy. Referring to small Italian enterprises, as an example, Sabel argues: "The internal division of labour in such firms tends to be extremely flexible. The contacts among owners, engineers, technici-ans and various heads of production, and skilled workers of various grades are close, and hierarchical distinctions are often treated as formalities" (Sabel, 1982: 224).

So, flexible specialisation implies broad restructuration based on:
- an alternative technological paradigm,
- reduced mass production,
- contraction of markets for mass products,
- new opportunities for small companies opened by new flexible technology,
- application of programmable technology in large companies leading to flexible specialisation as a form of organisation in smaller units.

The last two aspects imply new and changed management strategies regarding the labour process.

CONTROL AND FLEXIBILITY IN SMALL ENTERPRISES

This section describes the type of control exercised in small enterprises in the terms of the labour-process discussion. To that end, first some relevant features of small and medium-size enterprise are discus-sed, and next the specific characteristics of labour processes in such enterprise.

In comparison with large companies, small and medium-size enterpri-ses are marked by:
- personal entrepreneurship and direct personal work relations;
- less division of work;
- stronger dependency on the environment.

Personal entrepreneurship and personal work relations

Personal entrepreneurship can be defined as direct involvement in, and personal contribution to, the company. Some features stand out. The entrepreneur in a small enterprise is both the supplier of capital

(property of the company) and the manager (control of production means). As owner he belongs to the 'capitalist class'; as manager he has authority to activate production means, in other words, to control the production process. Finally, in many cases he also participates in the work, that is to say he practises a profession, he is a producer (cf. Mok, 1982). That combination of occupational roles in one person influences the entrepreneur's values and attitude towards consultation and participation. If he involves the employed staff in decisions and strategies, he does so to motivate them to better performance rather than to grant them participation in the company (Braaksma and Toppen, 1982: 19).

Because of the direct personal relations, the employment relation is essential to the work process in small companies (Scott et al., 1988). Typically, in small companies the labour contract between the two parties is informal. This implies that important elements of the work relation are non-contractual, for example the obligation to perform certain activities without pay, to work irregular hours, to take a co-operative attitude, etc. In that situation, 'beyond contract' seems a very apt expression (Fox, 1974). A second feature of small companies is that the employment relation is actually an extension of the family relation, and often has the character of patronage. The employer is morally committed to care for the people in his employ by providing good working circumstances, but also by a generous interpretation of the employment conditions and working hours, for instance allowing workers to use equipment for private purposes, etc. (Scase and Goffee, 1982).

The direct personal relation is reflected in the relative absence of formality in the employment relation. Control is exercised not so much in formal rules as through direct communication. Personal control is the central idea. Conflicts are not fought out openly in the company but, dependent on the authority of the persons involved, will be settled in a subtler way. In that respect, the entrepreneur holds the best cards. Not only can he make a personal appeal to the worker, put him or her under pressure, play workers off against each other (or against participating members of the family), but he can also deprive him or her of the non-contractual ele-ments of the employment conditions.

To the entrepreneur, the continued existence of personal employment relations provides him with useful tools, in terms of staff policy as well as recruitment and selection, to ensure himself of constant optimum application from his staff. In fact, to realise his objectives the entrepreneur pursues a strategy of exclusion towards non-cooperative

associates (Scott et al., 1988), which explains why open conflicts are not likely to break out.

Low degree of splitting up work

The low degree of work division, and a corresponding high degree of autonomy, are structural characteristics of employment in small companies (cf. Maas and Toppen, 1983; Van Driel et al., 1987). There are sectoral differences, however. In commerce (retail and wholesale trade), large parts of the production process are so firmly surrounded by technical and bureaucratic rules as to minimise the short-cycle contribution of human activity. In manufacturing, on the contrary, workers still account for a considerable part of the value added, and can perform their tasks in relative autonomy. Indeed, the workers are apt to have specific skills on which the entrepreneur 'depends'. To replace a worker would incur considerable expense. So, the threat of leaving or being less industrious is an important means of control on the part of the employee. So, with respect to these workers, the entrepreneur can not use the option of autonomy destruction, but he does have the option of autonomy regulation.

By the much-postulated flexibility of small companies is mostly understood their ability to respond instantly, both in quantity and in quality, to changes, because in the smaller companies the supply and processing of information and the decision making are ideally united in one or concentrated with a few persons. Moreover, there is a directly visible relation between the individual performances of the staff and the performance of the company, which makes the workers readier to adjust (Mendius, Sengenberger, Weimer, 1987). Thus, some functional and operational flexibility (related to the activities of the company) is achieved, which, however, does not necessarily constitute a comparative advantage. In fast changing markets, the specific consequences of a change for the smaller companies cannot always be predicted. Problems may develop for lack of information. With some exaggeration, to be flexible may in that case mean to be prepared to adjust on the strength of inadequate information.

For small companies to be potentially flexible, the important thing is to combine professional skill with unsplit tasks that can be carried out with a high degree of autonomy. In craft-like and industrial companies, potential flexibility permits instant response to bottlenecks in the staffing (functional flexibility) as well as flexible operations; in commerce and

services, such flexibility is hardly if at all present. Because the potential flexibility in craft-like and industrial companies is mostly based on vocational training (apprentice scheme, 'duale Fachausbildung'), flexibility can also be achieved by exchanging staff on the external market for skilled labour (Sengenberger, 1987: 127). The workers consider that a normal part of their career rather than employment insecurity. In services, especially in retail trade and in the hotel and catering business, where the qualification level is lower than in craft and industry, flexibility is achieved by flexible labour relations, for instance with part-time and "on-call" labour, and flexible remuneration (Van Driel et al., 1987; Van Driel and Van Ginneken, 1986).

Another basis of the smaller companies' potential flexibility is the capacity reserve that can be mobilised with relative speed. By his strong control position and because the interests of the staff are not formally represented, the entrepreneur can easily enforce his staff to work overtime. On the other hand, compensations or rewards can be agreed upon in an informal way, or a way can be found at less busy moments to fill working hours up in a way profitable to the employed.

Another way to achieve flexibility is to make use of informal labour: participating family members, students, etc. The entrepreneur himself can also put in a hand in an emergency (possibly supported by members of his family). All such things help to keep the capacity flexible.

Finally, the flexibility incorporated in the staff's willingness and ability to be content with less in a crisis or accept a wage reduction, should not be underestimated. Small entrepreneurs are prepared to operate for a long time on a subsistence basis, either because they can see no alternative or because they value indepen-dence more than profit. Such autonomy is based not on the potential of adequate action but on the willingness to, and possibility of, downward adjustment.

From the above short expos, an important part of the flexibility in small-scale enterprise appears to be a function of the type of control, which is personal and informal. Often, flexibility is the fruit not so much of a conscious active attitude as of bowing to the inevitable. In small and medium-size enterprise we indeed observe companies actively operating in a flexible way as well as companies assuming a dependent, adjusting attitude.

Dependency on the environment

Small companies depend more than large ones on their environment (Braaksma, 1987). They are dependent on buyers and suppliers, other companies, sources of information and advice, and funds, as well as on the labour market. The developments in the industrial organisation (considered on the meso level of production and business columns) point to the changing role of small and medium-size enterprise in that context. Technological advance makes for the progressive co-operation of companies. A conscious strategy to that effect is followed in research and development, market segmentation, etc., both horizontally (mutual co-operation) and vertically (for instance in the business column). The smaller companies are not always aware of the relations, nor do they use them offensively in the sense of adopting a well-defined market approach and looking for co-operation in more or less structured associations. Rather do they try, from a more conservative point of view, to limit their expenses by an effective joint effort in order to keep their market position. That refers in particular to horizontal associations.

On the basis of relevant experiences in the agricultural sector, Benvenuti (1987) introduced the TATE concept. He defines this 'Technological Administrative Task Environment' as a super structure, a quasi-organisation, institutionalising the environmental relations of small businesses. He envisages a network of formal organisational, consulting and supporting agencies taking over most of the mainly informal social networks of the entrepreneur. To the individual company, such a development spells less autonomy.

Autonomy of the individual firm is also affected by the growing mutual adjustment of the elements in the business column expressed in the supplier-buyer relation, also called vertical integration. Systems for Just-in-Time (JIT) and Total-Quality-Control (TQC) are the central applications. Within the vertical business relation, standardised agreements are made on the time of delivery and the quality of the products. To small and medium-size enterprise that implies a relation with a large-scale buyer, who increasingly makes detailed demands down to the very structuration of the labour process. To test how far the quality agreements are respected, a quality manual has to be at hand describing in detail the labour process and the conditions under which the work is performed. To supply its (large) customer with the required information on quality control, the supply company has to manage an adequate information system. In many cases such information systems are completed with variables relating to staff information.

Exploring the dual industrial structure of Japan, Vreeman (1984) came to the conclusion that a conglomerate of small supply companies serves as a buffer to the large company, thus helping it to follow a strategy of flexibility. The result is that small enterprise adapts itself, at the expense of the quality of its employment and of its autonomy. Atkinson (1984 and 1986), after an investigation in six industrial branches, describes the large flexible company as a structure with "commercial subcontractors, specialist self-employed in the surrounding ring representing groups of peripheral workers". Atkinson's model of the flexible (large) company, as well as the observed tendencies to vertical integration, depict small and medium-size enterprise as a dependent flexible segment of private enterprise.

The *conclusion* may be that the study of small enterprises reveals the import-ance of the employment relation, and in particular its non-con-tractual elements, for the control of the labour process. Often the control is personal, with - dependent on the sector - autonomy destruction or autonomy regulation as tools. Precisely in the matter of management control there is a marked difference between the smaller and larger companies. Small-scale enterprise is characterised by personal entre-preneurship and family relations between the workers and the employer; in other words, the employment relations are personal and informal, and control is mostly exercised by hegemony and consent at the one end and exclusion at the other. Finally, the smaller company is found to be dependent on its environment, which determines the space within which the labour process can develop.

AUTOMATION, CONTROL AND FLEXIBILE SPECIALISATION

This section presents some results of studies of automation in small firms. These results are subsequently used to comment on the concepts of control and flexible specialisation formulated before.

Automation and control

The studies point out that the entrepreneur may proceed to automation from different motives, namely:

- to increase productivity by reducing the costs of staff and materials, avoiding errors, and making use of simple solutions; in brief: *cost control*;
- to improve the quality of his product: constant or improved quality at

lower prices, improved accountancy and documentation, more functional production and service; in brief: *quality control*;
- to be more flexible, able to switch faster to other products and/or services, to reduce delivery times, offer a wider range of services, in brief: *activity control* for flexibility.

The three motives: cost control, quality control and activity control, vary in frequency and intensity and cannot always be profitably combined. The research show that especially flexibility and productivity may be incompatible objectives. To the more flexible small companies, cost control is the first motive for automation, while activity control ranks high with large-scale companies. Indeed, small companies setting out to reduce their cost by automation, might well end up losing some of their valuable flexibility.

Another effect is the greater amount of *formalisation* (that is, bureau-cracy and standardisation) inherent in automation. Research shows that the applicati-on of automated systems mostly entails a more forma-lised management control and formalised work relations in the company. Consequently, this centralizes the problems of flexibility and the question of automation. The changes should preferably leave flexibility intact, since that is seen as an essential feature of the 'economy of scope' of the smaller companies. A multi-skill job content, autonomy for the flexible execution of tasks, and informal employment relationships are regarded as the functional aspects of jobs in small-scale enterprise.

Research outcomes indicate that in the smaller companies tasks are less fragmented than in the larger ones. In small-scale enterprise, programming of equipment is mostly (for 69 per cent against only 29 in large companies) left to the operator rather than entrusted to specialists. The question is, however, whether the system integration inherent in advanced auto-mation will not lead to progressive functional fragmentation because of formalised and detai-led control of activities.

From case studies in small and medium-size enterprise, it is evident that in two situations companies may prefer a certain fragmentation of tasks.

A tradition of strong functional breakdown of tasks in the organisation makes a change to multi-skill functioning hard to realise. In a metal works, for instance, decentralised multi-skill functions were considered unfeasible because traditionally the tasks had been split up into functions requiring little skill. Nor had the recruitment strategy ever been oriented to skilled labour. It was just a question of learning a few tricks which, by

way of speaking, any baker could master.

On the other hand, the very formalisation required for automation may be an obstacle to decentralisation. Direct, informed control ensued by information systems enables management to detail the tasks more and more and to exercise central control. An installers' firm had programmed project control to the point where the manager could determine which employee was allowed to perform which tasks at which terminal, and deny the staff access to other activities. The central management could split or combine tasks at will by regulating access to the system. As a consequence, the administrative functions in this company were severely eroded.

The above results illustrate clearly that despite system integration, a traditional production concept of task fragmentation can be supported by a stronger formal management control favouring centralisation and polarisation. Moreover, managers sometimes lack the insight needed for the optimum distribution of tasks among functions. Not knowing well enough what qualification level fits the new tasks, they may be little inclined to entrust more tasks to the functions on the workfloor by enriching the function content or giving more responsibility.

On the other hand, there are examples of companies that have indeed adopted an integral option. An accountancy firm had arranged automation in such a way that teams of associates each had control of a segment of the firm's patronage. A team would be responsible for a project from the processing of the customer's data to reporting to that customer. Another auditor's office, on the contrary, favoured a strong functional split-up and a hierarchical organisation.

Flexibility and flexible specialisation as the type of control in small firms?

Flexibility, in this context, means activity control. Automation will make this control less personal and more bureaucratic. Standardisation and formalisation will at the same time set limits to flexibility. On the other hand, new technology is alleged to enhance flexibility. That argument lies at the base of 'flexible specialisation', proposed by small-scale enterprise as an alternative production concept. From the study results, this concept needs to be qualified.

The notion of 'flexible specialisation' leans heavily on the technical flexibility of new systems. However, that flexibility is disappointing, for one thing because configurations are subject to the limited possibilities of the equipment and the overall operation. Especially the adjustment and operative scope of (peripheral) equipment severely curtail the technical flexibility. On the other hand, especially the smaller companies leave

opportunities for flexibility unexploited. From an investigation carried out by EIM and TU-Delft (Van Uxem et al., 1987; Poutsma et al., 1986), the flexibility of computer automation is underutilised. CNC-machines and robots are predominantly used for constant serial production with little reprogrammation. Accounting systems - with the exception of elements of business and commercial services - are insufficiently put to work to design a commercial strategy aiming at flexibility.

The next point of criticism is that the fragmentation of sales markets referred to by Piore and Sable might also be the object of management strategy and action. Fragmented sales markets can be looked upon as a risk factor, as disturbance of planned continuity. Managements try to reduce such uncertainties, such varieties for instance by efforts to control their sales markets to some degree. The direct link which Piore and Sable lay between variety on sales markets and multi-functional work in the manufacture neglects also the intermediary step of progressive simplification and standardisation. Some people have even perceived a tenden-cy among companies to prefer a limited, 'defined variety' (Galjaard, 1988), to a wide variety of products made possible by flexible production processes. That preference may be associated with the fact that at the preparatory stage of automation, the entrepreneurs' first concern is to simplify and standardise product components. The manufac-ture of product components is standardised as much as possible into serial production, which implies less variation in the production of these components. On the other hand, the final products made with the standardised components are made as varied as possible. The conclusion could be that ultimately greater variety of products on sales markets is attended by a less varied manufac-ture and assembly by means of the more sophisticated production of components and modules.

Another object of criticism is the alleged direct relation between flexible specialisation and job enrichment. Perhaps the fact has been overlooked that operational flexibility is sometimes achieved by making certain activities external to the company: marginal activities are farmed out to a flexible segment of enterprise, while the multi-functional core of craftlike activities remains. When activities are externalised, statistically they come under, say, the services (small companies), where the activities, the work content and the qualifications of the staff can be of a lower grade. What logically remains is an industrial 'core' of activities, which may be marked by flexible specialisation. Actually, the notion of flexible specialisation takes no account of such segmentation between core and marginal work. We might use the term 'large-scale management strategies', work being allocated according to transaction costs

(Williamson, 1981), which would lead to specific labourmarket segments (cfr. Ten Have and Vissers, 1987). The Atkinson model, mentioned before, is applicable in that respect.

As to the conditions for flexible specialisation, the interest in small companies is associated with the switch of employment from manufacturing industry to service sectors, among which wholesale and retail trade activities. That switch explains most of the growth of new jobs in the smaller companies. Analyses of flexible industry that put emphasis on manufacturing thus overlook the increasing number of jobs with short-cycle tasks and low skill in parts of this service sector. In a sense that is the counterpart of flexibility, especially numerical flexibility and flexible wages (informal staff and various types of on-call contract). In other words, work can be made flexible without multifunctional 'craftsmen'.

The conclusion is warranted that the thesis of flexible specialisation emphasises, more than the control thesis, the potential of small-scale organisations. However, most attention goes to small manufacturing and craft companies, while the development of low-qualified employment in services is neglected. Indeed, a possible tendency towards flexible specialisation need not be the expression of skill being upgraded to the multifunctional work of the craft type, nor need it open better prospects for small, independent companies. The thesis lays too much emphasis on the technical flexibility, resulting mostly in functional flexibility. Other forms of flexibility, such as flexible labour relations and flexible wages, thus are mistakenly left out of consideration.

CONCLUSIONS

This chapter has considered the significance of recent discussions of the labour process for the analysis of work in small enterprises. The central themes were the control in small companies and the perspective of 'flexible specialisation'. Tentatively we can say that with respect to control, the employment relation is more important than the division of work. Control in small companies tends to rely on exclusion or on loyalty taken for granted. In the discussion of the theme of flexible specialisation, small and medium-size enterprise will presumably assume a central role. Flexible specialisation, functional flexibility as a future alternative small-scale organisation form for employment, is an intriguing but barely explored theme. The comments given show that the studies undertaken so far suffer from partiality and limited empirical range. Flexibility understood as a specific form of control, a way of strategic action by the management, need not be tantamout to a multifunctional job content.

On the meso and macro levels, new types of industrial organisation are developing in the sense of relations among companies. In that sense a concept of flexible organisation seems to evolve in which the smaller enterprise fulfils a peripheral supplier's role. That points at the same time to possible segmentation as a result of specific work allocation.

How does control on the micro level relate to the macro concepts of the discussion ? That is a question for us to consider in times to come. Some research problems indicated in this chapter seem at any rate worth exploring.

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AUTONOMY AND INDEPENDENCY: CASES

WORK AUTONOMY AND TECHNOLOGY IN FINNISH SMALL FIRMS

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SUMMARY

In studying work autonomy the authors take as a point of departure the structuration of work positions, which again is based on the structuration of class relationships. An attempt is made to enlarge Giddens' approach to work autonomy by taking, although tentatively, into account the relationships of the productive enterprises to their external economic environment. The approach is explorative.

On the one hand the effects of three individual-level factors, viz. gender, skill and union membership, and on the other hand the effects of three firm-level factors, viz. branch, technology and subcontracting, on the work autonomy of manual workers in small firms have been examined. An attempt is made to analyze the effects in a combined model.

At the firm level the industrial branch and subcontracting influenced work autonomy most clearly. The results show that the subcontracting system per se tends to limit the work autonomy of workers on the shop floor of the small subcontractor. This is an important result because it means that when large manufacturing firms are letting more and more work out to small firms, it simultaneously decreases the work autonomy of manual workers in small firms.

Out of the individual factors only gender influences work autonomy in a statistically significant way. Employers use ascribed characteristics, like gender and attributes like education, training etc. as screening mechanism. Male workers are trusted and accordingly allocated to autonomous jobs, while female workers are supposed to do simple and consequently less autonomous work. The analysis indicates further that formal skill is irrelevant for work autonomy. The findings seem to indicate that small employers prefer gender to skill in allocating people to autonomous jobs.

INTRODUCTION

Sociologists of work have recently been increasingly interested in the work autonomy, or rather in the control, of manual workers within the productive enterprises. This interest has been brought about by the labour process debate initiated by Harry Braverman (1974). In spite of the lively debate and the research around it, few sociologists have concretely examined the various aspects of work autonomy. In the labour process debate the usual procedure has been to argue for or against that manual workers are subjected to control of conscious strategic nature and whether or not they oppose it. Few have concentrated upon the examination of the variety of concrete forms of control or work autonomy in different industrial settings. And those who have discussed different forms of control in different industrial settings, have presented as it seems, biased views on the control of manual workers in a small firm and usually labelled it, as Edwards (1979, pp. 25-36) does, in toto as simple.1)

This could be argued in spite of the fact that the overwhelming majority of small firms are labour-intensive despite of the recent growth of hi-tech enterprises. The starting point in this paper is to argue that, in fact, this "simple" form of control includes a variety of different forms of work organizations on the shop floor of small manufacturing firms. The control of workers can be labelled as simple only as far as there are so few employees in the firm that technical and bureaucratic control are not reasonable forms of control.

In the labour process debate there has always been an emphasis on the consciously planned relationship between control and technology. This has been exemplified by the distinction of the technical control of the labour process from other forms of control.

The relationship between technology and social structure in industry, between the productive process and the social relation which surround it, has been an important theme in the sociological analysis of industrial societies. This focus of interest is particularly emphasized in the parallel concern with the social consequences of technical innovations. (Parker et al. 1967, pp. 113)

The aim of this paper is to examine -on basis of Anthony Giddens's (1973) theory of class structuration- the relationship between manual workers' work autonomy and technology, or rather the (old-fashioned or modern) nature of technology, in relation to relevant individual- and firm-level factors in small manufacturing firms in Finland.

CLASS STRUCTURATION, WORK AUTONOMY AND TECHNOLOGY

Anthony Giddens' theory of Class Structuration

Giddens' (1973, pp. 101-102) point of departure is that, in capitalism, the market is intrinsically a structure of power, in which the possession of certain attributes advantages some groupings of individuals relative to others. Ultimately, the market is a system of economic relationships founded upon the relative bargaining strengths of different groupings of individuals. In this context Giddens (1973, p. 103) speaks of market capacities including all forms of relevant attributes which individuals may bring to the bargaining encounter. While different market capacities may create an indefinite multiplicity of cross-cutting interests in the market, there are still a limited number of classes in any given society (Giddens 1973, pp. 105-106). These classes are, on the one hand, structured by mediate factors, which intervene between certain given market capacities and the formation of classes as identifiable social groupings. Following Weber, Giddens (1973, p. 107) argues that the foremost and only mediate factor is the distribution of mobility chances in a given society. The formation of classes is facilitated to the extent to which mobility closure exists in relation to any specified form of market capacity. There are three important forms of market capacity: (1) ownership of property in the means of production, (2) possession of educational or technical qualifications, and (3) possession of manual labour-power. On the other hand, classes are also structured by proximate factors, which condition class formation. There are three sources of proximate structuration: (1) the division of labour within the productive enterprise, (2) the authority relationship within the enterprise, and (3) the influence of distributive groupings (Giddens 1973, p. 108). 2)

There are also institutions which try to influence the structuration of class relationships. One of the most important institutions is the trade union. Usually, trade unions represent attempts to offset, as far as possible, (1) the imbalance in market power in the bargaining procedure between worker and employer, and/or (2) the subordinate position of the worker in the enterprise (Giddens 1973, p. 205). Consequently, trade unions influence both mediate and proximate structuration of class relationships. Leimu (1983, pp. 290-291; cf., Leimu et al 1987b, p. 11) has argued that the concept of the productive position of workers can be based on the proximate factors of class structuration 3), excluding the influence of distributive groupings. In other words, the determinants of the productive position of workers are the division of labour, or, as Giddens (1976, p. 123) later explicates, the nature of work in the division

of labour, and the authority relationships within the productive enterprise.

Class Structuration and the Concept of Work Autonomy

It can be argued that one of the outcomes of the structuration of the productive positions of manual workers is work autonomy. 4) On the basis of the structuration of their productive positions, *manual* workers tend to form homogeneous groupings which cluster along the lines of the degree of work autonomy. This yields the foundation of three groups of manual workers in the productive enterprises: relatively autonomous, semi-autonomous and non-autonomous workers. (Leimu et al. 1987b, p. 19). Manual workers are often members of a trade union, which tries to offset, as far as possible, the subordinate control position of the manual worker in the enterprise in relation to the performance of his or her task in the division of labour. Thus, the policy of trade unions influences also the work autonomy of manual workers. (Leimu et al. 1987b, pp. 19-20) However, it is also known that unionization has proceeded much further in large than in small industrial firms in Finland. This suggests that unionization may be associated rather with employer policies than with the labour market position or productive position of manual workers. In this sense union membership may prove to be more of a constraint than a resource for small firm workers in terms of their work autonomy. Work autonomy can obviously be associated with *skills*. Skill is a concept for which the meaning is ostensibly obvious, so often it is neither defined nor measured. Among sociologists, there is a lack of consensus whether it is workers who are skilled or jobs that require skill (Lee 1981, p. 59; Spenner 1983, p. 827). The view that skill resides in persons has theoretical foundation in present-day human capital theory. According to this view, workers acquire a stock of capabilities, knowledge, and experiences that translate into productivity in the workplace and that yield reward. The second view that skill is the characteristic of jobs has theoretical foundation in the sociological theories of roles and positions in social structure. According to this view, skill is a component of work structure and organization. (Spenner 1983, p. 827) The authors prefer the view that skill resides in persons. Thus it can be examined how well workers' formal skills and work autonomy are associated with each other. 5)

Usually social scientists think the skilled worker is characterized by his or her autonomy on the job (e.g., Sabel 1984, p. 23). However this relationship between skill and work autonomy may not be so straightforward, even though there should be an overlap between skill and work

autonomy, at least to some extent (cf., Leimu et al. 1987b, pp. 22-23).

Class Structuration and Gender

In Finland where there are no large indigenous ethnic groups or large exogenous immigrant groups, the labour market tends to split according to *gender* and not according to ethnic or racial traits (cf., Anttalainen 1986). Unfortunately Giddens's comments on gender within his theory of class structuration are very preliminary (cf., Giddens 1973, pp. 219-220), except the notion of the "feminization" of clerical work (Giddens 1973, pp. 181, 191). Consequently, the incorporation of gender into his theory is very difficult (cf., Garnsey 1978, p. 233). However, gender obviously plays an important role in the structuration of productive positions and in the work autonomy of manual workers. On the basis of Giddens's theory, it can be argued that, where structuration deriving from economic organization "overlaps" with that deriving from evaluative categorisations based upon gender differences, there the tendency to class structuration -and consequently, the tendency to the structuration of productive positions in terms of work autonomy- may receive a considerable impetus. Where this is so, gender itself may become a form of market capacity. (Cf., Giddens 1973, p. 112) 6)

In other words, gender may serve as a "disqualifying" market capacity in access to autonomous manual jobs. Consequently, although men and women would have equal qualifications, women can fall more often into inferior, non-autonomous productive positions than men. 7)

Class Structuration and Technology

The historical starting point of class formation in Giddens's (1973, p.88) theory is the division of labour, which "fragments man" in two principal ways. In the first place, the division of labour promotes the specialization of occupational activity - a process which is carried furthest by the growth of mechanized production in capitalism. In this sense, the division of labour "subordinates man to the machine", limiting the range of the activities of the worker to routine, repetitive operations. But in the second place, the expansion of the division of labour also "fragments man" by dividing human society into classes. Obviously technology has an important role in the historical formation of classes. But does technology influence proximate class structuration within productive enterprises?

Giddens (1983, p. 108) argues that within the modern industrial order, the most significant influence upon proximate structuration in the division of labour is undoubtedly that of technique. 8)

However, the division of labour may be a basis of the fragmentation as well as the consolidation of class relationships. Giddens (1983, p. 141) seems to suggest that the effects of technology should be seen in terms of class structuration. Analogously with this idea, it may be suggested that the effects of technology can be seen in terms of the structuration of work positions. 9)

The crucial question in this context is the relationship between technology and the fragmentation of manual workers's productive position in terms of their work autonomy.

Work autonomy in terms of the capacity of the worker to do his or her job from start to finish, is directly linked to modes of control in the work organization (Leimu et al. 1987b, p. 20). Accordingly, the division of labour (or, the nature of work in the division of labour) and the authority relationship within the productive enterprise determine the structuration of the productive position of manual workers. The outcome is that manual workers are divided into three fragments or groups according to their work autonomy, i.e. relatively autonomous workers, semi-autonomous workers and non-autonomous workers (Leimu et al. 1987b, p. 20, figure 4).

In the analysis of the fragmentation of manual workers' productive position and, consequently, their work autonomy, *paratechnical* relations seem to be very important. By paratechnical relations Giddens (1973, p. 86) means those relations which place workers not only in definite relationships with the machine, but also with each other. In this sense, the concept of paratechnical relations 10) is related to, but not equated with, our concept of work autonomy.

As stated earlier, the proposed concept of work autonomy is closely linked to the modes of control in the work organization. On the one hand, this concept is naturally related to control through authority relationships. On the other, work autonomy is linked to the technical division of labour, i.e., to technical control. The organization, coordination and assignment of work tasks are embedded in a larger structure of work. The pace of work, along with the specific direction of work tasks, emanate from this structure. Two possibilities exist: the control mechanism could be embedded in the technological structure of the firm, or it could be embedded in the firm's social-organizational structure. Corresponding to these two possibilities are the systems of technical control and personal control. (Cf., Edwards 1979, p. 110) Technical control emerged from employers' experiences in attempting to control the production operations of the firm. 11) Machinery itself directs the labour process and sets the pace. (Edwards 1979, p. 20) How something is produced is in large part dictated, of course, by the nature of the product and by the known and

available technologies for producing it. It is well known that most industries confront a variety of possible techniques, and that the relative costs of required inputs will influence which is chosen. (Edwards 1979, p. 111) In other words, the technology adopted by the small firm is largely dependent on the one hand, on the product manufactured or, more generally, on the industrial branch which the small firm is operating in, and on the other hand, on the relative costs of available technology or, more generally, on the modern or old-fashioned nature of the production technology used.

Small firms are often not in a position to acquire the most advanced technology available, but they are forced to be satisfied with the old-fashioned and sometimes second-hand technology. Consequently, it may be expected that the modern or old-fashioned nature of the technology used by the small firm is also linked to the work autonomy of manual workers. 12)

In other words, the industrial branch of the small firm constitutes a kind of structural basis for the number of autonomous jobs. 13)

In addition, there are researchers, notably Robert Blauner, who focus on industrial branches as key explanation of work behaviour. Blauner (1964, p. 166) argues that the industry a man works in, is fateful because the conditions of work and existence in various industrial environments are quite different. According to him, an employee's industry decides the nature of work he or she performs eight hours a day. In other words, the industrial branch in which the small firm is operating would also be decisive for the work autonomy of manual workers.

The industrial branch of the firm is also important in another sense. This is because some industrial branches are male-dominated and other female-dominated. In Finland the most female-dominated branches are the manufacturing of textiles, wearing apparel and leather and the manufacturing of food, beverages and tobacco, while male workers dominate in the manufacturing of fabricated metal products, machinery and equipment and in the manufacturing of wood and wood products and paper and paper products (Anttalainen 1980, pp. 44-55; Kasivo 1985, p. 54). This means that gender and industrial branch can be strongly interrelated. If this is the case, gender and the branchwise technology are also interrelated.

Sociologists often over-emphasize the importance of technology as an extrinsic determinant of the different aspects of work behaviour. In addition to technology, there can be other extrinsic factors which determine different aspects of work, especially in small firms. For example, Rose (1979, p. 153) refers to a French sociological study, which deals with the relationship between work autonomy and organizational

factors. The investigators argued that organizational choices -in addition to the overall degree of formalization and the personnel policy of the firm- were influenced largely by a firm's market situation. This finding invites us to deal with the question of the extrinsic factors of proximate class structuration within productive enterprises.

Class Structuration and the Small Firms

Giddens has mainly been interested in the determination of proximate class structuration *within* productive enterprises. His comments on the external determination of class structuration centers upon the significance of extrinsic factors at the individual or group level, as for example upon the importance of distributive groupings, but not upon extrinsic factors at the enterprise level (Giddens 1973, pp. 183-184). In Giddens's (1973, pp. 158-160) theory, the effects of the productive organizations on class structuration appear in the processes of centralization and concentration of capital. Consequently, the resulting effect of centralization and concentration on class structuration is the decline of the old middle class (Giddens 1973, pp. 177-178). However, the second effect of centralization and concentration is the increasing interdependence between large and small firms. Giddens has largely ignored these other external effects on the proximate structuration of class relationships within productive enterprises. In manufacturing, one of the main interdependencies, which influence class structuration, is subcontracting. 14) Subcontracting refers to an arrangement whereby the employer pays for an agreed delimited amount of production or period of labour time, but leaves the organization, manning and the equipping of the tasks to the subcontractor (cf., Child 1985, p. 122).

By subletting work, large (and small) firms are, in effect, buying labour in a fixed quantity rather than attempting to directly control variable and unpredictable labour-power. Thus, in an uncertain market, risks are reduced by paying a fixed price per unit for subcontracting labour; payment is made only when a given quantity of work has been completed.

This contrasts sharply with the conditions under which labour is normally employed; typically it is the length of employment which is fixed, with output an productivity variable. Subcontracting, then, enables an *employment relationship* to be replaced by a *market relationship*. (Scase & Goffee 1982, pp. 140-141). This fact obviously means that the work organization of subcontracting is somewhat different from that of independent small firms. In principle, the work organization of the small firm may be independent of other firms or it may be part of the work

organization of other firms. 15) In both cases, the work organization of the individual small firm may be structured according to the principle of hierarchy or to that of autonomy. In the case of the small subcontractor, the work organization of the firm tends to be more often oriented towards the principle of hierarchy in relation to the whole system of subcontracting, even if the principle of autonomy is being realized at the shop floor in the firm. (Cf., Schmidt 1987, p.4) However, it may be argued that subcontracting per se tends to decrease manual workers' work autonomy at the shop floor, because it is, above all, a market relationship with its own fixed delivery schedules and so on, which have to have effects on the pace and control of work. Consequently, the entrepreneur's deliberate choice of work autonomy for his or her workers at the shop floor may be undermined by the subcontracting system per se.

The relation of subcontracting to technology is twofold. On the one hand, subcontracting is linked to the technology of the parent firm, because subcontracting is more practical where there is a technical possibility of segmenting distinct tasks or stages in production, which can constitute a specific subcontracted obligation (Child 1985, pp. 123, 138). On the other hand, subcontracting is related to the technology of the subcontractor, because subcontracting limits the options of the subcontractor for different technologies available, unless the entrepreneur makes also a decision to manufacture goods for customers in the open market. In some cases, the modern or old-fashioned nature of technology used in the subcontracting firm is also determined by the parent firm. This is the case in which the parent firm has sold its own, usually old-fashioned machinery to its subcontractor. On the other hand, the parent firm can help -both financially and otherwise- its subcontractors to acquire the most advanced technology available (cf., Poutsma et al. 1987, p. 108). Because subcontracting usually concerns productive activities which can be performed as discrete tasks or stages, it is also, more or less, linked to certain industrial branches, as for example, to the manufacturing of fabricated metal products, machinery and equipment. However, there are also small subcontracting firms, especially in the manufacturing of textiles, wearing apparel and leather, in which the workers make the whole product and which then, sell the finished product to their parent firm. 16)

Towards a Concept of the Internal and External Autonomy of Work

Poutsma (1987) argues that there are two forms of work autonomy, viz. internal and external autonomy. 17) *Internal autonomy* means that workers can to some extent solve their own problems and that they can

adjust the pace and method of their work according to their own will and to the requirements of their working circumstances. External autonomy means that the worker has some capacity to decide the planning and production criteria, so that he or she may obtain better materials and tools. Production units can be similarly typified. A production unit may be externally autonomous within a sectoral association, societal institutions and other production units, laying down its own rules and regulations. The unit may be internally autonomous in the organization of its production and in the distribution of work tasks.

We are interested in the question of how workers' work autonomy is connected with the external autonomy of the small firm. Does, for example, the low external autonomy of the firm indicate the low work autonomy of manual workers in the firm, and vice versa? Does the number of autonomous jobs vary by the degree of the external autonomy of the small firm?

On the basis of the modification of Poutsma's distinction between internal and external autonomy, a two by three table could be constructed which connects workers' work autonomy with the autonomy of the small firm. In our case, the most important factor, which restricts the autonomy of the small firm, is subcontracting. In other words, those small firms, which are not subcontractors, have higher external autonomy than subcontractors. 18) In Giddensian terms, it may be argued that manual worker's work autonomy is, *first*, structured by the labour market capacity (skill and work experience) and the union membership of the workers, and *secondly*, by the external autonomy (subcontracting) of the productive enterprise. In addition to these structuring factors, there are also other important factors which determine the access to autonomous jobs. At the individual level, gender is the most important structuring factor, which serves as a "disqualifying" capacity on the labour market, making it more difficult for women than for men to gain access to autonomous jobs. At the enterprise level, technology is expected to have structuring effects on the work autonomy of manual workers and especially on the number of autonomous jobs in small firms. In sum, our view of the internal and external autonomy of work owes much to the debate on the control of labour process. Consequently, the locus of this control is emphasized, whether it is within the productive enterprise or outside of it.

THE EMPIRICAL DETERMINATION OF THE FACTORS OF THE INTERNAL AND EXTERNAL AUTONOMY OF WORK

The Work Autonomy of Manual Workers

Above the concept of work autonomy on the basis of Giddens's theory of class structuration has been developed. Work autonomy is usually understood as the capacity of the worker to do his or her job from start to finish. Thus, according to Littler (1982, pp. 8-9), work autonomy is directly linked to the modes of control in the work organization. It means that it is not possible to define work autonomy independent of organizational control and control processes. However, Littler's discussion of work autonomy is confusing, because it is possible to control a work task, in which the worker can do the job form the start to finish. In fact, it may be argued that work autonomy has two dimensions which correspond to the authority relationships and to the nature of work tasks in the division of labour within the productive enterprise. The horizontal division of labour, or the nature of work, is probably best measured by the variable indicating the number of work phases performed by the worker. The vertical division of labour, or authority relationships, is again best indicated by the variable which stands for the setter of work pace. By categorizing these two variables and by cross-tabulating them, three groups of workers are obtained. (see Table 2).

From the cross-tabulation two extreme types of work autonomy are obtained: (1) relatively autonomous workers that can be considered the ideal type of autonomous craft workers, and (2) non-autonomous workers who have almost totally lost their autonomy, which can be considered the ideal type of a radically proletarianised conveyor-worker. In the Giddensian conception, relatively autonomous workers are those who themselves determine their work pace and who make the product from start to finish or who perform several work phases in the production process. Non-autonomous workers are, in turn, those who cannot determine their work pace and who perform one or a few work phases in the production process. The third type, semi-autonomous workers, is located between these two extreme types. 19)

The Giddensian definition of work autonomy is clearly based on the determination of workers' productive position (cf., Leimu 1983, pp. 279-280). But the labour market position of the worker can, of course, also predict his or her productive position in terms of work autonomy.

Table 1. Work autonomy by the amount of work phases and by the setter of work pace

Amount of work phases	Setter of work pace: Machine and/or another person	Machine or another person and worker him- or herself	Worker him- or herself
One or a few work phases	B		
Several or a varying amount of work phases			
Making the product from start to finish			A

A = relatively autonomous workers
B = non-autonomous workers

The labour market position of the worker has been defined as a position based on individual and collective labour market capacities, mainly on training, education and trade union membership (Leimu et al. 1987b, p.14).

Sociologists often attempt to measure the level of education by years spent at school. However, as Penn (1983, p.25) points out, increasing years spent at school do not necessarily lead to an increase in the skills of the incumbents. This is why a cumulative measure of vocational schooling is not used. Instead, it is emphasized that, if the manual worker has a certificate from a vocational school or vocational course 19), this certificate and the level of competence it represents is the very market resource which he or she brings to the bargaining process in the labour market rather than the length of the vocational training program per se. Experience in a certain occupation obviously leads to an increase in the skills of the worker, but these skills must be generally regarded as firm-specific, because they have usually been developed in the context of a certain firm-specific labour process. If the manual worker wants to leave the firm, these firm-specific skills, in addition to his or her formal qualifications, are those market resources which he or she can bring into

the bargaining encounter in the labour market.

Consequently, those qualifications which manual workers may bring into the bargaining process are their possible vocational schooling and their work experience in a certain occupation. These forms of the individual labour market capacity constitute the skill of the manual workers in small (and large) firms. Empirically, skilled workers are considered to be those manual workers who have a certificate from a vocational school or a vocational course and who have been in their present occupation for over four years. Other workers are regarded as unskilled workers. 21) In our scheme, union membership represents manual workers' collective labour market capacity. Here, union membership is simply measured by asking workers whether or not they belong to a trade union. Finally, women are considered to have a "disqualifying" market capacity, on the basis of their gender, on the labour market.

The External Autonomy of Small Firms

In subject conception, the participation of the small firm in the subcontracting system means that it has a low external autonomy. However, there are various definitions of subcontracting. In Finland, subcontracting is usually defined as such deliveries of semi-finished goods, etc., which comprise parts in the finished goods from one firm to another (Keski-Suomen1980, p.5; Karhu-Hyysalo 1983, p.176; Tossavainen 1985, p. 14). Consequently, all intermediate products acquired by the firm are not subcontracted goods.

The participation of small firms in the subcontracting system has been examined by asking the following question in our survey: Does your firm deliver some products to other firms for their production? 22)

Thus, this question concerns particularly the subcontracting of material goods and not that of work processes (e.g. painting of finished goods). Empirically, the question means that the small firm can either be the subcontractor of material goods or not. 23)

How to Conceptualize Technology?

"Technology" is sometimes used to refer narrowly to the particular machines and equipment employed in production, but can more usefully be held to refer also to the body of knowledge and ideas which makes possible the employment of such machines and equipment. It is important to bear in mind, too, that technology is itself a social product and not something separate with an autonomous development. (Parker et

al. 1967, p. 113) For example, Brytting (1987, p.4) means by technology a specific system of (material or immaterial)production, i.e., the tools and methods used in order to solve a specific business problem. It is obvious that this kind of broad definition of technology should also include workers' work autonomy, as it is understood in this study. After all, our concept of work autonomy concentrates partly upon the man-machine relationship.

Numerous schemes for classifying technologies and their relations to organizational structure have been proposed. 24)

The problem with many conceptions of the levels of technology is that they confluate into a single scale the mechanization and automation of quite different aspects of the production process, thus obscuring the possibilities for complex and uneven development of mechanization and automation (Coombs 1985, pp. 151-152).In order to avoid this problem, we conceptualize technology in a different manner.

Many small firms are not often in a position to acquire the most advanced technology because of its high costs. In addition to this, the majority of small firms are not high-technology enterprises. Consequently, it seems important to take the (modern or old-fashioned) nature of the technology used in the small firm into account. But it is obvious that the nature of technology has to be measured in relative terms. As emphasized earlier, technology reflects also the industrial branch which the small firm is operating in. Thus, the small entrepreneurs were asked to evaluate the modern or old-fashioned nature of their production machinery in relation to the average nature of the machinery in the industrial branch they are operating in.

WORK AUTONOMY AND TECHNOLOGY IN FINNISH SMALL FIRMS

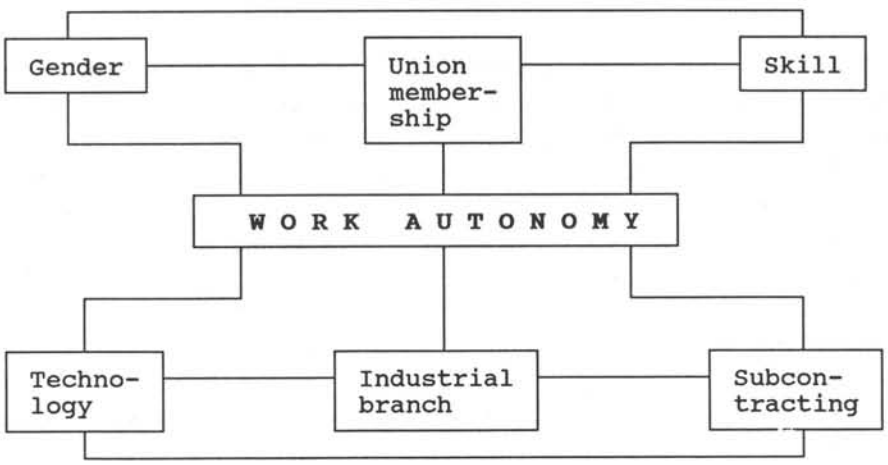
The Research Setting and the Data

Principly, factors have been discussed at two levels influencing workers' work autonomy in a small firms, viz. individual level, firm level or organizational level. At the cost of some degree of over-simplification, the research setting both at the level of the firm and that of the individual has been considered. Consequently, two research tasks are involved: (1) to examine the effects of gender, skill and union membership 25) and their interactions on work autonomy, and (2) to investigate the effects of technology, industrial branch and subcontracting and their interactions on work autonomy (see, figure 1). 26) In addition to these two research tasks, the effects of the combination of some statistically significant individual-level and firm-level factors on workers' work autonomy will

also be preliminary examined. 27) This kind of research strategy is, above all, due to the small number of cases in our empirical data. 28) Log-linear models are employed in the analysis, which can be considered generalization of usual multiway cross tabulations of frequencies. In particular, response models are used. This means that by deleting terms from, or adding terms to, a viable log-linear model of our data we can test the effects of the independent variables on the dependent variable, work autonomy (see section 4.2).

In 1975 for the "Research Project on Small Industry" the Central Statistical Office of Finland sampled the small industrial firms systematically from the 1972 National Firm Register in the city of Turku and rural communes of Vakka-Suomi (both in Southwestern Finland) and in the communes of Seinäjoki region and in the rural communes of Suupohja (both in South-Ostrobothnia in Western Finland). Small firms were defined as those which gave employment to less than 50 persons and the annual sales of which were less than five million Finnish marks in 1972.

Figure 1. The effects of worker-level factors and firm-level factors on work autonomy



Managers and shop stewards or senior manual workers in 217 small industrial firms were interviewed and additional mailed questionnaires to firms and manual workers were administered (informed in the firms).

The present analysis is based on the interviews of 199 shop stewards or senior manual workers and on the mailing questionnaires from 346 manual workers, totalling 545 cases.

The Effects of Gender, Skill and Union membership on Work Autonomy

Above some theoretical notions, and empirical observations about the relationships of work autonomy and gender, skill and union membership have been presented. In the sense of Wolf and Fligstein (1978) hypotheses applied to log-linear models about these relationships have been presented and tested. 29) Here those hypotheses that have some support in out data have been discussed primarily, beginning with the only one that reached statistical significance among the variables at the individual level.

H 3. Male workers perform more often autonomous work tasks than female workers, when effects of skill and union membership are held constant.

Previous research (Leimu et al. 1987b) indicates that gender is a potent independent variable but that skill does not influence work autonomy and union membership does so only, if a 10 per cent level of statistical significance is accepted.

Our data shows that male workers are, indeed, more autonomous in their work than female workers when the effects of skill and union membership are held constant (see line 11 in table 2; $p = 0.001$). 30)

Earlier the relationships of gender, skill, industrial branch and work autonomy have also been modelled and found industrial branch by skill influencing work autonomy (Leimu et al. 1987b, pp. 21-23). -The log-linear models in table 1 allow for hypotheses of three variable relationships (see, hypotheses H 4-6 in appendix). However, they do not obtain statistically significant support in our data.

The Effects of Technology, Industrial Branch and Subcontracting on Work Autonomy

Since the empirical analysis has been divided into two groups of factors roughly speaking according to their level, firm or individual, we have here also industrial branch that previously has proved statistically significant in three variable terms. viz. together with skill and work autonomy, at least the 10 per cent level of significance (Leimu et al, 1987a, pp. 21-22). Thus the following hypothesis may be included:

Table 2.A log-linear analysis of the effects of gender (G), skill (Q) and union membership (U) of the small firm workers on their work autonomy (W).

Model	X^2	df	p
1. GQU, W	26.15	14	0.02
2. GQU, GW, QW	8.19	10	0.61
3. GQU, GW, UW	7.11	10	0.72
4. GQU, QW, UW	20.30	10	0.02
5. GQU, GW, QW, UW	6.43	8	0.60
6. GQU, GUW, QW	5.44	8	0.49
7. GQU, QUW, GW	4.82	6	0.57
8. GQU, GQW, UW	3.19	6	0.78
9. Line 2 vs. 5 (test for UW)	1.76	2	0.42
10. Line 3 vs. 5 (test for QW)	0.67	2	0.71
11. Line 4 vs. 5 (test for GW)	13.86	2	0.001***
12. Line 6 vs. 5 (test for GUW)	1.00	2	0.61
13. Line 7 vs. 5 (test for QUW)	1.62	2	0.44
14. Line 8 vs. 5 (test for GQW)	3.25	2	0.20

*** = Statistically significant at 0.1 per cent level

Table 3. A log-linear analysis of the effects of the branch (B), the level of the technology (T), and the subcontracting position (S) of the small firm on its manual workers' work autonomy (W).

Model	X-2	df	p
1. BTS, W	57.30	46	0.12
2. BTS, BW, TW	38.45	36	0.36
3. BTS, BW, SW	31.40	38	0.77
4. BTS, TW, SW	49.64	40	0.14
5. BTS, BW, TW, SW	30.04	34	0.66
6. BTS, BTW, SW	21.59	22	0.48
7. BTS, BSW, TW	26.90	28	0.52
8. BTS, TSW, BW	24.75	30	0.74
9. Line 2 vs. 5 (test for SW)	8.41	2	0.02*
10. Line 3 vs. 5 (test for TW)	1.37	4	0.85
11. Line 4 vs. 5 (test for BW)	19.60	6	0.003**
12. Line 6 vs. 5 (test for BTW)	8.44	12	0.75
13. Line 7 vs. 5 (test for BSW)	3.08	6	0.80
14. Line 8 vs. 5 (test for TSW)	5.29	4	0.26

** = statistically significant at 2 per cent level

* = statistically significant at 5 per cent level

H 9. The number of autonomous jobs differs by industrial branch when the effects of the level of technology and subcontracting position are held constant.

H 9 receives statistically significant support in our data ($p = 0.003$). It indicates that there are, for instance, more autonomous jobs in the manufacturing of metal products machinery and equipment, while there are fewer autonomous jobs in the manufacturing of food, beverages and tobacco.

Above is indicated why subcontracting may be a factor that directly or via other factors like technology influences the number of autonomous workers in a small firm. Thus the following hypothesis may be included:

H 7. The number of autonomous jobs differs by subcontracting, when the effects of the level of technology and industrial branch are held constant.

This hypothesis obtains statistically significant support in our data ($p = 0.02$), which also indicates that there are less non-autonomous workers in firms that are subcontracting. Somewhat surprisingly the hypothesis (see, H 12 in appendix) about three variable relationships, viz. the effects of subcontracting by the level of technology on the number of autonomous workers (see, line 14 in table 5) did not receive statistically significant support in our data. However, the term concerned (TWS) obtained a smaller risk percentage ($p = 0.26$) than the other three variable terms.

The Effects of Gender, Skill, Technology and Subcontracting on Work Autonomy

As the experimental joint analysis of all the variables in sections 5.1-2 above did not succeed because of high correlations between some independent variables, it was decided to drop industrial branch and union membership thus reducing the log-linear model to five variables. 31)

As could be expected, the variables influencing work autonomy at the individual level and the firm level are also accentuated in the model including variables at both levels. The expectations are also reflected in the following hypotheses:

H 13. The number of autonomous jobs differ by subcontracting, when the effects of gender, skill and the level of technology are held constant.

H 16. Male workers perform more often autonomous work tasks than female workers, when the effects of gender, skill, the level of technology and subcontracting are held constant.

Table 4. A log-linear analysis of the effects of gender (G) and skills (Q) of the small firm workers and the level of technology (T) and the subcontracting (S) of the small firm on the work autonomy (W) of small firm workers.

Model	X-2	df	p
1. GQTS,W	58.23	46	0.11
2. GQTS, GW, QW, TW	36.41	38	0.54
3. GQTS, GW ,QW, SW	29.85	40	0.88
4. GQTS, GW, TW, SW	28.51	38	0.87
5. GQTS, QW, TW, SW	49.66	38	0.10
6. GQTS, GW, QW, TW, SW	27.14	36	0.86
7. GQTS, GQW, TW, SW	25.93	34	0.84
8. GQTS, GTW, QW, SW	23.09	32	0.88
9. GQTS, GSW, QW, TW	27.04	34	0.80
10. GQTS, QTW, GW, SW	24.18	32	0.84
11. GQTS, QSW, GW, TW	24.78	34	0.88
12. GQTS, TSW, GW, QW	21.19	32	0.93
13. Line 2 vs. 6 (test for SW)	9.27	2	0.01**
14. Line 3 vs. 6 (test for TW)	2.71	4	0.61
15. Line 4 vs. 6 (test for QW)	1.37	2	0.50
16. Line 5 vs. 6 (test for GW)	22.52	2	0.000***
17. Line 7 vs. 6 (test for GQW)	1.21	2	0.55
18. Line 8 vs. 6 (test for GTW)	4.05	4	0.40
19. Line 9 vs. 6 (test for GSW)	0.10	2	0.95
20. Line 10 vs. 6 (test for QTW)	2.95	4	0.57
21. Line 11 vs. 6 (test for QSW)	2.35	2	0.31
22. line 12 vs. 6 (test for TSW)	5.95	4	0.20

*** = statistically significant at 0.1 per cent level
** = Statistically significant at 1 per cent level

These hypotheses are supported by our data at 1 per cent and 0.1 per cent level respectively (lines 13 and 16 in table 3). Accordingly it can be stated that the workers in firms that do not sell subcontracted goods enjoy more often autonomous jobs and vice versa. Furthermore, male workers enjoy more often autonomous jobs than female workers, when the effects of skill, the level of technology and subcontracting are held constant.

Somewhat surprisingly hypotheses about the effects of gender on

work autonomy by the level of technology (see, H 18 in appendix) and by subcontracting (see, H 22 in appendix) do not receive statistically significant support in our data. The fact that the terms testing these hypotheses (particularly H 22) obtain the lowest risk percentages ($p = 0.20$) does not give much ground for fruitful speculations.

At first sight it may seem surprising that variables at the individual level have slight, if any, influence on autonomy with the exception of gender. After all, it may be less intriguing that variables at the level of individuals have relatively little "sway". It is the case of deep seated structures, where autonomy is primarily structural by definition. For the sake of argumentation even gender can be seen as an exponent of these structures determining work autonomy. As argued earlier, referring to Anthony Giddens (1973), gender has taken the place of race as a labour market determinant in Finland. In the last analysis, to be a female is a negative resource in labour markets. Accordingly, females have more often positions or jobs that are less autonomous than those of their male colleagues.

CONCLUSIONS

Summary

In studying work autonomy the point of departure has been the structuration of work positions (Leimu & al. 1987b), which again is based on the structuration of class relationships (Giddens 1973). In this paper, an atempt has been made to enlarge the Giddensian approach to work autonomy by taking, although tentatively, into account the relationships of the productive enterprises to their external economic environment.

However, the sketched relationships between different factors do not form any coherent theory of the determination of work autonomy in small firms. Rather, this approach is very explorative in nature.

On the one hand, the effects of three individual-level factors, viz. gender,skill, and union membership, and, on the other hand, the effects of three firm-level factors, viz. branch, technology and subcontracting, on the work autonomy of manual workers in small firms have been examined. 32) Also it has been attempted to analyse the effects of the statistically important individual and firm-level factors in a combined model. The study has taken place by testing the effects of the factors by means of log-linear models of response type. Only a few of the hypotheses presented (see, appendix) have obtained statistical support in our data.

At the firm level the industrial branch and subcontracting influenced work autonomy most clearly. The firms participating in subcontracting

have less autonomous jobs. Schmidt (1987, p. 4) has argued that, in the case of subcontracting business the work organization of the small firm tends to be oriented towards the principle of hierarchy related to the subcontracting system on the whole, even if in the individual small firm the principle of autonomy is being realized on the shop floor. However, the results show that the subcontractingsystem *per se* tends to limit the work autonomy of manual workers on the shop floor of the small subcontractor. This is a very important result, because it means that when large manufacturing firms are letting more and more work out to small firms, it simultaneously decreases the work autonomy of manual workers in small firms.

Industrial branch also influences work autonomy so that there are more independent jobs in branches like fabricated metal products, machinery and equipment, while there are less independent jobs in branches like food, beverages and tobacco. Incidentally, the former are male dominated while the latter are female dominated.

Without having very much empirical data on the influence of industrial branch and gender it has been argued preliminary that gender can be seen as a structural factor not only in the context of industrial branch but also more generally. To be a woman has a disqualifying effect in the ordinary labour market. Our findings confirm this. Out of the individual factors, only gender influences work autonomy in a statistically significant way so that males more often than females enjoy autonomous jobs.

Ascribed characteristics, like gender, together with a host of attributes achieved by individuals such as education, training and so on, have pervasive *even dispositive* effects on the kinds of work structures to which people are allocated. One of the many reasons why these characteristics sort people into particular jobs is that employers use them as screening mechanism, that is, employers believe that they are indicators of potential work performance (Kallenberg & Berg 1987, p.129).

This structural effect of gender is seen in the labour market, where gender is employed by entrepreneurs as a criterion for the allocation of labour into positions of jobs differing according to the level of wages, skill, working conditions etc. Of course, other criteria can also be employed in a similar way. Why is gender so important in Finland? It is thought that there are at least three possible explanations for this. First, women may take jobs in small firms to supplement their family income, the major part of which is brought home by the husband. Second, the Finnish local labour markets are usually very small and when female manual workers have been concentrated in fewer industrial branches than their male fellows,

this means that women are usually not in a position to choose from many different jobs and are rather forced to take a job available on their local labour market. Third, labour management in small firms is usually very paternalistic with its emphasis on trust relations. This paternalism may bring with it a male bias in the selection of labour force. In other words, male workers are those who are trusted and accordingly allocated to autonomous jobs, while female workers are supposed to do simple and consequently less autonomous work.

The analysis indicates that skill is irrelevant for work autonomy. 33) However, this involved *formal* skills and not, for example, tactic skills (cf., Manwaring & Wood 1985, p. 189, Niemelä 1988). The findings seem to indicate an odd circumstance in which small employers prefer gender to skill in allocating people to autonomous jobs. The explanation might be again that gender, in addition to being an indicator of potential work performance, can also be an indicator of the potential stability of the employment relationship. In other words, being a male can be regarded as a guarantee for stable employment relationship without interruptions and unexpected quitting and, consequently, as a person to whom the small entrepreneur can teach "the tricks of the trade" and the different tasks which a worker must do in his firm.

When four of the independent variables in a combined analysis were examined, the remaining variables influencing work autonomy, viz. gender and subcontracting position, were accentuated in the the combined analysis as well. In other words, in another context of variables, gender and subcontracting have again proved their importance in the allocation to autonomous jobs in small firms. Altogether structural factors seem to have more pondus than individual factors on manual workers' work autonomy, which, by definition, can be seen to be primarily determined by structural factors, or by factors the effect of which can be interpreted mainly structurally.

Concluding Remarks

Technology has figured weakly in the empirical findings. 34) There are reasons of fundamental nature for the non-existent association between technology and work autonomy. As Coombs (1985, pp. 150-151) argues, it is dangerous to assume, in the way that much labour process literature does, that technology is shaped by considerations of work control alone. This is much to superficial a treatment of what is in fact an enormous analytical problem which has occupied a great many writers for many years and is only now approaching a coherent solution. This problem is the relationship between the relatively autonomous advance

of scientific knowledge, partially shaped as it is by funding patterns, and, on the other hand, the complex array of needs, market forces, political forces and pure accidents which select between alternative technological application of scientific knowledge.

We are here moving into the arena of management, viz. factory (and office) where its relative external autonomy is greatest (Tainio & al. 1984, p. 14). The issues in case, viz. organizational structuring, job structuring and labour selection and allocation, are also such areas where the internal autonomy of management is relatively great. 35)

For example, the considerations on management autonomy suggest the tentative hypothesis that socioeconomic factors seem to carry more pondus than technology with respect to work autonomy, at least in term of our data.

This in not to say that technology is unimportant. Its importance only unfolds in a continuous series of piecemeal modifications and innovations. This is part of a complex patterns of socio-technical design and improvement, where technical development interacts with organization and manpower development (Sorge et al. 1983, p. 147).

This mutual dependence of technical and social processes seems to imply such complicated networks of interactions that our survey data are far from adequate to convert them. Actually one may ask whether survey analysis should not be supplemented by other techniques like observation of the actual work processes on the shop floor in order to solve the riddle of technological versus socioeconomic determinants of work autonomy. The expertise of our respondents in their own work is without question and it is only suggested that ordinary survey questions are insufficient to cover this type of issues.

Technology influences surprisingly weakly work autonomy in our findings considering all the research spent in efforts to show its allegedly decisive role in different contexts, for instance, in the form of technological determinism. The other extreme would be to push al effects in the direction of socioeconomic factors, particularly control in terms of the labour process literature.

Obviously neither extreme would correspond to a plausible reality. Recent Finnish research (e.g., Koistinen 1984, p. 85-94) indicates that firms planning their new production processes primarily consider technological aspects e.g. the flow in the materials, and that the control of workers emphasized in the labour process literature appears more as a residual factor in the planning of these new production processes.

The pros and cons of the influence of technological factors and of the socioeconomic factors on work autonomy have been discussed without actually being able to strike a balance between them in this paper.

However, intuitively we are inclined to emphasize the influence of socioeconomic factors on work autonomy or at least the joint effect of socioeconomic factors and technological factors. Primarily we have been obliged only to offer preliminary observations or to suggest hypotheses, the closer study of which waits for a keen theoretician and empiricist. The discussion is made more complex by two threads running in different directions. One is the age-old question of the influence of technology vs. the influence of social factors. The other one is the influence of variables at the structural level vs. the influence of individual variables. The variable standing out in the empirical findings is gender, usually considered to be an individual characteristic. However, gender can be understood in structural terms. Referring to Anthony Giddens (1873) we have argued that gender replaces race as a disqualifying factor in the Finnish Labour markets and that, consequently, to be a woman is a disqualifying characteristic in the labour market. In other words, employers use gender -as well as other ascribed or achieved characteristics- to allocate labour to positions and jobs assuming that they indicate a certain working ability and a certain loyalty to the firm (or lack of them).

Basically we must take into consideration the manifold structures in which a firm is operating, out of which we have only glanced at, for instance, its position in the subcontracting system, and the fact that workers are working at the shop floor level of one of these structures, that of the firm. Adding the structural aspect of gender we are inclined to stress the influence of structures without aiming at playing down the influence of individual factors.

The circle may be closed by returning to the very origins of the discussion. The concept of work autonomy was based on the structuration of work positions, which again is based on Giddens's (1973) structuration of class relationships. In our data these conceptions seem to fit best to the effects of gender, which seems to have a strong structural aspect in the sense that it is used by employers as a screening device in the labour market. Of course, gender as a biological characteristic cannot be manipulated. But Giddens considers gender (and race) as a criterion for status, which turns gender into a social criterion. Females seem to be counted as secondary labour in spite of the fact that they in our data are vocationally as schooled as their male colleagues. The usual assumption is that productivity rises with schooling. This is not the case for females in our data. 36) Gender is, de facto, probably the strongest criterion for labour market segmentation in Finland, where race and ethnicity are of minor importance.

It was found that females enjoy more seldom autonomous positions than males. Females seem to be considered less productive per se in some

industrial branches. However, there are branches like textile industry, in which definitely more females are employed than males, though their wage level is modest. The treatment of gender implies that gender strongly influences the structuration of work positions in the last analysis. In trying to pull the various ends of several threads together the autonomy of the small industrial firm or entrepreneur and that of their workershas been distinguished between. Even with a rather modest array of variables referring to autonomy it may be preliminarily concluded that the firm autonomy measured by whether the firm participates in subcontracting or not influences rather clearly the state of autonomy of the workers, viz. subcontractors offer more seldom independent jobs than non-subcontractors.

Notes

1) Edwards's view is biases, in our opinion, because he does not refer to any empirical study in order to bring forward arguments for his concept of simple control.
2) By distributive groupings Giddens (1973, p. 109) means those relationships, which involve common consumption patterns of economic goods.
3) By structuration Giddens (1976, p. 66) refers to the conditions which govern the continuity of transformation of structures, and therefore the reproduction of systems.
   Class structuration refers naturally to the reproduction of class systems.
4) A more systematic presentation of the construction of the concept of work autonomy based on Giddens's theory of class structuration can be found in Leimu et al. (1987b)
5) One of the advantages of this kind of understanding of skill is that it does not vary greatly from firm to firm. If skill were to be defined on the basis of the job, then the meaning of "skill" could vary from firm to firm (cf., Spenner 1983, p. 826).
6) One should note that Giddens (1973, pp. 111-112; cf., pp. 216-219) applies these thoughts to ethnic differences and not to gender differences. In fact, Giddens (1973, p. 112) argues that where ethnic differences serve as a "disqualifying" market capacity, such that those in the category in question are heavily concentrated among the lowest-paid occupations, or are chronically unemployed or semi-employed, we may speak of the existence of an underclass. However, Giddens seems to deny the possibility that gender differences, which often serve also as a "disqualifying" market capacity, could create a similar underclass. On the contrary, Giddens (1980, p.505) thinks that economically active women form a distinct underclass, or rather a distinct under-stratum, within certain given classes (cf., Garnsey 1978, p.231). We think that this tendency is stronger in countries where there are very small ethnic minorities. Thus, in these countries -like in Finland- gender tends to replace ethnicity in class structuration and in the structuration of productive positions.
7) For example, in our data, female manual workers are, on the average, as skilled as male manual workers (Leimu et al. 1987b, p.42, 75).
8) However, Giddens (1973, p.108) argues that the most important effect of industrial technique is to create a decisive separation between the conditions of labour of manual and non-manual workers, because "machine-minding", in one form or another, regardless of whether it involves a high level of manual skill, tends to create a working environment quite distinct from that of the administrative employee.
9) The concept of work position is a combination of the productive position and the labour market position of manual workers. Above we have mainly discussed the productive position. Labour market position refers to those determinants which Giddens calls labour market capacities, like skill and vocational schooling. We speak of the structuration of the total work position as well as of the structuration of the productive position and the structuration of

the labour market position (cf., Leimu et al. 1987B, Leimu 1983).

10) While any substantial modification of a system of paratechnical relations necessarily involves alteration in pre-existing techniques of production, change in the authority system does not inevitable entail modification in technique (Giddens 1973, p. 183). Thus the concept of paratechnical relations tries to cover the technical and social nature of manual workers's work.
11) The assembly line came to be the classic image, but the actual application to technical control was much broader (Edwards 1979, p. 20).
12) However, one should note that, despite the recent growth of high-technology enterprises, the overwhelming majority of small firms are labour-intensive using a large variety of the mix of craft and manual skills.
13) Furthermore, one can see that there are tendencies, at least in Finland, that the industrial structure of small firms is becoming more and more dualistic. In other words on the one hand, there are still a large number of those small firms utilizing craft skills in their production processes, but on the other hand, there are more and more high-technology small firms, where some manual workers are bound to loose their work autonomy or part of it. This means that the industrial branch of the small firms is becoming an increasingly important factor in analyzing workers' work autonomy in these firms.
14) Subcontracting obviously influences also the class position of manual workers in larger parent firms, for example by increasing their job security. However, subcontracting has clearly its strongest impact on the class position of the small, legally independent subcontractor. Here we are only interested in the difference in the work autonomy of manual workers between small subcontractor firms and independent small firms (cf. extended aspects by Hudson & Lewis 1985, pp. 39-40).
15) In Schmidt's (1987) analysis, the concept of work organization covers the arrangement of work tasks (jobs) in a firm.
16) This kind of subcontracting is usually directed at the bottlenecks in the capacity of the parent firm.
17) This distinction and the relation behind it is very close to the psychological concept of internal/external locus of control developed by Rotter (1966).
18) In fact, subcontracting is not a dichotomous variable, but a continuum, because small firms can be to a different extent subcontractors. In other words, their whole production or only a tiny fraction of it can be sold to the parent firm. Unfortunately, our data allows us to use subcontracting as a dichotomous variable only; i.e. whether the small firms are subcontractors or not.
19) We have empirically compared the Giddensian definition of work autonomy with that based on Melvin Kohn's concept of self-directed work (Kohn & Schooler 1981, pp. 288-291). The result was that both the Giddensian and Kohnian conception of work autonomy produced similar results (see Leimu et al 1987a).
20) In Finland, the periods of vocational schooling vary usually from two to three years depending on the occupation in question. Vocational training courses vary usually from six months to one year. In addition, it must be pointed out that apprenticeship is an uncommon avenue to a skilled occupation in Finland.
21) The classification of workers into a skilled and unskilled group is due to the small number of cases in our data. This dichotomy entails a very cautious

estimate of the proportion of skilled wokers.

22) Here products do not refer to raw materials, fuels, etc., nor to machines but primarily to semi-finished goods.

23) It was also attempted to use a more complicated concept of the subcontracting position of a small firm, which takes into account both the selling and the buying of subcontracted goods (cf. Kankaanpää et al. 1988, p. 22). However, subcontracting, understood as four different subcontracting positions, did not influence workers' work autonomy at all. Furthermore, it was also associated with other explanatory factors.

24) For a review, see Lynch (1974).

25) Strictly speaking, however, trade unions are at the organizational level, whereas union membership is at the individual level.

26) The precise hypotheses examined are presented in Appendix.

27) This is why we have preliminary discussed some relationships between the individual-level and firm-level factors in the previous section.

28) As the number of variables examined increases, the number of zero-cells also increases and, ultimately, leads to the problem of the interpretation of the results. However, log-linear models (see, for instance, Everitt 1977, Payne 1978, Upton 1978), which we shall apply in the analysis, are not so prone to this problem.

29) The full list of hypotheses posited in this section is presented in Appendix.

30) A strict analysis might note that the other one of the models compared does not seem to fill the requirement that a model should correspond to empirical reality (line 4, $p = 0.02$). On the other hand this also indicates the weight of the term containing gender, i.e. the effects of gender on work autonomy. Stressing this latter aspect "saves" the setting.

31) Union membership influences work autonomy so that persons belonging to unions more seldom enjoy autonomous jobs than nonmembers ($p = 0.10$, Leimu et al. 1987a, table 4, p.46). The effect of branch on work autonomy differs by skill, or vice versa, when the effect of gender is held constant (Leimu et al. 1987b). The problem is, however, the correlation of gender with both union membership and industrial branch. Thus we would have obtained a log-linear model, which contained too much overlapping information nor could it be employed fruitfully to test hypotheses in the sense of Wolf and Fligstein (1978).

32) Our research setting is sketched in figure 1.

33) This result might also be due to our cautious, dichotomous measure of skill.

34) We are hampered by our survey data, which do not contain exactly ideal questions for analyzing the effects of technology on autonomy.

35) To be more exact Tainio (1982, 12) depicts a fourfold table, in which management is relatively high on managerial independence and relatively low on the controllability of implementation.

36) The vocational schooling of the respondents was at the same level as that of their colleagues in large firms on the average. The vocational schooling of our females was higher than that of their colleagues in large firms (Leimu 1983, p. 178). However, schooling did not influence the wages of females, while it raised substantially the wages of males (Leimu 1984).

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APPENDIX. Hypotheses presented

Table 2

H1 Unionised workers perform more often autonomous work tasks than non-unionised workers, when the effects of gender and skill are held constant (line 9).

H2 Skilled workers perform more often autonomous work tasks than other workers, when the effects of gender and union membership are held constant (line 10).

H3 Male workers perform more often autonomous work tasks than female workers, when the effects of skill and union membership are held constant (line 11).

H4- The effect of gender on work autonomy differs by unionisation (when the effect of skill is held constant) (line 12).

H5 The effect of skill on work autonomy differs by unionisation (when the effects of gender is held constant) (line 13).

H6 The effect of skill on work autonomy differs by gender (when the effect of unionisation is held constant) (line 14).

Table 3

H7 The number of autonomous jobs differ by subcontracting, when the effects of the nature of technology and branch are held constant (line 9).

H8 The number of autonomous jobs differ by the nature of technology, when the effects of subcontracting and branch are held constant (line 10).

H9 The number of autonomous jobs differs by branch, when the effects of the nature of technology and subcontracting are held constant (line 11).

H10 The effect of the nature of technology on the number of autonomous jobs differ by branch (when the effect of subcontracting is held constant) (line 12).

H11 The effect of subcontracting on the number of autonomous jobs differ by branch (when the effect of the nature of technology is held constant) (line 13).

H12 The effect of the nature of technology on the number of autonomous jobs differs by subcontracting (when the effect of branch is held constant) (line 14).

Table 4

H13 The number of autonomous jobs differ by the subcontracting, when the effects of gender, skill and the nature of technology are held constant (line 13).

H14 The number of autonomous jobs differs by the nature of technology, when the effects of gender, skill and subcontracting are held constant (line 14).

H15 Skilled workers perform more often autonomous work tasks than other workers, when the effects of gender, the nature of technology and subcontracting are held constant (line 15).

H16 Male workers perform more often autonomous work tasks than female workers, when the effects of skill, the nature of technology and subcontracting are held constant (line 16).

H17 The effect of skill on work autonomy differs by gender (when the effects of the nature of technology and subcontracting are held constant) (line 17).

H18 The effect of gender on work autonomy differs by the nature of technology (when the effects of skill and subcontracting are held constant) (line 18).

H19 The effect of gender on work autonomy differs by subcontracting (when the effects of skill and the nature of technology are held constant) (line 19).

H20 The effect of skill on work autonomy differs by the nature of technology (when the effects of gender and subcontracting are held constant) (line 20).

H21 The effect of skill on work autonomy differs by subcontracting (when the effects of gender and the nature of technology are held constant) (line 21).

H22 The effect of the nature of technology on work autonomy differs by subcontracting (when the effects of gender and skill are held constant) (line 22).

WOMEN, TECHNOLOGY AND AUTONOMY

A second look at women in small business in The Netherlands

Monika Triest

SUMMARY

The specific purpose of this paper is to show some current trends with regard to the women's labor market situation and technological developments, particularly in small and medium sized enterprises.

In The Netherlands women's commercial participation is on the increase, though still concentrated in traditional women's sectors. Within these sectors automation is slow to develop. Due to the scarcity of data on this automation and on the situation of Dutch women entrepreneurs and contributing wives, analyses on these topics have to remain of limited extent. There are certain trends, however, of women's increasing need for economic independence as independent businesswomen and as contributing wives. The second part of the paper addresses the issue of women and autonomy. Many women appear to see independent businesses or business partner-ships as a means to increase selfsufficiency and autonomy. In analyzing the concept of autonomy however, traditional sex roles appear to play a dominant part in the perceptions of women entrepreneurs and of contributing wives. In The Netherlands new training projects are being set up with a specific autonomy-approach which appeals to many women. The paper concludes with a few considerations and suggestions for research which would contribute to the improvement of business women's visibility, autonomy and quality of life. It is argued that insights gained from the situation of business women can be conducive to a better understanding of women's work and life situation in general.

INTRODUCTION

Women's growing labor force participation and career orientation during the decennia since the second world war have been abundantly demonstrated. This is the case in The Netherlands as well, though this country is known as one with still a relatively low female labor force participation when compared with other European countries (39.8% in 1984 compared to 49.6% in Belgium) (Ministerie Sociale Zaken, 1986). During this period, changes have taken place with women-non-wage workers as well as wage-workers, but in general they have received less attention from researchers and policy-makers alike. Consequently, the situation of women "contributing wives" and women entrepreneurs in the Netherlands so far has not been very well documented. Particularly with regard to the effects of automation on the work situation of those women, hardly anything is known. As a result of recent initiatives taken by this group of women of women workers themselves and of growing public concern, this situation is likely to change in the years to come. Women who are "contributing to" family business, or who are business partners or entrepreneurs, are becoming more visible. Moreover, they have begun to disentangle their familywork relationships, in the search of an independent legal status, economic independence and personal autonomy. Some of those, for whom these relationships are the most entangled, seem to be taking the lead in the movement for equal rights between the sexes. The first part of this paper will look into technological developments in women's work, while the second part will deal with women's autonomy in their situation as contributing wives and as entrepreneurs. Where it is possible, some limited references will be given for Belgium as well as for the Netherlands.

WOMEN AND TECHNOLOGY

In the Netherlands research on the effects of new technologies on women's quantitative and qualitative work situation was stimulated by the government: one of the main studies consisted of a literature review (Meurs, Rohling and Weggelaar, 1982) and of four case studies (Weggelaar & De Boer, 1984). The four case-studies were: an engineering bureau, a blood bank, an insurance company and a hospital. This study led to similar conclusions as were already known from studies abroad: the effects of the introduction of microelectronics are very diverse, but, as far as women is concerned, a trend is appearing of decreasing demand for women's labor, and deteriorating quality of the work situation. Women showed satisfaction for being able to work faster and better with the new

technology, and, in some cases, for being able to increase contacts with colleagues. As far as the knowledge and mastery of the equipment, and insight into the organization as a whole, considerable dissatisfaction was apparent.

These fringes, though not very surprising, were indicative for the Dutch situation. What was missing in this study, however were data on women and technological developments in small and medium sized enterprises.

Similarly, one can say that a recent study on automation in SME was very instructive, but did not result in any specific data on women (Poutsma et al. 1987). The research which is available on technology and women has largely concentrated on large firms and on specific industrial sectors (e.g. Meydam et al. 1987; Tijdens 1986; Weggelaar & de Boer, 1984). Many studies investigate the effects of the introduction of new technologies on the quantity and quality of women's work. Tijdens (1986) looked at the effects of new technologies on sex segregation in banks; she found that no desegregation trends can be observed. On the contrary, sex-segregation at the workplace may be strengthened as a result of automation processes and related reorganization and cost-reducing management measures. If one were to speculate on the effects of technology on women's position in small businesses, it would not be recommended to speculate on basis of these findings: there is sufficient evidence to suggest that these effects vary depending on industrial sector, and on firm size (e.g. Poutsma et al. 1987).

While waiting for research results on women and technology in small businesses to become available, we will make use of the data from the three relevant studies mentioned here (Meijer et al. 1986, Poutsma et al. 1987; Weggelaar & De Boer 1984). It should be noted, that the terms of "women in small business", "women entrepreneurs" and "contributing wives" are not interchangeable, though sometimes, in the analysis they are grouped together as "women in small businesses".

The sex division of labor

Perhaps the most striking phenomenon one finds, not only in Dutch studies on women business leaders and women business partners, but European studies in general (e.g. Donckels and Meyer 1986), is the consistency of the sex division of labour. In agricultural farms and in small shops, where the business is run by a husband-wife (or a man-woman) team, there seems to be a strict division of labor, which today is not challenged except in a very minor (almost negligible) way. While reading this literature, Illich's concept of *"gender"* becomes a very up-to-date one:

"gender is a distinction in behaviour between women and men, a universal phenomenon which distinguishes places, times, tools, tasks, forms of speech, gestures, and perception that are associated with men from those associated with women". (Illich 1982, p.3).

Whether the Dutch woman "contributes" to her husband's trade or farm business, or runs the business as an equal business partner, there seems to be a dominant role division in the division of tasks. Typically, he does the heavy work of the trade and represents the business to the outside world, while she does the more supportive- and household tasks, such as administration, bookkeeping, receiving clients, telephoning, etc. Even when both husband and wife share heavy manual tasks, such as farm work, there seem to be traditional female- and male tasks. While women often invest extensively or even equally with their male partner in the family business, they themselves are often not fully aware of this. "Investing" in terms of large sums and high cost equipment appear to belong to the male sphere. When asked in more general terms of "influence on business management" however, the women's share appears to increase with provision of own capital, number of weekly hours spent in the business, the possession of legal licensing documents and educational level (Meijer et al. 1986). Women's business decision-making role varies with their actual time-, money- and qualification inputs. This finding could lead to an interesting hypothesis while studying women's labor position in general. One study looked specifically at Dutch women entrepreneurs and found the typology of Goffee & Scase (1986) to be useful for The Netherlands as well: women entrepreneurs can be divided on the basis of two dimensions: their sex role adherence and their acceptance of entrepreneurial ideals. From these four types of women entrepreneurs, the most typical Dutch women entrepreneur seems to be the conventional type, integrating high adherence to sex role and to entrepreneurial ideals; though another type, the "hobbyist"-type, integrating high adherence to sex roles with low acceptance of entrepreneurial ideals, seems to be increasing. Both these types of women are typically married, middle-aged, have a family-of-origin in small- and medium sized business, and have a middle- to high level of education; often they reenter the market after having raised small children (Koopman 1986).

From these results it becomes clear that the Dutch business woman profile does not present a challenge to traditional sex roles, but tends to strengthen it. The two other types of women entrepreneurs who consciously set out to challenge these sex roles, remain a fairly small group.

Consequently, one can say that the sex-division of labor between marital business partners is also a *technical* division of labor: women perform technically different tasks from men, and where they do perform men's tasks (such as business leadership) they try to reconcile their sex role and their business role. As far as one can read from the literature on *automation* in SME, this behaviour pattern is not changing as a result of the introduction of automated techniques. Here one should have strong reservations however, with regard to the size and scope of automation in these Dutch businesses so far. This scope is still so small (Poutsma et al. 1987) that, in fact, it is too early to make any general statements on "the effects of technology", either in general or on women specifically. Where some speculations can be made on the technical expansion of communications and business services (areas where technological developments in SME are most advanced), one could also speculate on women's increased "chances". Such chances are seen, for example, in telework, home-work, wordprocessing, networks and even in increased part-time work and temporary work in subcontracting businesses. One should be very critical, however, of such speculations in the context of women's labor market position and women's economic independence.

There is a *second* aspect of the sex division of labor, which could be more appropriately termed sex segregation of the labor market of SME. From Dutch studies it appears that women business leaders, women business partners and contributing wives, are concentrated in traditionally *female branches*: retail, hotel and restaurant, business services, clothing, etc. (Meijer et al. 1986). While the total number of "wives actively involved in their husband's business" is estimated at about 113.000 and, on an average, in 1 out of 3 Dutch firms the wife assists her husband, in the typically female sectors this amounts to 2 out of 3 firms (Meijer et al. 1986).

It has been stated that certain technological developments result in changes, not only within functions and within firms, but also between firms and between industrial sectors (the so-called Japanization of the economy). Though in the Netherlands these kinds of developments are still in the very early stages or non-existent, one could speculate that such trends do not automatically lead to improvements in women's work situation or labor market position. On the contrary, if one were to envision a further division of tasks between management and execution of labor on the one hand, and a further development of "networks" of small- and medium sized, "flexible", independent or subcontracted firms, one could be pessimistic about women's chances to equal labor market status with men. Fortunately, there is no need for pessimism yet, since researchers and policy makers today recognize that it is not technology which deter-

mines organization, but human policies which determine economic-technological-social developments (see also Poutsma et al. 1987, p.124 ff).

A *third* aspect of sex division of labor becomes evident from the fact that women business partners are socially and legally defined first by their *family and marital status*, and secondly by their work status. This appears most clearly from the Dutch term, "contributing wife". The next chapter on women and autonomy will analyse this third aspect of the sex division of labor in greater detail. Prior to doing so, it might be useful to very briefly compare the *Belgian* data with the Dutch data on the topics which have been discussed so far. Though not quite comparable as units of analysis, the Belgian study of women in small business by Donckels and Degadt (1986) provides some information.

Belgian people who make their living of their own (small) business are called "independents". A distinction is made between independents as a main profession, as an additional profession or as an assisting person (these are official social statuses). Counting the "main" and "additional" professional independent people in 1981, one arrives at a total number of 380,584: of these 73,679 or 24.01% were women (o.c., p.46). In 1984 the women's share had slightly increased to 25.45%; they are relatively better represented as "main" professionals than as "additional" professionals, and only show a figure of 12.82% in the group of assistants (o.c., p.47).

These figures might give the impression that women in business mainly own their own business. Since the figures only show the registered women, however, that conclusion is faulty. In Belgium, many women "assist" or "help" their husband's business in a similar way the Dutch contributing wife does, but (mostly for fiscal reasons) do not register.

Since Donckels and Degadt did not include those women in their study and mainly focused on independent people who exercise their entrepre-neurship as a main profession, important information is missing from their data. Moreover, there is also no mention of technological developments in their study, except that in a survey of 400 women entrepreneurs, professionals and contributing wives, 6% reported to use complex technology; 86% stated not to use a computer, but 48.2% planned to do so in the future (o.c., p.53). With regards to this last issue of technology, it is worth noting that in 1983, the organization of Flemish Christian Small Business Women (C.M.B.V.) organized a conference on the "Social Consequences of New Technologies", where the emphasis was put on human decision-making processes involved in realizing the new technical possibilities. With regard to specific consequences for women, it was argued that parttime and home-work could open up new chances but also new dangers for women. The policy measures which were suggested included educational reform, changes in sex role socialization, equal

opportunities and "positive action" for women. Overall, emphasis was put on the quality of work and life (CMBV,1983, Conference documents).

In summary of the first chapter, we may conclude that very similar trends were found in Dutch and Belgian studies on technological developments and sex segregation in the SME-labor market. Dutch SME-women, as well as Dutch women in general, show an increasing labor market participation rate, but their business role remains strongly defined by their traditional sex roles. This leads us to the next chapter on SME-women and autonomy.

WOMEN AND AUTONOMY

"Autonomy" is a concept which has been defined in many different ways. With regard to women's position and identity, it has most often been used in analyses of *Third World* women. There the multifaceted aspects of the concept has become visible when one analyses the relationship between lifecycle and work, between reproductive and productive spheres for women (for an extensive bibliography see Vrouw en Werk in de ontwikkelingslanden, 1987). In empirical studies of *Dutch* women in automated firms, autonomy has been defined as "the degree to which someone can shape her own work situation" (Weggelaar & De Boer 1984, p.116). In four case studies these authors found women to have differing degrees of autonomy in their work situation, but in general the women appeared to lack the necessary information and alternatives to make any real choice and to be absent from the decision-making processes with regard to technological developments and organization (Weggelaar & De Boer 1984, pp.144-145).

Since no Dutch studies are available yet on the effects of technology on the work situation of women in small business, and since, moreover, these developments are still in the initial stages, it would be premature to discuss this topic. Instead, we prefer to make some suggestions for an analytical framework for future research. In doing this, we want to argue that an important distinction is to be made between the women entrepreneur and the contributing wife.

Women entrepreneurs

Not too many differences are to be expected between male and female entrepreneurs, since it has been shown that decisive factors in technological developments in SME are managements strategies, business size and sector, market position, etc. (Poutsma 1987). The only gender-specific factors which may appear on the basis of women's general social

position and socialization are:
a. educational level
b. degree of information on automation processes
c. access to financial means
d. degree of risk-taking attitude.

ad. a.: Dutch women entrepreneurs have a relatively high *educational level*, not geared however to their technical business area. When one takes into consideration that most women entrepreneurs are older than 30 years, the higher educational level is even more striking (Koopman 1986).

ad b.,c.,d.: one may be inclined to look for "prohibiting" factors in women's status. It is well known indeed, that, generally, women have less access to information on automation technology, that they tend to take fewer financial risks, and that they often get less credit from financial institutions (Koopman 1986). It should not be overlooked, however, that most Dutch women entrepreneurs are *married* and that this fact could influence their access to financial credit and their risk-taking attitude in a positive way (Goffee & Scase 1986, p.27). Evidently, as long as other household incomes are available, business failure is not so dramatic as when households are supported by a single business income. The fact that the typical woman entrepreneur (like the typical woman worker) today is married, while she was unmarried a few decennia ago, could influence her decisions as an entrepreneur in a positive sense.

These phenomena have to be taken into consideration when studying women entrepreneurs and autonomy. In their study of *British* women business owners, Goffee and Scase (1986) found that the quest for autonomy is an important motive for business start-up, but that autonomy, as well as gender role challenge, is achieved in differing degrees depending on the "type" of woman entrepreneurship. While the "innovative" and the "radical" type clearly challenge traditional sex roles and strive toward personal autonomy and material independence, the dominant "conventional" and "domestic" types define their autonomy within the context of patriarchal relationships. In *The Netherlands*, Koopman (1986) found similar results: the need for autonomy is a driving force, but mostly seen as complementary rather than contradictory to gender roles. We will return to this particular issue in this chapter. The link between entrepreneurship and women's personal autonomy is part and parcel of a recently started dutch training project for re-entering women who want to set up their own businesses. The project also included automation training for women and appears to be very successful: success as defined by the number of women applicants and the number of graduates who pass public exams and find employment either

as wage workers or as business owners or as contributing wives (see Alida de Jong School, Utrecht, internal documents; Eggenhuizen 1986). What is considered by the school as an important factor of success is the training approach with characteristics which we would like to summarize with the concept of *women-identified autonomy*" (Triest 1987). Indeed, this concept refers to the integration of personal-, social- and technical skills which appeals to many women today and which is actively used in the training program of the Dutch project. Interestingly enough, this concept corresponds well with the definition of autonomy which Leestemaker used in a recent study of Indian women: autonomy seen as the degree of control women have in private life, social life and economic life (Leestemaker 1987). With this concept of woman-identified autonomy, it becomes clear how women can increase their control over their work situation and their personal situation from an emancipatory perspective: gender characteristics become a contributing rather than an limiting factor in women's drive for autonomy.

The most important aspect in this process is that women as individuals determine their personal and their economic goals. The importance of this aspect is highlighted by our second group of SME-women, the Dutch contributing wives. With them a reverse trend is coming to the surface: an increasing number of them want to disentangle their entangled work-life situation, in order to increase their personal autonomy and material independence.

Contributing wives

In the Dutch study already refered to (Meijer et al. 1984), the participation of contributing wives in business decision-making was measured. "Decision-making" as a concept does not coincide with the autonomy concept in this paper, but it gives some indications. As was mentioned earlier, Meijer et al. found that a large majority of those women co-decide, either always or sometimes, in business matters. Women's educational level, number of hours spend in business, capital investment and the possession of legal licensing documents, appeared to relate positively to their participation in decision-making (Meijer et al. 1984, pp.50-51). This finding could indicate that the contribu-ting wives' autonomy would be also positively influenced by these factors. What is missing from these data and could be suggested for further research, are data which facilitate the measurement of those women's control over the private-, social- and economic aspects of their lives. Contrary to the situation of women entrepreneurs, a *women-identified autonomy*, as used earlier, would be approached by separating the strong links which now

exist between these women's family roles and business roles.

The apparent contradiction which surfaces from the comparison between these two groups can be explained as follows: entrepreneurship is so strongly *male gender* identified, that women who want to become successful entrepreneurs feel compelled to follow the male model, without however damaging their proper sex role as woman. This is a conflictual role model, which does not attract many women. Those who solve the role conflict by challenging the sex role ideology, remain a small group.

By taking the approach of a woman-identified autonomy, such as is done by the Dutch training experiment, the gender role conflict is resolved in a more attractive way: female gender characteristics can contribute to better entrepreneurship (or at least this is assumed).

For contributing wives, on the other hand, the argument can be formulated the opposite way: the wife's work role is so strongly *female gender* identified, that a distinction can hardly be made between her marital role, her familial role and her work role. A woman-identified autonomy approach would make it necessary for those women to separate those roles, so that their visibility and their individual goals within each one of those roles are strengthened.

The personal-economic link

What is still in need of an explanation is the link which is assumed in this paper between the personal-, the social- and the economic situation with women in small business, as with women in general. In this explanation the group of contributing wives will be used since they can be seen as cases where this link, though invisible, is very strong. It can be argued that, by showing some of the mechanisms which cause and maintain the entanglement of the different life spheres with those women, one may also uncover some of the mechanisms of entanglement with women in general. In recent years women's studies literature has abundantly demonstrated that it is important to recognize different aspects of women's specific social situation. In this literature these aspects are often identified as personal, social and economic. What is less well documented is the nature of the interrelatedness of these aspects and the mechanisms which maintain that interrelatedness. For future research it may be productive to make use of the structuration theory of Giddens (Giddens 1979): gender could be seen as an organizing principle which "structures" women's personal-, social- and economic spheres, without reducing them to passive agents. One such attempt was made by Wolffensperger (1987): she introduces the concept of "engendered

structure" to indicate social practices and systems organized according to gender. This means that:

> "when a specific social system has an engendered character, or is organized according to engendered rules and resources, differences between females and males are produced as an integral part of social practices... On the level of institu-tional analysis engendered rules and resources have to be studied not only as media of system reproduction but as media of gender reproduction as well!"
> (Wolffensperger 1987, p.7)

In this approach, at the level of interaction, power refers to reproduced relationships of autonomy and dependence (Wolffensperger 1987, p.6). Two elements are of interest for our analysis here: power and autonomy. If gender can be seen as a fundamental organizing principle and gender relations are to be characterized as relations of domination (as Wolffensperger suggests), *gender* becomes an important element in the analysis of power and autonomy within productive units, including small businesses. Moreover, Giddens, in his theory of class formation, (Giddens, 1973) considers authority relationships and the nature of work in the division of labor to be determinants of the productive position of workers. Within this framework it could be argued that the "productive position" of women in small businesses depends on the outcome of, firstly the authority relationships, which may be viewed as gender relations of dominance and, secondly, the outcome of the nature of work in the division of labor, which may be viewed as a gender-based division of labor.

Other authors (Leimu et al. 1986) attempted to use Giddens' theory of class structuration to arrive at measurements of "work autonomy". Work autonomy is seen as one of the consequences of the structuration of workers' productive positions. This could be a useful approach to gain insights into the degree of work autonomy of women in small businesses, including the contributing wives, though it is not yet common to analyse their "productive positions". Interestingly, one of the findings of the empirical research of Leimu et al. (see this volume) of work autonomy in Finnish small industrial firms, was that gender appeared to be a most important factor from the point of view of access to autonomous jobs. It would be instructive to test these findings in small businesses with women as entrepreneurs and as contributing wives. We now want to return to the interconnectedness, assumed in this paper, of the personal-, social- and economic situation of women in small businesses in general, and of contributing wives in particular. In his article on "Relative

autonomy and new forms of workorganization" (see this volume), Villrokx considers new development of self-employment in the future. The concept of "autonomization" is introduced to indicate the processes of growing independency of smaller organization units. These units can be firms, households or individuals. In particular, the author projects a growing number of firm-related households and individuals. He is not concerned with social relations of production, or with division of labor or authority relations *inside* these household-units. Such an approach could be useful however in view of the work organization and work relations in household-businesses today. If contributing wives and homeworking women today present any indication of future self-employment models (which is just a hypothesis), gender-based divisions of labor and gender-based authority relationships may remain prevalent. Although Vilrockx` does not claim more egalitarian social relations in his projected future, the impression is left that "autonomized" units and interactions are more desirable than either dependent individuals or relations of inter-dependency of previous eras. In Vilrokx' view, the household will serve as the social and economic allocation mechanism, the unit where work, home leisure and quaternary activities are integrated. From what was said earlier in this paper, it could be argued that Vilrokx' thesis needs to be looked at from the perspective of *present* "engendered" structures and systems, particularly in household-businesses. One could investigate whether, for example, the contributing wife's chances for individual autonomy are enhanced or hindered as a result of a higher degree of interrelatedness of work, home and leisure. Even if the phenomenon of the contributing wife of today would disappear in the future, it is likely that households will include women and men. This would make a gender analysis (in the sense which was proposed earlier) in the household-businesses of the future relevant.

To conclude this theoretical section of the paper, we want to present some observations, which could serve as hypotheses for empirical research.

Observation 1

For contributing wives "autonomy" is an other-defined autonomy: the woman is in the first place a wife; she identifies with her husband, not only in a personal (parital) relationship, but also simultaneously in an economic (business partner) relationship. Though the wife-business partner knows herself to be indispensable, she defines her goal for economic independence not as an individual goal, but as a family goal.

Observation 2

In a small business setting the survival and the social-economic wellbeing of all family members is dependent on their family cohesion. Moves toward individual autonomy by individual members are perceived as a threat to the family's and business' stability. Personal and economic goals are intertwined, particularly for the wife, who more than other family members is supposed to guarantee and symbolize this family cohesion.

Observation 3

Autonomy is a multi-faceted concept; it has personal-, economic- and ideological aspects as well. Contributing wives who attempt to increase the degree of their individual autonomy, may affect considerable changes in the family's social-, economic- and ideological structure. The stronger the family is perceived as an economic unit, the less relevant questions about personal autonomy and economic independence may appear to be to the women in these households.

Observation 4

A certain number of contributing wives are experiencing the discrepancy between the family-defined goals and some individual outcomes, e.g. after divorce or husband's death. Organizations which represent contributing wives in Holland, have begun to formulate demands for a better legal status (e.g. the agrarian women's league - Bond voor Plattelandsvrouwen). These demands are justified in a context of equal rights for women and men, without necessarily challenging traditional sex roles.

Observation 5

Currently, a dual trend can be perceived among Dutch contributing wives: on the one hand, there is a sex role strengthening trend, due to market competition and technical innovations. The family's economic goals are given priority, precluding innovation of traditional sex roles; on the other hand, there is a sex role weakening trend due to three phenomena: the experienced discrepancy between women's family ideology and individual status; the women's increasing educational level and use of formal- and informal networks; and, finally, a social-political environment where, as in Holland, women's emancipation and individual economic independence are stated as public goals.

On the basis of these observations, hypotheses for research could be formulated and theoretical insights could be gained. To conclude this second chapter, we will briefly look at some possible comparisons

between the Dutch and the Belgian women in small business, as far as "autonomy" is concerned and as far as data are available.

Belgian women in small business

One study (Donckel & Degadt 1986) found a sample of 400 Belgian business women (including entrepreneurs, contributing wives and professional women) to rank "personal independence" very low on their motivation scale. When rating their "positive experiences", a low score was attached to "leadership exertion". For the entrepreneurs "human contacts" score highest, while contributing wives consider "respect from the job" as one of the most important aspects of their work situation. When asked whether they feel "hampered by a dependence towards the partner", the dominant answer from this sample of women is negative (Donckels & Degadt 1986, p.155). Obviously, Belgian women, as their Dutch counterparts, do not express a need to challenge existing sex roles. This finding should be interpreted in the light of the catholic Flemish organization, from which the sample was taken. This reservation is supported when reading the internal documents of this organization (1983) which were mentioned earlier.

Interestingly enough, from these documents the emphasis on a pro-family policy becomes clear; but it is added however, that this term does not mean "women back into the kitchen", but a closer link between family work and professional work for *both* partners, to the benefit of the couple, the family and the business (CMBV, 1983, internal documents).

CONCLUSION

This paper sets out to make an analysis of women's autonomy within current technological developments, particularly in small business. Since it was found to be premature to discuss this topic within the Dutch context, a different approach was chosen. Two discussions were offered, one on "women and technology", mainly on the basis of research-findings on women wage workers; and another discussion focussed on the topic of "women and autonomy" from the situation of women entrepreneurs and contributing wives in The Netherlands. Though most Dutch women entrepreneurs were still found to attempt reconciliation between their female gender roles and their male business roles, a Dutch alternative training project was discussed, which would provide a new perspective on autonomy. This perspective was called "a woman identified-autonomy" approach. In this project schools are set up specifically for re-entering women who want to set up their own business, thereby integrating personal-, social- and technical skills. Due to the recent character of the

schools set up in this project however, one has to interpret any results very carefully, though the appeal these schools have to women is undeniable.

Ironically, with this second group of women which was discussed here, the Dutch contributing wives, a high degree of integration between the personal-, social- and economic situation was seen as an impediment to women's individually defined autonomy and economic independence. It was hoped that some observations made with regard to this group of women, may provide some useful hypothesis for future research.

The relevance of such research is beyond doubt: scientific relevance would appear from insight gained into the mechanisms which structure and maintain the entanglement of women's personal-, social- and economic life spheres.

The growing number of Dutch women who strive towards autonomy, either by setting up their own businesses, or by demanding an independent legal status as contributing wives, should make the social relevance of this research clear. Moreover, in The Netherlands, as elsewhere, there is a growing interest on the part of policy makers and business managers for women's potential as business leaders. It has already been suggested that women would make better business managers than men. Before a mythology can be developed around this topic, it is hoped that research will provide the necessary information and analysis. Hopefully, this chapter contributed to an analytical framework for this research.

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THE APPLICATION OF TECHNOLOGY IN WORKER CO-OPERATIVES: SOME PRELIMINARY EVIDENCE FROM BRITAIN

Alan Thomas

SUMMARY

This paper sees the "new wave" of worker co-operatives in the context of the trend towards "autonomization". Data and examples from the U.K. are used to show that there is no general support either for the "optimistic" hypothesis that co-operatives are necessarily able to make humanizing choices about technology or for the "pessimistic" hypothesis that they are completely constrained by technology. In fact, there are cases where co-operatives have been able to take some control over technology and others where the constraints appear to be much heavier.

The paper ends with an attempt to develop a framework for analyzing the factors in this "relative autonomy" which either allow or do not allow technological choices. This framework includes the position of the co-operatives as a small firm within its particular branch of industry, the way new technology is applied in that branch, and the potential for identification between job, product and social or political aims.

THE APPLICATION OF TECHNOLOGY IN WORKER CO-OPERATIVES: SOME PRELIMINARY EVIDENCE FROM BRITAIN

INTRODUCTION

In the last ten or twenty years the number of worker co-operatives has increased on a scale unprecedented since the years around the turn of the century. This "new wave" of co-operatives has occurred throughout almost all the countries of Western Europe, as well as many others. The greatest numbers of new co-operatives have been formed in countries with long-established federations and networks op support for new co-operatives, notably France and Italy, but other countries where the worker co-operative form had almost died out have experienced a revival.

This new wave of co-operative formations should perhaps be seen as an aspect of the trend noted elsewhere in this volume by Vilrokx (1987) towards "autonomization". In fact, compared with the decentralization of decision-making units within large corporations, the growth of small firms in general, partly as a result of large firms "fragmentation strategies" (Shutt and Whittington 1987), and the increase in self-employment of both traditional and "new" types (Vilrokx 1987), the formation of co-operatives is on a relatively modest scale. However, co-operatives have great potential importance because as collective, though small, organizations, they may offer some resistance to the tendencies towards 'atomization" and "individualization" noted by Vilrokx. In the U.K., in the seventies, one could almost say there were three parallel "new waves", that have since come together to give the new co-operative movement ideological breadth and strength, if not always coherence! First, rather in the tradition of the nineteenth century Christian Socialists, there were a few philanthropic business-owners who converted their businesses to co-operatives, perhaps aiming to institutionalize what they felt to be the best aspects of management and industrial relations in family firms. Second, there were worker takeovers of failing businesses, or parts of them, seen by many of the active participants as a way of putting into practice the ideals of "workers' control", as well as simply attempts to save jobs in declining industries. Finally, there were "alternativist" collectives, mainly in wholefoods, radical bookselling or community printing. These latter generally had a more-or-less explicit critical orientation towards the alienative and ecologically destructive tendencies of big business and large bureaucracies, particularly as regards the adoption of newer and newer technologies. However, they where still in business to try to make a

living.

In the eighties, job creation and saving, with the assistance of a network of local- and national agencies, has become the overriding consideration in co-operative development, but the above ideological strands are all still present. Thus, the question of whether workers' control, as apparently embodied in the very idea of worker co-operation, can in fact be made meaningful in such co-operatives, is very much a live issue. In particular, can workers in co-operatives take effective control over the way in which technology is implemented?

There are two conflicting hypotheses on this question. The first might be called the "optimistic" hypothesis. It assumes, first, that individuals and firms are free to make choices as they see fit, and, second, that workers grouped together in co-operatives will make choices in line with the common good rather than in their own material interests. Thus workers in co-operatives are perhaps in the best position of anybody to implement a version of technology that humanizes and democratizes work practices and takes care of natural resources and the environment.

According to the alternative, "pessimistic", hypothesis, not only can workers in co-operatives not take control over technology, but in fact technology is a major vehicle of maintaining control over them, even though they appear to be in their own independent- and democratic business. In this argument, the control of industries, and hence of work within small firms, including co-operatives, lies increasingly outside the individual enterprise. Co-operators can only take decisions within parameters defined for them, including what technology is available and even what they have come to expect from work. Technology is developed to meet the criterion of profitability in the context of large organizations and co-operators have no realistic choice over it.

In this paper I shall quickly survey the relationship of worker co-operatives in Britain to technology in general terms before going on to some sketches of particular cases. The survey data and several of the examples come from a three-year study, just completed, at the Open University's Co-operative Research Unit, entitled "Creating Successful Co-operative Businesses" (Cornforth, Thomas, Lewis and Spear 1987,1988), It should be noted, however, that this study was not focussed on technology and the data given here was to some extent incidental to that study. Two of the additional examples (co-operatives F and H in what follows) were co-operatives that took part in a training programme evaluated by a team led by the author (Thomas and Abraham 1986). The last examples (co-operatives B,J,K, and L) were added for the purposes of this chapter, and the detail on co-operative L, in particular, comes from the author's own research investigations. The chapter concludes by reviewing the two

hypotheses given above and with suggestions for a framework of analysis for looking more closely at the relationship between co-operatives and technology.

EXTENT OF NEW TECHNOLOGY AND LEVEL OF CAPITALIZATION IN CO-OPERATIVES OF DIFFERENT TYPES

The first thing to note is that the extent of "new" technology in U.K. worker co-operatives is very limited. This is not necessarily different from the position in conventional small firms in similar sectors. However, co-operatives tend to be concentrated in particular subsectors, characterized either by easy market entry in terms of capital and skill requirements, or by the possibility of identification between the job or product and some kind of political or social commitment, or both. Thus about 25% of worker co-operatives, as against only 10% of businesses in general, are in manufacturing, engineering and production, but more than half of these are concentrated in printing and clothing manufacture, particularly Cut, Make and Trim (CMT). Similarly, about 15% of worker co-operatives are in retailing, about the same proportion as for all business, but almost three-quarters of the retail workers co-operatives are wholefood shops or radical bookshops. The clearest exceptions to the above are "rescue" or "phoenix" co-opera-tives in declining industries where there are few alternatives for people with specific skills.

Thus, relatively few worker co-operatives are in subsectors where new technology is of prime importance. Printing co-operatives are an exception to this, and analysis of financial data for printing co-operatives shows them divided into two main groups, one with very low capitalization, productivity and wage levels, the other much higher on all these measures. (Typically, -net assets per head- might be as low as £1000 or less in the first group, and around £ 8000 - £12000, or slightly above the average, for a printing firm, in the second). The first group are community or radical printers, subsidized partly from outside and partly by their members' "collective exploitation" and kept going by political commitment often combined with high labour turnover. The second group are co-operatives that may have started like those in the first group, but now combine political ideals with commercial aims. Co-operatives in this second group must have come to terms in some way with the fast-changing technology that dominates the print industry.

Clothing co-operatives, by contrast, are concentrated almost entirely in a subsector - CMT - where technology has remained little changed for fifty or more years. Sewing is still done by one person at one sewing machine. New technology is affecting the cutting part of CMT, and there

are applications of computer-aided design, particularly in knitwear, but this still leaves a large number of small, undercapitalized firms and outworkers who compete fiercely for subcontract orders. -Net assets per head- in clothing co-operatives average below £ 500, compared to £ 3000-£ 4000 for the clothing industry as a whole, but the latter figure includes the large, automated textile and hosiery sectors.

Similarly, although the world of large multiple retailers has been transformed by computerized stock control and checkout systems, the co-operatives in this sector, like most co-operatives, are small, and moreover they are mostly specialist local shops such as wholefood shops or bookshops. Their ethos corresponds with the idea of friendly, quality, personal service that keeps small shops in general going in competition with branches of large chains. The figures for -net assets per head- for wholefood co-operatives show a similar variation to those for printing co-operatives, though a less marked separation into two groups. In this case the reason for certain co-operatives showing a high figure may well be the ownership of property rather than investment in technology! Worker co-operatives can of course be found in other sectors as well, though not in sufficient concentrations for a good comparison to be made with conventional businesses on the basis of average statistics. As mentioned above, there are several rescues of businesses in declining sectors including some engineering co-operatives, and these are certainly in industries dominated by changes in technology. However, it is likely that the rescue co-operatives will be trading in particular market niches that allow the continuation of old skills. Their levels of capitalization per head may be much higher than for other types of co-operative, either because they were able to use their position to acquire capital assess cheaply or simply because they had redundancy monies available, though this may still not be sufficient to finance any attempt to diversify into new areas.

Of co-operatives starting as new businesses, a few have grown substan-tially or developed themselves in other ways. These include some printing co-operatives, as mentioned above, and also several wholefood co-operatives, especially wholesalers. However, there are also a few examples where the product or service itself has a scientific or technological content. In our study (Cornforth et al. 1988) we identified these "self-developing" co-operatives as particularly important. Where the development requires increasing capitalization, investment and reinvestment, they are perhaps doubly important, as examples of the possibilities or the limits of worker cooperation.

SOME EXAMPLES OF TECHNOLOGY IN CO-OPERATIVES

I now give some brief sketches of the relationship between technology and certain co-operatives of some of the above types. Co-operative A (Cornforth et al.1988, Plumpton 1988) was a small radical bookshop collective that traded for about five years up to 1985. It made use of standard items of technology, such as a microfiche reader, and generally was managed quite efficiently. However, when major book retailers began to move in to the market niche carved out by radical publishers and booksellers, and sales of books to institutions were also hit by the general cutbacks in public spending, Co-operative A was forced to close.

Co-operative food retailers are mostly in wholefood and many began trading with a deliberate orientation towards using as little technology as possible. Wholefood co-operatives in the seventies often served bulk items direct from sacks on the floor and eschewed pre-packaging and electronic weighing scales. Nowadays, however, Co-operative B is fairly typical of the wholefood sector in making use, like Co-operative A, of standard items of technology. These include packaging- and labeling equipment, display freezer, and electronic till as well as the scales mentioned above.

Co-operative C (Mc.Monnies 1985, Birchall 1987, Cornforth et al. 1988, Thomas 1988a) was a non-wholefood retailer, being a rescue of a small branch of a large chain of supermarkets. Again, its technology was neither more nor less advanced than that of any other independent small supermarket, though its work organization was quite different. There were more jobs to do, particularly for the manager, since, in the large chain, functions such as buying, pricing, promotions, etc. were centrally controlled. Also, in the co-operative, all five workers were expected to be able to do any job, and by implication to be able to use any of the equipment. At one level there is nothing surprising here, since none of the operations in question were particularly intricate or skilled. The co-operative appeared to have escaped easily from the seemingly unnecessary alienation of the extreme division of labour imposed in large-scale retailing. However, the co-operative was forced to close after barely two years following difficulties with its suppliers.

Technology might seem irrelevant or neutral to the workings of such co-operatives, but without the competitive advantage of the larger business, including the latest computer-aided stock control and forecasting package, small retailers, whether co-operatives or not, are very vulnerable to market (or supply) changes.

Still in the food business, Co-operative D (Macfarlane 1987, Cornforth et al.1988) is a very successful wholefood wholesaler, which has expanded from a collective of a handful of workers in 1975 to employ about 35 and turn over approaching £ 5 million today. Again, technology employed is more-or-less standard for a warehousing- and delivery service, but this co-operative has greater scope for new investment, and is likely to invest in technology to enhance its members' skills rather than to reduce the need for more staff. So, for example, it is a priority to Co-operative D to ensure there are no barriers to women doing any of the jobs in the co-operative. Insisting on women being able to drive large delivery trucks on an equal basis with men is indicative of this particular co-operative's achievement of some control at least over how technology is used, if not over its form.

In the case of small clothing firms, dependence on customers may extend to their supplying machines, designs, and even production management and supervision. Co-operative E (Cornforth et al.1988) was not such an example, in fact owning its own machines outright, the members having agreed to repay the initial loan to a co-operative support organization out of retained surplus while paying themselves very low wages. This gave Co-operative E a small area of choice over technology. For example, they had the possi-bility of altering layout so that machines face each other, facilitating group working, social contact and quality control by peers, rather than the conventional picture of lines of workers arranged for ease of supervision. However, in general the clothing industry constrains the small firms in it very tightly, both through the market and through the technology employed, even though much of it has not changed a lot for a long time. One woman, in a different CMT co-operative, summed up how it appears from the inside when she said:

> "... We thought we were working for ourselves, but (indicating blue overall material in every machine and boxes all over the floor) we end up working for this!"

Co-operative E eventually closed after failing in an attempt to break out of these constraints by marketing its own designs.

None of the above examples has been affected more than slightly by new technology. Co-operative F (Thomas and Abraham 1986, IPP 1987) is different in that, as a printing co-operative, it works in an area undergoing considerable changes in technology and is participating in these changes. Like Co-operative E, it has grown considerably since starting to trade as an independent business, in its case from some 7 workers in 1980 to almost 30 now. It has separate design, printing, plate-making, typesetting,

finishing and administrative departments, and has recently moved from a fully collective structure to one with a designated manager in each department. New technology has in fact been one powerful reason for moving from partial job rotation to more strict specialization. However, Co-operative F also has a specific commitment to trying to maintain control of the technology it employs and use it to further its social and political, as well as commercial, goals. These include a commitment to equal opportunities and to developing the skills of the workforce. This has entailed taking great thought as the co-operative has expanded as to the direction of expansion at any particular point, given the uneven but rapid development of technology. For example, from a commercial viewpoint, the co-operative might have opened a typesetting department two years before it did. However, it was realized that new technology was about to transform this particular aspect of the business so that some of those taken on would probably have to be laid off again, and the co-operative waited until it was able to implement fully computerized typesetting, taking the opportunity at the same time to train women in what had previously been largely a man's job.

My final group of examples have products which are themselves based more closely on science and technology. Co-operative G (Cornforth et al.1988, Thomas 1988b) employs 15 worker members where three years ago 80 were made redundant. The original private company had been taken over by a large conglomerate and what had been a general engineering works found its production increasingly concentrated on to manufacture of one particular line of equipment for a major nationalized industry. A national strike in that industry disrupted sales and the parent company decided it would in any case be more efficient to concentrate still further. Rather than producing on several sites, including the one we are interested in, they would move production of this item to one site only and close down this particular branch factory.

Backed by their Union and the regional co-operative support agency, the workers, led by one of their stewards, were able to create a "phoenix" co-operative by going back being a locally oriented jobbing engineering works. Skilled workers still concentrate on use of a particular machine, but with less supervision: "...there is more freedom in how you do the job - you know the job's got to be done but you choose when and how." The co-operative has also begun making and selling as its own lines some products from the range produced before the takeover by the large conglomerate. In other words, by using "old" but fairly standard technology, and using feelings of local loyalty and developing a reputation for good quality, Co-operative G has survived so far (in its reduced size compared to the previous firm) without developing new products or

investing heavily in new technology. It will be interesting to see how long this can continue, or whether it will be necessary to make large investments and somehow raise the money for them.

Co-operative H (Thomas and Abraham 1986, IPP 1987) was a rescue sponsored by the then Greater London Enterprise Board of an old established signwriting firm. The workers became determined to save their company rather than seek work elsewhere (which, given the high level of skills of many of them, they could probably have succeeded in doing). One of the principal features of this determination was the wish to preserve the great range of traditional craft skills employed, in typesetting, etching, metal and wood working of various kinds, etc. The co-operative was somewhat slimmed down in numbers but competed for business on the basis of being able to design and work in any and all materials and styles, so that all the craft skills had to be maintained, as well as introducing new computer-aided design techniques and computerized typesetting. This multi-skilling meant the most experienced workers in particular had to work in several media and there was a great need for training in techniques of flexible working as well as general upgrading of skills and learning of new techniques. In addition, there was a programme of training in the techniques of worker participation. To some extent this skill-intensive development seems like an example of the possibility of a humanizing application of technology in a co-operative setting. However, it was not perceived entirely positively. Craft skills were kept alive and quality maintained, but some of the old craft skills were effectively downgraded in status to a useful additional aspect of the repertoire of a worker with general skills. Competitive pressure was enormous and there was pressure on the co-operative to move into some semi-mass-produced lines -nameplates, labels of different kinds, etc. In fact, with policy changes at its Enterprise Board sponsor following the demise of the Greater London Council, Co-operative H failed to meet the more stringent targets set for it by the renamed Greater London Enterprise. It was forced to revoke its co-operative constitution to become a company managed directly by the Enterprise Board before being sold back into private ownership.

Co-operatives J, K and L, by contrast, have products which in different ways are near the forefront of technology. Co-operative J uses new plastic and fiberglass materials for design work and the manufacture of kit-based products, particularly aimed at the educational market. Co-operative K (see also P.A. Management Consultants 1985) engages in research, consultancy, design and manufacturing in the field of wind energy and related products. Co-operative L manufactures scientific instruments, mainly for applications in agricultural and botanical research

in the Third World. All these co-operatives hold clear objectives on the type of technology they are prepared to use or promote, including specific commitments not to sell products or services that might have military use. They also began trading with commitments to fully democratic working, in the case of Co-operatives K and L, fully collective working. Although a degree of specialization has had to be introduced as the co-operatives concerned have grown, in Co-operative L's case from one worker in the early seventies to about 25 today, commitment remains to principles of skill-sharing and to finding new ways of working to combat the constraints of technology and market. For example, in deciding on a new investment involving a new product line, additional premises and manufacturing equipment, Co-operative L is actively seeking ways of presenting the technical and financial options to its membership that do not slavishly follow standard accounting criteria of return on capital but also bring labour and skill-enhancement into the equation. It is also developing the use of information technology to help in devolving both information and decision-taking to group level where a form of collective working might be maintained, alongside a more formal democratic structure at the level of the whole co-operative. If such a system cannot be made to work, they will actively consider whether to assist a new co-operative to form rather than find themselves forced to adopt what they consider to be undemocra-tic practices.

CONCLUSION: TOWARDS A FRAMEWORK FOR ANALYZING THE RELATIONSHIP OF TECHNOLOGY TO A PARTICULAR CO-OPERATIVE

The data and examples do not give full support for either hypothesis. On the "optimistic" side, there are certainly some possibilities for humanizing. There are some small gains, where co-operators have been able to make choices for themselves within the constraints set by available technology, plus a very few possibilities for bigger changes, notably in Co-operatives F and L.

As for the "pessimistic" hypothesis, technology has not obviously itself been an vehicle of constraint except perhaps in Co-operative H. Many of the examples where technology appears neutral or even unimportant are in fact in business sectors or subsectors that are out of the mainstream of technological change. Thus, although not impacting directly on particular co-operatives, technology plays a part in keeping co-operatives in general out of the most important areas of industry, since

the pace, complexity, and cost of developments makes it ever more difficult to break in, particularly given known limits of self-financing or of obtaining outside finance for co-operatively owned and run ventures.

It is perhaps unsurprising that we find no determined future for the place of all co-operatives with respect to technology. Discovering a range of different possibilities fits well with Vilrokx' (1987) discussion of different possible scenarios for the future of work in general. His use of the concept of "relative autonomy" to describe social relations in a future "knowledge society" leads one to ask what are the conditions in which autonomy might be substantial and what are the conditions under which autonomy is likely to be relatively more constrained.

Translating this back to our discussion of co-operatives, rather than seek to prove or disprove over-general hypotheses, there is a need to analyse the conditions in which co-operatives might be either dominated by technological changes outside or alternatively able to promote their own humanizing ideals. It is suggested that a useful framework for this analysis can be built up by regarding worker co-operatives as small firms but with a difference. In Rainnie's (1985) words:

> "...co-operatives (too) ...have to survive in a world that is not of their own making, ...a world dominated by large capital, and must therefore fit into one or other of the categories ...devised for all small businesses."

The proposed framework has three dimensions, the first of which concerns the place of a particular co-operative as a small firm within its particular industry. A useful starting point for such analysis is to divide activities in each industry between "core" and "periphery". Increases in numbers of small firms or in self-employment can often be simply increases in the number of "peripheral" jobs that large firms push outside their organizational boundaries, and therefore outside their legal responsibilities as employers. Vilrokx (1987) uses this distinction, as does Friedmann (1977), who considers centre-periphery relations between firms as well as within firms or between firms and self-employed individuals. Thus small CMT firms like Co-operative E tend to consist entirely of "peripheral" workers (in that example, there are only machinists employed, not even a cutter, let alone a designer or a manager), and their relationship with the small number of larger firms that are their "customers" can be characterized as one of ultra-dependency. This case can be taken as one extreme on our first dimension, which can be developed to measure different types and degrees of dependency on large firms and on the market.

Shutt and Whittington (1987) suggest three basic types of small firm in this respect. Small CMT firms, like subcontractors or manufacturers of parts in the car industry, are examples of the first type, ultra-dependent on particular large firms, in the case of CMT firms, on large retailers. The second type, including jobbing printers or engineers, for example, are more independent in that they have real choices of customers and of which specialities to go for in the market, but the market as a whole is very competitive and its terms are set by large companies. The third type of small firm is more independent altogether in that its business is based on a degree of local control over its market. This can come about by market innovations that create particular customer loyalties, as to some extent with wholefood co-operatives, or the independence can be based on specialist skills or on an innovative range of products, often science-based. (Note that very few even of the third type of small firm are involved in "core" activities in Vilrokx' terms).

The second dimension involves the way new technology affects a particular industrial sector or subsector. In some cases new products are themselves created directly from technical innovations, and the microchip industry is an obvious case in point. Elsewhere Donckels and Mok (1987) term this "product innovation", to distinguish it from "process innovation" or "administrative innovation". "Process innovation" would include cases where new production techniques have been developed for what may have been essentially a standard product, as in the application of new technology to cutting in the garment industry or computerized typesetting in the printing industry. "Administrative innovation" would describe yet other cases where the impact of new technology is more indirect, for example the application of computer aided design or information systems, or in office automation, and so on. Donckels and Mok suggest that whereas process innovation can occur in a big firm as an independent measure aimed at increasing productivity and thus lead to "jobless growth", in a small firm it is more usual to find process innovation related to a previous product innovation.

In the case of worker co-operatives, there is a third dimension to add to these two, namely the potential for identification between job, product and social or political aims.

Using this framework, one might postulate that there are a few, but only a few, cases where co-operators are likely to be able to institute significant positive innovations in terms of the humanizing application of new technology. These could occur where a co-operative has a new technology-based product range and so is of the third, independent, type, being based on innovative products or specialized markets with a degree of customer loyalty. Ideally the products would also allow identification

with social or political aims. This may be the case in Co-operatives J.K and L. Co-operatives of this third type, even if their products are not new-technology-based, might be able to use information technology or new production methods in innovative ways in line with their humanistic and democratic aims. This may also be the case for co-operatives of the second (independent but competitive) type, such as Co-operative F in the printing industry, but this type of co-operative could also be subject to the greatest pressure to conform to technological innovations defined outside, as with Co-operative H, the signwriters. At the other end of all the dimensions, co-operatives of the first type, with ultra-dependence on particular customers, and in areas where the application of new technology is restricted to "administrative innovation", i.e. including only design or information aspects, are likely to appear little affected but also may in an way be most constrained by technology. Co-operative E in the clothing industry would be a good example. In between are co-operatives, like Co-operative D in wholefoods, that are able to make small gains in their choices about technology, but only within strict limits.

There is a clear need here for further analysis and research. For example, in-depth studies of decision-making and investment criteria in co-operatives such as Co-operative F and Co-operative L might define the bounds of what is feasible. Survey or data-base work on worker co-operatives should include collection of data on sources and allocation of investment funds. More comparative cross-country studies would also help in that countries with more developed co-operative sectors have worker co-operatives in stronger or even dominant positions in certain sectors, and this may also affect the analysis.

Finally, practical work on collaborative methods of research and development, as well as on ways of channelling investment funds into co-operatively-owned ventures, is needed.

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FUTURE PERSPECTIVES

SMALL FIRM DEVELOPMENT AND INDUSTRIAL ORGANIZATION

Werner Sengenberger

SUMMARY

With the exception of some more peripheral niches of economic activities, not accessible or not of interest to large firms, small firms are thrown into competition with large enterprises which usually have superior resources and control of the market. Under these circumstances there are essentially two basic options for small firms to find their place in economic development. One is that small firms compete on the basis of lower factor costs, especially labour costs. Many governments have endorsed this approach through legislation relieving or exempting small firms from the same labour standards and social obligations that large firms face. It is highly doubtful whether the low labour cost approach will improve the competitive position of small firms. The main alternative competitive strategy for small firms is to gain both better efficiency scale as well as better political voice and representation through some kind of support system. A promising road is the formation of collective organization of small firms on an industry or regional base, with the prospect of sharing resources and improving resource utilization through cooperation. Compared to the low-cost approach, this strategy leaves much greater chances to the small firm of attaining equal or similar performance as the large companies. If this holds true, a lot of the promotional policies towards the small firms may have to be reconsidered.

INTRODUCTION

For a long time the study of small firm development received a cinderella-like treatment in the social sciences. Small businesses were largely viewed as a vestige of an earlier stage of economic development, doomed to a gradually more residual role in the modern industrialized economy and ultimately becoming an accidentally surviving anachronism. Apparently, this view was fueled by the fact that over most the past one hundred years (or since the modern census-recording of business organization was started), economic development proceeded ostensibly and rapidly in the direction of concentration and centralization.

This long term trend seems to have come to a halt during the past decade, at least in part. While nearly all signs point to a continued process of financial capital concentration, a stop, or even a reversal of the process of centralization of the structure of production and employment, has been observed. In practically all industrialized countries, large enterprises have lost a substantial amount of employment, or lost more than small firms; in some countries the small firm sector gained employment in absolute terms; so everywhere a shift occurred in the size-structure of employment in the direction of smaller units, noticeable on the enterprise level, or on the establishment level, or on both (Sengenberger and Loveman 1987).

This new tendency towards smaller units of employment has been taken by a number of analysts, as well as by politicians, as a sign of a new age of "entrepreneurship" and of the superior flexibility, innovation capacity and competitiveness of small firms. Many have begun to herald the view that the dynamism of small firms could generate additional employment, and eventually provide a break-through solution to the persistent problem of mass unemployment. There are good reasons to caution against overly optimistic expectations as far as the autonomous job creation capacity of small firms is concerned. A large part of either the absolute or relative employment gains of the small firm sector has resulted from decentralization and fragmentation strategies of large companies; another part is due to sectorial shifts towards services; the number of cases in which independent small firms have generated extra jobs is limited, at least in Europe. The outcome of government programmes, especially in Britain and France, under which small business creation has been encouraged through transfer payments to the unemployed, has been disappointing so far. Little income and unstable employment were generated (Bendick and Egan 1987). Finally, the superior efficiency of small firms may be questioned in view of the average lower profitability, and the much higher and significantly

increased mortality rate of small enterprises.

It may be argued that although there are undoubtedly certain technical efficiencies associated with the scale of operation, firm size as such is not a crucial variable in terms of both economic viability and social standards. This is indicated by the observation that both within and across countries we find a very large diversity and dispersion of economic and social performance of small firms. There is the Sweat shop with substandard labour conditions next to highly competitive and innovative small enterprises with good pay, favourable working conditions and a type of work organization that leaves ample autonomy to the worker. Rather than size *per se*, it is the "social organization" of small firms which is the decisive variable for the status and vitality of this group of business. It is misleading treating small firms as individual entities. Rather, the status and role of small firms have to be seen in the larger context of prevailing business strategies; in particular, what is the position of small firms in the division of labour and what is their relationship to large firms, in terms of dependence and hierarchial position? The answer to these questions have to take into account the fabric of institutional arrangements of a nation, both in the product and the labour market.

THE SMALL FIRM IN THE WIDER ECONOMIC AND SOCIAL CONTEXT

A good deal of the new euphoria about the dynamism of small enterprises stems from neoclassical thinking that likes to see the small firm operating in a world of deregulated, competitive markets. If the "right" business environment would be created, if above all, firms would be freed from all kinds of social obligations, tax burdens, regulative restrictions, then, the argument goes, the Schumpeteran spirit of entrepreneurship would triumph. Yet, by failing to look beyond the operational requirements of the individual enterprise and by ignoring the powerstructure in the market, this model of entrepreneurship runs into to the same fallacies as much of the productivity theory which attributes worker performance to innate or acquired individual characteristics. Small firm performance is intricately linked to the nature of interfirm division of labour and the mechanism and forces of coordination of economic activities is dependent on the division of labour and the organization of work within the firm. In most industrialized countries small firms are faced with a rather unequal distribution of power and control in favour of large enterprises, in the capital-, the product- and labour markets. Large oligopolistic corporations tend to have superior resources at their avail while they are better equipped to exert influence on their economic and

political environment. Indeed, while large companies lost employment during the seventies and eighties, there is no indication that they lost market power. Studies for Japan and West-Germany indicate that the largest 100, as well as the largest 500 companies, have substantially increased their capital basis, their turnover and their share in the gross national product; at the same time they retrenched their employment and lowered the value added per product sold (see e.g. Bade 1987). This suggests an extended and changing division of labour among firms, making the large corporation less of a producer and having the production move to medium-sized and small firms through subcontracting and other forms of outsourcing and at the same time expanding the large corporation's role as a market agent through both product and financial conglomeration and diversification. In other words, today the average large company is engaged in an ever larger range of products (or services), but tends to produce less itself of each of these products. This redivision of labour can explain the concur-rence of ongoing capital concentration and decentralization of the stock of physical capital.

While there are niches in each country which have always been a reserve for small firm production or services, most small firms do in some way compete with larger ones, or are subject to some kind of inter-enterprise division of labour. Thus, large and small firms may compete with each other in the same product market (="Horizontal division of labour"). For example, there is in some countries, at present, a very tight, sometimes cut-throat competition of industrial- and craft firms in the food production sector. In addition there is often a vertical dimension in the division of labour as between small and large enterprises: small firms may serve as subcontractors or suppliers of parts, component, and sub-assembly of goods, to final producers: furthermore, small firms frequently act as vendors of products of large companies, or take up the function of servicing, repair and maintenance of these products; increasingly, production related services, such as product design, R&D, software production, cleaning, catering, etc., which used to be provided in-house, are subcontracted to other, mostly smaller enterprises.

While previously we could witness growing vertical integration of production and services by large producers, with the aim of getting control over the entire production process and freeing themselves from risks associated with supply and supplier bottlenecks, the more recent trend emphasizes the externalization of a wide range of economic activities from the large companies. However, the new preference for "buying" over "making" does not necessarily mean that the large company looses control over these external activities. It may still exert influence through power relations and financial and other transfers that create

dependencies, or even a kind of satellite relationship with other firms.

Measures of externalization, such as subcontracting, spin-offs, homework, franchising, and worker and management buy-outs often leave the newly created, frequently small firm in a state of legal, economic, or financial dependency from the large firm. For manufacturing firms, the advent of modern logistical concepts of production facilitated by new information and com-munication technology, can also foster stronger inter-firm dependencies. Suppliers (of parts or components which they design and market themselves) or subcontractors (which merely manufacture parts predesigned and specified by the orderer) are subject to this change of inter-firm organization.

Computerized on-line data exchange designed to reduce inventory costs, speed up material flow and make scheduling more precise, have already progressed in a number of industries, e.g. in the automobile sector, yet large companies foresee a tremendous further potential for rationalization in this area (Ebel and Ulrich 1987, pp. 76-83). Right now, it is difficult to make any reliable projections about the consequences of this process for the (smaller) supplier and subcontractor firms. What is clear, however, is that many of them, especially the hitherto independent ones, are afraid of a much greater transparency and direct access by their customers to their technical know-how. They fear the risk of becoming fully exposed to and "governed" by some external directive hand and, thereby, loosing their managerial autonomy.

COMPETITIVE STRATEGY AND THE SMALL FIRM

Given the extended inter-firm division of labour and the power and control differential among enterprises, especially between large and small ones, the question arises of what the position of the small firm is in areas where it faces competition with large companies.

The individual small firm, left to its own, is normally in a poor competitive position. It is restricted in its economic-, technical-, personal- and political resources, and it lacks the ability and the autonomy to influence its external business environment, which would be required for strategic behaviour. To gain strategic capacity, the small firm is forced to borrow, or rely on, resources from others, such as the state (in the form of special rights, privileges, protection, subsidies, etc.), or large resourceful firms, which may provide capital, equipment, technical know-how, skill, etc., or from a collective organized community or congregation of firms. Such "supportive structures" can help the small firm to overcome its paucity of means and power, but resource transfers of this kind usually entail social relations in the market that are far from the ones envisaged

by the competitive market model.

In all instances of relative success and dynamism of small firms that have become known in recent years, some kind of intermediary or support agency was involved that helped to create a kind of social organization, around which the individual firm could revolve and to which it could be linked. In the case of the high-tech small firm this institutional support is frequently provided by a university, in the case of the Italian cottage industry it was the local political administration or the church (see: Brusco 1986, Piore and Sabel 1984), in the German-speaking countries it have been the craft institutions, in other cases industrial associations or banks. Whatever the intermediary organization consists of, it usually performs economic- and political functions to enhance the small firm's position in the market, which will now be illustrated for the case of the industrial community.

(a) The Strategy of Collective Organization of Small Firms

As mentioned, one option available to small enterprises for resource transfer is to look for other small firms to build a joint support system. By forming communities or congregations small firms can overcome the kind of deficiencies which they face as individual market agents acting entirely on their own. Again there is a wide variety of historical and modern communal support structures, ranging from co-operatives to industrial districts, science parks, craft combines, and ad hoc co-operations. What makes this type of supportive institutions especially interesting is the thesis (developed by Piore and Sabel in the "Second Industrial Divide") that they have been spreading in recent years. The authors list examples of communal organization of small business in various countries which provide the social underpinning of "flexible specialization".

In the present literature as well as in the country reports 1) we find two interconnected kinds of rationales, an economic and political one, by which communal organization can resolve the resource deficiency problem of small firms: economic and socio-political. The *economic rationale* essentially says that by grouping together, small firms can obtain economies of scale similar to those of large enterprises. In the Italian report, which elaborates a great deal on the resurgence of industrial districts over the past two decades, the scaling up effect in these districts is described as "Marshallian", pointing to Alfred Marshall's analysis of scale economies. Higher efficiencies can be gained by joint design of products, purchase of raw material, equipment and energy, joint use of equipment, office space, and transport vehicles, joint production, financing, marketing advertising, distribution, personnel administration,

joint organization of exports, research and development, training, and so forth. In addition to joint purchase and joint utilization of resources there may also be efficiency gains through bunching and spatial agglomeration of firms, which reduces transport costs and facilitates various sorts of inter-enterprise exchange of information and other resources.

The spatial conglomeration of small firms, at the extreme, may come close to the spatial concentration exhibited by big integrated plants. Sometimes entrepreneurial networks develop spontaneously but frequently they are built into existing social networks. In some cases there is public support given, as for example in some of the Italian provinces which provide a public infrastructure for small business development; or under the two successive pieces of legislation of 1982 and 1983 in France which provides a legal frame for decentralization coupled with various kinds of local logistic assistance, such as buildings, real services and counseling.

Concentration in a locality may not merely be significant for the pooling of resources and for their exchange, but also for the process of diffusion of innovation and new technology. The industrial districts (just like occupational markets) do live on an egalitarian principle that in this case requires a rapid assimilation of all firms in the group.

Density of demand and supply is also an important functional requirement of occupational labour markets that rest on the easy substitution and mobility of workers with the same skills across firms. There must be enough employers and workers in the local market to enforce the "law of large numbers" to work which forms the basis for quantitative- and qualitative adjustment in this labour market structure. Further, the work-sites must be close enough geographically to avoid undue mobility costs.

The economies flowing from communal relations pertain to both co-operating firms in the same industry of product area and firms operating in different branches. In other words, the efficiency gains of small firm communities can be built on the principles of industrial- and spatial groupings. Some of the best known examples of industrial communities can be found in the engineering; shoe-, textile-, leather- and clothing industries in Italy, France, Britain and West-Germany.

Firms with different products, product market affiliations and technologies may profit less from exchange relations and transfer, as far as the specific product is concerned, but may still benefit from co-operation and co-ordination, e.g. through joint procurement or use of resources, such as energy supply, office capacity, and various services.

The second principle rationale for communal organization is more *social or political* in nature. Joint organization and representation of firms

may strengthen their "voice" vis-à-vis various levels of government. For example, for the more than 200 industrial districts now in existence in Sweden, their bargaining power vis-à-vis the local public authorities is said to be at least as important for their economic welfare as the benefits accruing from the efficiency gains of groupings together.

There are often less tangible resources of communal organization that stem from existing residential ties, kinship, religious affiliation, political parties, social class, ethnic group and other sorts of coherent and socially integrated structures. These resources provide a "sense of belonging" (Becattini) as well as trust, which again form the basis for mutual exchange and co-operation. If people are bound to live together for a long time, there is little space for the oportunitic behaviour typical of shot-lived, casual market relations. Both the Italian report which analysis the social fabric of industrial districts, and the United States report, which investigates cases of effective communal organization in garments and construction in New York City based on ethnic or religious ties or on immigration links, point to the close interplay of social- and business organization. Becattini defines an industrial district as the "thickening" of inter-dependencies among several firms and between this group and a population of workers or other people within a common and relatively circumscribed location.

In fact it may ultimately be the social control feature of organization, in particular the power of sanctioning "unsocial" economic behaviour through a tight social group which constitutes the common thread to all kind of success stories of large as well as small firms. Still, by far not all well integrated social organizations produce effective economic organization, and a key question for research may be under what circumstances "social resources" are tapped and mobilized for economic ends.

Obviously, one of the effective mechanisms of social organization lies in the reduction or even elimination of short-run competition. This appears to be required for dynamic efficiency to materialize, for generating resources and ;making good use of them, both within firms as well as across firms. One may even speak of "internal product markets" within which competition is not absent but is regulated in a way that is compatible with the collective interests and ends of the community.

The country reports furnish various kinds of evidence that curtailing competition is an essential organizational feature in the small firm sector. The Swiss report, for example, speaks of a longstanding tradition of collective organizations in Switzerland to cope with the challenges of adjustment. Protection and cartels of firms are explicitly seen as legal, and a very high cartel density has emerged grounded in associational rather

than collec-tive concentration of economic responsibilities. The law is intended merely to prevent abuses in the reduction of competition, not to prevent its curtailment as such.

The law may not be everywhere as explicit about the desirability of organized co-operation of collusion but these forms are often tolerated. In Germany, the Federal Cartel Office and the courts responsible for acting in anti-trust cases have viewed inter-firm cooperation with a critical eye, especially where it begins to lead to the fusion of the co-operation firms and toward corporate concentration. But in fact, a lot of spontaneous and organized types of co-operation have taken place, especially among small industrial firms and in the craft sector.

However, there may be a price to be paid for the limitation of competition, in the form of the exclusion of those not belonging to the group or community. Here, the question raised by Piore and Sabel at one point comes in, namely what constitutes a group. Does efficient co-operation of firms based on controlled competition and social integration extend merely to local groups, does it remain an "insular" solution, or can it be organized on a broad, e.g. national scale? In a restricted regime, as Sabel writes, isolated communities of producers would seek their fortune without regard for the fate of their rivals. under an alternative, more inclusive or expansive regime local community structures would be coordinated by national social welfare regulation, and the provision of research facilities and training would be a public responsibility.

(b) The Low-Cost Strategy

Support system for small firms based on the transfer and share of resources are no guarantee for viability and competitiveness, but often are a precondition. Small firms can use them to gain comparable or at least similar financial-, personnel- and technical means as large enterprises. In fact, there are certain affinities between decentralized large companies with various plants or product linesand industrial districts in which various firms are closely knit together. both structures are characterized by the coordination of individual units which simultaneously cooperate with and compte against each other.

In the bases of effective support systems it is likely that small firms are left with only one other option for competition: lower factor input costs than prevailing in large firms, be it lower labour or lower capital costs.

Reduced labour cost is a frequent method through which small firms seek to survive and gain competitive advantages. They play lower wages, provide lower or less fringe benefits and less social security, care less for

standards of occupational health and safety which would require investment, work longer hours or engage in overtime work, for which no premium payment is given, and so on. Frequently, the lower labourcostbill to small firms is related to an inferior degree of unionization and works council representation; but small firms are also frequently exempted from particular legal labour standards, such as employment security clauses or other protective legislation. Finally, even where such regulations exist it may not be enforced or observed to the same degree as in large firms due to the absence or weakness of unions and other worker control agencies.

A significant amount of the recent decentralization and fragmentation of production and employment towards smaller units can be seen as a result of labour cost saving endeavours: large firms have tried to cut their wage bill or their operational costs by shifting production to small firms and/or to union-free locations. And a fair amount of the newly created self-employment if profitable presumably because it operates in a rather hidden, less visible business environment in which labour standards and labour inspection are widely non-existent and in which a good deal of self-exploitation of the entrepreneurs occurs. The increase in self-employment, as well as the scaling down of wages and labour standards, has been greatly facilitated by the continued slack in the labour market. Moreover, the increased rate of bankruptcy and enterprise mortality has lowered the financial barriers for market entry. Cheap capital at knock-down prices became available. In quite a number of countries, both developed and developing ones, new legislation was introduced during the past decade to exempt small firms from labour standards or social obligations, or to at least relax existing norms and rules. From these changes a new growth of small firms and new employment was expected.

Serious doubt may be raised, however, as to whether a low labour cost strategy for small firms will actually improve their performance and competitive position in the market. First, lower standards of renumeration and other terms of employment may not allow the small firm to attract and recruit labour resources of similar quality as large firms. This may lead to lower productivity, and to a reduced ability to engage in business strategies based on innovation or flexible specialization requiring highly skilled, polyvalent work force.

Second, and equally important, the option of lower cost for gaining competitive advantages may turn out as a short-lived gain, as a kind of Phyrric victory. It may induce the entrepreneur to rest comfortably on the bed provided by the lower cost/price edge, instead of making efforts to seek competitive power by developing new products or new market opportunities. It may, in other words, produce complacency instead of

dynamic efficiency; and by loosing out on adjustment and innovation, the small firm may hand away its competitive margin. So, what in a static analysis may sound as contradictory, namely the lower efficiency of the small firm in spite of lower factor imput costs, may turn out as a more realistic result, when seen from a more dynamic point of view: lower labour costs end up in higher unit labour costs. It implies further that public policies of deregulation may turn out counter-productive. Third, large labour cost differentials between large and small firms entail the risk that the (weaker) small firm is used by the (more powerful) large firm as a kind of buffer. Large firms may be encouraged to externalize costs and risks (like the risk of providing new technical developments) to smaller firms, because the cost of subcontracting would be less. This, in turn, may produce particular one-sided dependency relations victimizing the small firm.

Once the small firm sector is set on the track of lower efficiency, a vicious circle of reinforcement of the performance-gap may set in. The entrepreneur, or his representatives, may call for further exemptions form the regular tax and social obligations, the workers in small firms will tend to go along with the inferior rewards out of fear of loosing their jobs, and for the same reason of preserving employment the labour inspection authorities will abstain from or relax standards of controlling and enforcing safety at work. Under these auspices it is likely that polarization in the product and labour markets develops dividing large and small firms into different segments.

SMALL FIRM PERFORMANCE AND LABOUR MARKET INSTITUTIONS

Whether a low-cost competitive strategy for small firms if feasible in a country depends a good deal on the labour market population and the general system of industrial relations. In general one might say that the low labour cost avenue is more likely to be followed in countries with decentralized systems of industrial relations and standardwage-setting than in countries with uniform terms of employment and wages, fixed either under law of comprehensive, centralized collective bargaining. Looking across the industrialized nations we find that, everywhere, small and medium-sized firms trail behind large ones in the average level of wages and other terms of employment; at the same time the gap varies a great deal. As shown in Table 1, in Denmark (as well as in the other Nordic countries) and in Germany, i.e. in countries with comparatively centralized machinery for wage-setting, small firms of less than 100 employees pay not much less of what large firms pay, whereas in countries like Japan

and in the Unites States, the wage differential is very much larger. The same holds true for fringe benefits and other features of job quality (see Table 2).

As mentioned in the previous section, large institutionally induced differentials in wages and labour standards may generate in a large gap in productivity. This is evidenced by the data in Tables 2 and 3 which show that indicators of economic performance corresponds to wage structures. Thus, in the case of Japan (Table 2), we do find within the size structure of firms a very sizeable dispersion of productivity levels and technology, as indicated by measures of capital intensity, corresponding to the large wage differential. In European countries, on the other hand, where the firm-size related wage gap is much smaller, the productivity gap is also of a much smaller magnitude (Table 4). The main implication of this information for small firm policies is that small firm performance is influenced by national institutions.

Table 1. Average Wages by Enterprise Size [1]
Percentage of wages in enterprises with 500 or more employees

Country	Year	10-99	100-499	500+				
Denmark	1978	93.2	97.3	100				
France[2]	1978	82.9	86.3	100				
Germany[3]	1978	89.7	92.2	100				
Italy[3]	1978	85.4	92.7	100				
Japan[4]	1982	77.1	82.9[5]	100[6]				
United States[7]	1983	57.0	73.8	100				
United Kingdom[8]	1980	93[9]	---	100				
		20	20-44	45-89	90-179	180		
Norway	1982	88	92	94	95	100		
		5-29	30-99	100-499	500+			
Japan[11]	1984	58.2	73.6	84.9	100			
		10-49	50-99	100-199	200-499	500-999	1000+	
Germany[12]	1978							
blue collar		80	79	80	82	86	100	
white collar		64	74	79	80	85	100	
		25-49	50-99	100-199	200-499	500-999	1000-1999	2000+
United Kingdom[13]	1980							
semi-skilled		76	86	85	91	94	97	100
skilled		82	88	86	94	95	97	100
clerical		82	86	87	89	89	89	100
middle management		82	85	85	87	92	94	100

1. Italy, Norway, first German series, and second United Kingdom series are for establishments, all others are for enterprises.
2. Hourly pay, manual manufacturing workers.
3. Hourly pay, male manual manufacturing workers.
4. Monthly scheduled earnings for regular emplyees in private non-agricultural sector.
5. 100-999.
6. 1000+.
7. Usual weekly earnings for wage and salary earners in private non-agricultural sector.
8. Average weekly earnings for manual workers in small engineering firms.
9. 25-99.
10. Data on blue collar workers from Norwegian Employers Federation, adjusted for worker and job characteristics.
11. Average hourly earnings in all industries.
12. Total labour cost per hour in manufacturing, mining, and construction.
13. Workplace industrial relations survey for whole economy, establishments.

Source: OECD, 1985, p. 78; and IILS, 1987, p. 123.

Table 2. Non Wage Compensation by Firm Size

		Enterprise size (Number of persons employed)					
United States		1-24	25-99	100-199	500-999	1000+	
Health insurance coverage (%)	1983	35.4	64.9	75.1	79.1	86.3	
Pension or retirement plan coverage (%)	1983	17.3	40.7	63.9	74.3	87.9	
Average years of tenure with current employer (years)	1983	4.5	5.2	6.0	6.8	9.0	
Part-time employment (proportion of employment in each size group (%))	1983	31.8	16.6	15.8	14.1	12.2	
Japan		1-29	30-99	100-299	300-999	1000 -4999	5000+
Average cost per regular employee of obligatory welfare services[1] (%)	1982	..	70.5	71.8	81.2	92.6	100.0
Average cost per regular employee of non-obligatory welfare services[2] (%)	1982	..	28.7	30.4	41.6	60.5	100.0
Retirement allowance at mandatory retirement (%)	1982	..	22.1	-------46.7-------		---------100.0----------	
Average years of tenure with current employers (years)	1982	-----7.9[3]-----		--------9.1--------		----------12.2----------	
Part-time employment (proportion of employment in each size group (%))	1983	15.1	8.8	7.5[4]	7.4[5]	----------8.4----------	

1. Employer payments for pension schemes, health insurance, etc.
2. Company housing, canteens, recreational facilities, etc.
3. 10-99.
4. 100-499.
5. 500-999.

Sources: United States, data supplied by BLS based on the May 1981 Special Pension Supplement to the Current Population Survey: Japan, Ministry of Labour, Yearbook of Labour Statistics and Bureau of Statistics, Labour Force Surveys.

Table 3 Indices of Wages, Productivity, Unit Labour Costs, and the Capital-Labour Ratio by Firm Size in Japan

Establishment size	Wages	Value added per employee	Unit labour costs	Capital-ratio
1000+	100.0	100.0	100.0	100.0
500-999	85.5	89.3	95.7	83.3
300-499	81.9	81.3	100.7	77.6
200-299	74.7	72.6	102.9	57.8
100-199	67.6	64.2	105.3	46.3
50-99	60.3	53.0	113.8	36.4

Source: Nippon: A Charactered Survey of Japan, 1981-82, Kokuseisha, Tokyo 1982, S. 51.

Table 4 Indices of Labour Productivity by Firm Size: FRG, France, Italy and UK

Establishment size	FRG	France	Italy	UK
000+	100.0	100.0	100.0	100.0
500-999	86.2	87.3	96.0	100.0
100-499	85.5	85.7	87.0	91.3
20-99	84.7	116.1	75.0	83.8

Source: Eurostadt, Structure and Activity in Industry, 1978, Vol. 15, Sengenberger (1987).

CONCLUSION

Small firm development should be seen within the wider context of economic structures and social institutions. With the exception of some more peripheral niches of economic activities, not accessible or not of interest to large firms, small firms are thrown into competition with large enterprises which usually have superior resources and control of the market.

Under these circumstances there are essentially two basic options for small firms to find their place in economic development. Each of these options are encouraged or channelled by national labour market regulations and institutions. One is that small firms compete on the basis of lower factor costs, especially labour costs. This approach had been suggested recently and many governments have endorsed it through

legislation relieving or exempting small firms from the same labour standards and social obligations that large firms face. Apart from the equity problem of lowering received labour standards, it is highly doubtful whether the low labour cost approach will improve the competitive position (and also the employment creation capacity) of small firms.

The main alternative competitive strategy for small firms is to gain both better efficiency scale as well as better political voice and representation through some kind of support system. A promising road is the formation of collective organization of small firms on an industry or regional base, with the prospect of sharing resources and improving resource utilization through cooperation. Compared to the low-cost approach, this strategy leaves much greater chances to the small firm of attaining equal or similar economic- and social performance as the large companies. If this holds true, a lot of the promotional policies towards the small firms may have to be reconsidered. Less emphasis should be placed on the individual small firm straddling the cost hurdle, and more thinking and support should be given to the development of organizational models that enable small firms to cooperate among each other.

Notes

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"Review of Developments in the Organization and Structure of Small and Medium Sized Enterprises". The reports from nine countries will be published in a reader in 1988.

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RELATIVE AUTONOMY AND NEW FORMS OF WORK ORGANIZATION: THE CASE OF EMPLOYMENT

Jacques Vilrokx

SUMMARY

In this contribution we propose the *Relative Autonomization Tendency in/of Organizations (RATO)* as a perspective to study future trends in work and employment. The concept of RATO is however not restricted to the domain of labour. Also fundamental elements of the restructurations concerning sport, religion, language, the use of leisure time etc. can be usefully studied from the point of view of a growing relative autonomy of social actors or groups of actors. We will use some important qualitative developments in self employment as a "case study". *Three forms* of self employment will be distinguished *(traditional, new and organizational self employment)* and will be linked with what we consider as the crucial variables in the definition of the emerging new concept of work and employment. *Atomization of work* and *individualization of social life* are the two main factors underlying this process.

INTRODUCTION

The very profound changes currently taking place within (social) organization structures can be interpreted as an expression of the relative autonomization tendency in/of organizations (RATO). By this, we point to the growing importance and emphasis given to smaller organizational units or groups within the global organization. This tendency pertains to the *increasing accountability* given to smaller organizational units or groups, or even individuals in society and its social institutions or subsystems. We call this relative autonomization because at the same time dependency *and* autonomy become the attraction poles of social (or organizational) relations. Also, on the one hand integrating forces are operating (joint ventures, world wide financial and industrial concentrations, Live Aid, and other solidarity movements), while, on the other hand, greater possibilities exist for the creation of small groups and/or individualized behaviour patterns.

Central to the RATO concept are the atomization tendency of work and the working activity and the individualization tendency of socio-cultural life. We will start with a brief outline of these different tendencies, relating them also to the role played by the technological developments.

ATOMIZATION AND INDIVIDUALIZATION

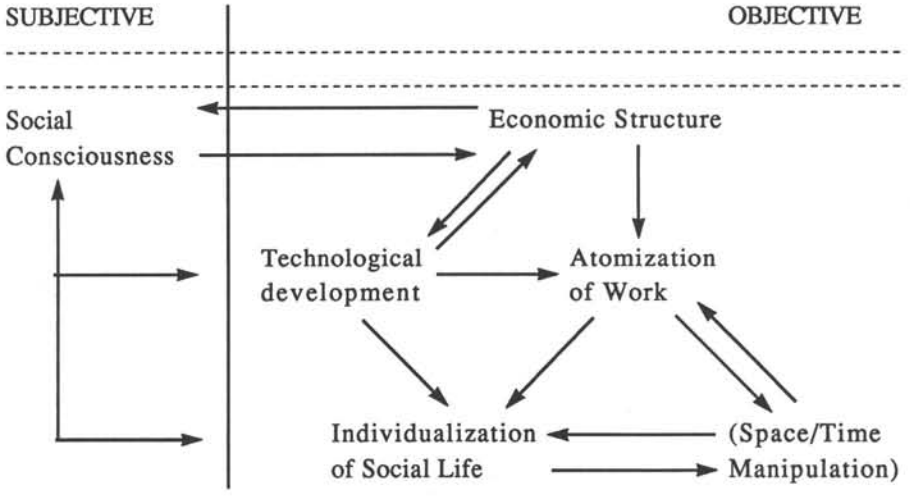
If we agree upon the point of departure (and there seems to exist a consensus from Marx to Maslow) that most efforts of (wo)men are directed at *controlling* their surrounding material and immaterial world as much as possible, in other words to try to realize collective and individual plans and dreams, then we may say that the rationalization process (as described by Weber) is at the core of (individual and collective) human action. Two major trends have supported this rationalization process in socio-economic history since the end of the 18th century. Each of these trends relate to the two activity spheres which can be considered as encompassing most of the totality of human existence. These are, of course, the work and the "leisure" sphere. Within the work sphere, or the labour process, the *atomization tendency* of work and the working activity (in short - atomization) is the expression of rationalization. In the "leisure" sphere it is the *individualization tendency* of socio-cultural life (individualization), while the global outcome of these two trends is called the *relative autonomization tendency* of social interaction patterns (relative autonomization).

Having introduced the three main concepts of the theoretical scheme which is visualized in *Diagram 1*, we will now briefly outline their meaning and point out the relationships between the different tendencies.

As a general starting point, we hypothesize that the economic structure is highly important for the way social evolutions are taking place. The economic structure includes the labour market, the origins and development of collective (power) relationships, the positions of and the relations between economic and financial interest groups, the economic policies of the big corporations, etc. Starting from this economic structure, Diagram 1 is constructed. Atomization, individualization and technological development are the central concepts. Attention is also paid to the increasing possibilities of manipulation of time and space.

Without giving a strict definition of technological development, we consider this to be one of the basic conditions relevant for the atomization process. Furthermore, from Diagram 1 it appears that there exists a two-way relationship between economy and technology.

Diagram 1 The structuring Components of the Process of Relative Autonomization



It is a fundamental feature of our model that individual *and* collective perceptions of objective reality are also incorporated. It is assumed that economic relationships induce forms of social consciousness (i.e. ideological and cultural value systems and perceptions of reality) of individuals and groups of individuals. The evolution of social consciousness, however, has an impact on the evolution of the economic

structure as well as on technological development. Although largely neglected in general, the triad "social consciousness-economic structure-technological development" seems to be of crucial importance in any evaluation of assessment of the current societal transformation. Atomization of labour (or work and working) related to the tendency to organize the performance of tasks in the most rational way in order to maximize the economic functioning of agricultural, manufacturing and service industries. *Control* is very central in this context but it must be noted that atomization has a broader meaning than Braverman's (1974) disciplining of labour. It is linked more to Durkheim's analytical concept of division of labour (1973) because atomization is, like Durkheim's concept, related to the way other social phenomena (for example, social integration, law) develop. Two elements define the atomization process. On the one hand, there is an *increasing division between producer and product* and on the other hand an *increasing division between producers themselves*. This two-fold separation is attained through the specific organization of the socio-physical (mostly technological) environment and via a specialization of labour tasks into component tasks of an increasingly supervisory nature. This means that *monitoring* production processes will increasingly replace the traditional manipulation of pieces. Next to this separation between producers and product (as is already the case in the process-industry), job contents are increasingly designed to engage *relative individual responsibility* of workers who execute their work as autonomously as possible. Thus, in a totally atomized situation individual performances are easily accountable, while at the same time individual achievements depend less and less on the activities of fellow workers. Along with the atomization in the labour process, there is also good evidence to identify a tendency towards an increasing individualization in social life, partly as a result of the atomization of labour. Popular terms as individualism, me-generation, narcissism, or the French expression "mai 68, moi 86" etc., point to *some* aspects of this process but *cannot at all* be assimilated with individualization and should best be avoided in this context. What we call individualization has to be regarded as a scientific-analytical concept and is (intrinsi-cally) defined as the individualization of the *social contact and contract fields*, and not as an individual attitude. A further explana-tion is perhaps needed here.

The process of individualization is indeed not related directly to what in general is designated as, for example, the "individualism" of the Seventies and the Eighties. As opposed to the "collectivism" emphasis in the Sixties, it is being argued that a shift has occurred. Two kinds of arguments are put forward in this respect. The *first* one is based on the cultural and subcultural movements in the sixties. They were supposed to

imply a rejection of the dominant norms and value patterns in society and, to a certain extent, this was undoubtedly the case. The alternative value orientations, however, stayed on the one hand rather marginal and on the other hand (more importantly) were in no way "carried" by changes at the level of the structure of societal organization, any more than, of course, these movements could change relevant aspects of the societal structure. In this sense, it is not at all astonishing that the socio-political and (sub)cultural ideas prevalent in the Sixties could hardly take root: the "objective: socio-economic structure left little room for other than superficial and temporary movements. To contrast the current "narcissist" or "individu-al" spirit with the "collective" Sixties, is more of a commercial trick of trendy authors than a scientifically accountable analysis. Rather, we should say that individualization, as we see it, is inherent in a bureaucratized, industrial society because of the relationship between the rational organization of the labour process and the societal organization. The recent increase in information applications and automation only amplifies this historical (and continued) transformation and makes its nature somewhat more transparent than a couple of decades ago.

A *second* kind of argument which is often put forward goes back to the political-ideological meaning of the so-called opposition between individualism and collectivism. Once again, it is suggested that we are witnessing a shift towards the dominance of a liberal economic model detrimental to the collective view prevalent in the Sixties. This may be true, but the issue relates more to transformations in the macro- and meso-economic power structure (with consequences on the micro-level) in which it is difficult to see a generalized individual-voluntaristic component.

Furthermore, such an assumption is based on a totally erroneous understanding of the individualism-collectivism polarity in the political-ideological vocabulary. Macpherson (1983) has indeed convincingly demonstrated that the use of this polarity rests upon a wrong interpretation of the classic political-economic thinkers of the early industrial period and thus leads to false (or, perhaps better, irrelevant)"insights". By way of conclusion, we may say that although such concepts as (political) individualism, individualistic life-styles, narcissism - can- in some cases be consequences of ongoing societal transformations, they are not equal to the analytical-structural concept of individualization as we have defined it. The latter refers to the rationalization process characterizing industrial societies and, at the same time, to its accompanying concept of atomization. The originality of our theoretical analysis lies precisely in the hypothesized relation between the two concepts: in fact, within our analytical scheme it is not possible to consider

them separately. Both are connected with the *increasing information content* of our material and immaterial realizations and link techno-economic develop-ments with the social structure.

RELATIVE AUTONOMIZATION

Because of the two tendencies described above, we can observe in societal organization a relative autonomization of the possibilities of social interaction. The combined effects of atomization and individualization and the corresponding changes in social values and norms, create the conditions for a socio-economic environment in which the level of social functioning constantly shifts *towards smaller organizational units*. This process is called the relative autonomization trend of which the most characterizing aspect is the *growing relative independence or accountability of "lower level" organizational units*. Control by the organization and relative autonomy form the two poles of attraction of this dynamic process.

The process referred to is often called decentralization. Analytically, however, the notion of decentralization lacks precision because it says little or nothing about the *nature* of such a process.

For the theoretical reasons given above, it is thus preferable to speak of relative autonomization.

Many reasons could be given of the relative autonomization tendency. In *collective bargaining*, we observe that negotiations that were formerly conducted on a national level are now increasingly taking place at sectoral and enterprise level. This leads to a greater number of individual labour agreements whereas formerly collective agreements were the standard. In most European countries, this shift can be documented.

Also, in the broader *economic system*, we witness the unravelling of the market in a number of sub-markets often with a surprisingly high degree of independence. The hidden economy, black market, domestic economy, etc. have become more or less institutionalized as sub-systems. However, they escape any precise analysis because our economic theories cannot easily take into account the relations between the official and non-official market activities. It is a clear indication of the relative autonomous functioning of these sub-markets. In the context of this chapter, the most significant illustration of RATO is, of course, to be found on the level of the structure of enterprises.

RELATIVE AUTONOMIZATION AND ORGANIZATION STRUCTURE

Organizations tend to structure their operations increasingly around *"core", "peripheral" and "potentially external"* activities. On this subject, the literature has become more than abundant. Different concepts are used to describe these 'new' organization structures: departmentalization, decentralization, flexible firm, hollowization and parcellization among others. Again, we prefer the analytical concept of relative autonomization in order to stress underlying changes involved in this process. The essential point is that firm structures in this view depart from the traditional homogeneous, all encompassing organizational concept (with vertical hierarchies) and become networks of substructures in which different organizational functions are performed in such a way as to confer to (or impose on) smaller units a greater autonomy. The linkage between these relatively autonomous substructures is no longer of a global nature, but has a particular character in the sense that relations between substructures are limited to specific and direct interaction needs. In such organizations core activities concern those functions that are of *crucial integrative and strategic economic importance* for any organization: R/D, top and middle management, planning etc. belong to these functions. The positions connected with these activities have a relatively high degree of job security, are well paid (even under the top level), have fringe benefits, and are geographically concentrated. Individually and/or collectively negotiated full-time and long term wage contracts form the legal basis for work relations.

Around these core activities, and within this conception of the firm as a network (or a matrix), peripheral and external organizational structures exist performing the necessary functions in the most optimal way. Within the peripheral sphere (which often coincides with the relative stable part of the *production execution tasks*) we find mostly those functions which are an integral part of the production process and have to be performed on the geographically defined production site. Assembly activities connected with the (semi-)end product are often among these peripheral functions. The producers involved in these functions can be full, half, and part-time workers, or can be engaged in any other possible semi-permanent or non-permanent working schedule. External functions concern those activities which, for various reasons, at a specific moment, can be better executed *outside the main geographical production site.* Here, subcontractors, interim firms, and, of course, self employed, etc. come into the flexible production picture.

This global description and positioning of self employment in relation to the production of goods and services within an organizational context,

enables us to distinguish between common ("traditional": agricultural, craft, etc. and "new": binary information handling) and "organizational" self employment. We will explore these different types of self employment in the next section.

SELF EMPLOYMENT AND NEW FORMS OF WORK ORGANIZATION

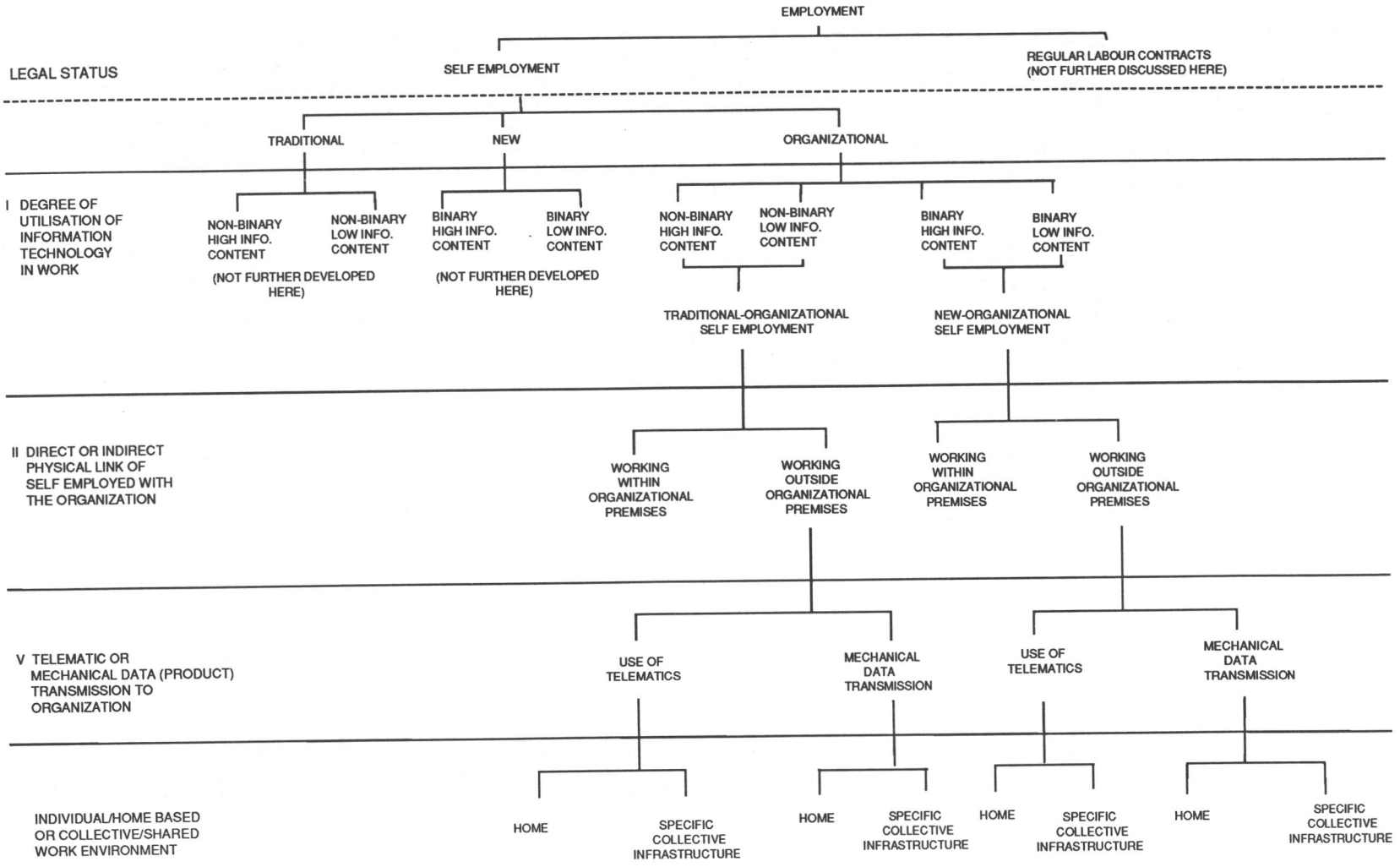
In *Diagram 2* we confront three different types of self employment with what are, in our opinion, the five basic levels regarding new concepts of work organization. In fact, this diagram gives an overview of the ideal-type possibilities to organize work. Instead of concentrating on the physical location as is usually the case (tele-, distance, homeworking, etc.), we consider this factor *as only one element* in the current restructurations of work. It is certainly an important one from the point of view of the establishment of social relations, but its socio-economics importance is heavily influenced by other circumstances than purely geographical aspects alone. In this context, we consider the dependency relations underlying the more organizational epiphenomenal aspects have to be taken as the starting point for an analytical evaluation of, for example, home and teleworking.

The *first level (or variable)* is that of the legal/contractual status under which tasks are executed. Of course, this level concerns the definition of self employment. One of the more relevant results of this approach is the conceptualization of *organizational self employment*. It is the self employment *institutionally linked with enterprises*. It is one of the expressions of the relative autonomization tendencies emerging within organizations next to subcontracting, the use of temporary work, etc. Organizational self employment is likely to increase substantially as important firms in significant branches of industry already rely on this kind of employment - insurances, banking, software production, electronics, for example. Numerous firms "offer" new employees the status of self employed where previously these employees would have had labour contracts. Also existing labour contracts an be changed into self employment contracts. (See, for example, INS 1986:91). This can be done for a very large number of different tasks.

We define, *as opposed to traditional self employment*, the *new self employment* as being characterized by binary information processing. Organizational self employment can involve a high or low utilization of information technology.

This is the *second level variable* of Diagram 2. It is interesting to note that shifts from traditional (farmers, lawyers) to new self employment can be conceived of and can be assessed by this concept of information

DIAGRAM 2: FORMS OF SELF EMPLOYMENT IN RELATION TO FIVE CRUCIAL VARIABLES



content (for example, the relation between traditional farming and new biotechnolo-gical farming).

For the three variables we next introduce, we will discuss mostly the *organizational* self employment because of the more relevant and illustrative nature as far as these variables are concerned. However, it is conceivable that also forms of the *new* self employment can be connected with the three variables.

Taking into account the *next variable* (link with the organization) self employment can occur within and outside the firm. Within the organization there is little formal difference with employers under regular labour contracts (except, of course, for this important contractual aspect). Individuals who are self employed and working within the organization (as a physically located entity) mostly function under similar working conditions as regular employees, although the patterns of integration and the way solidarities with fellow employees are constructed can be very different. We have mentioned already that this kind of use of the labour force tends to increase and can be considered as one of the most important (that means fundamentally restructuring labour-capital relations) social innovations.

The *fourth variable* we have introduced concerns the way data transmission is integrated into the internal communities/production system of the firm. In general, this can be done mechanically (a financial report on diskette can be mailed; a technical drawing of an air pump can be brought to the firm) of telematically (from an individual home computer via a modem to the computer system of the organization or via a telefax system.

The *last element* we need to define the field of new forms of work (and self employment) is connected to the physical place where the job is executed. Again, we do not have to consider those who are self employed within the firm since their work location is integrated in the collective workplace. As suggested in Diagram 2, level V takes into account the environmental dimension of the organization/information flow chart presented in that diagram. Most of the organizational self employed (but also the traditional and new self employed) will work at home, at least in the beginning of such an evolution. Specific infrastructure can, however, be set up by private of public bodies where the self employed can share tools and instruments, computer hardware and software, etc. Info centers, neighbourhood offices, satellites, etc. are thus the alternative between work within an organization and home working.

This five dimensional interpretation scheme permits -a more systematic analysis- of forms of work which have been described until now under such heading as telework and distance working (FOP nr. 117,

Holti and Stern, 1986) because it relates coherently one to another the major defining elements of work as a social economic interaction process.

TOWARDS A DEFINITION OF SELF EMPLOYMENT

The main message underlying the above remarks is that technological, organizational and social transformation cannot be disassociated. In the context of self employment, the principal dimension concerning these broader societal transformation can be translated into three questions. C. Handy (1985: 69-79) thus considers that future society is confronted with the following alternatives:

- wages or fees,
- tools or dials,
- trains or terminals.

All these options point to or are connected with the relative autonomy tendency illustrated previously, as far as self employment is concerned. Now we will use them to lead us to a definition of self employment.

Income from Fees

The first of Handy's options we mentioned ("wages or fees") is of a most unambiguous nature. We can easily see that in the case of self employment -as a definition-, financial rewards must be based on fees rather than on wages. In other words, if people are, in general, paid for a certain time spend producing goods or services in the context of a particular legal contract, this is mostly not so for self employment. Only when income is directly and totally related to the quantity and quality of the production of goods and services *by means of fees* we can speak of self employment.

Computer Data Processing

The second of the options ("tools or dials") refers to the well known distinction between tools and machines. Tools have little information content: they are instruments that assist us in accomplishing tasks. Machines, on the other hand, perform functions that were previously done by people and have a higher information content. Summarizing the main argument with respect to this evolution, we can say that some of the information needed to execute certain tasks, or produce goods or services, is no longer "human" but is "put into the machine". More and more sophisticated machines take over more and more human functions, thus

limiting human intervention mostly to supervising monitors ("dials"). We have to define the notion of "dials" somewhat more clearly. We propose that *all data processing* where computer software and hardware is used (in other words automated binary data processing) should be considered here. This means that two different types of involvement are possible. We can, grosso modo, differentiate between binary data processing on an execution level and binary data processing where a high degree of information content handling is involved. An example of the first case, as far as independent work involved, is the self employed secretary using a word processing unit or a farmer assisted by computerized food and other schedules and monitoring devices. The second type of self employment, where a high level of information content handling is needed, is the case of an independent system integrator harmonizing an AVG system in one factory assembly department and the supplying of parts managed by the stock department. Both examples are types of *new self employment* as opposed to traditio-nal employment.

Organizational Link

The last choice ("trains or terminals") is of a more diffuse nature as far as self employment is concerned. Of course, "trains" refer here to the traditional way of producing goods and services in geographically concentrated organizational units where people have to go in order to perform the tasks they are paid for. It is certainly the dominant way of organizing economic activities. To a certain extent, communication technology allows for people to work at home because a lot of jobs are basically done at terminals and monitors ("dials") or can be redesigned to do so: these terminals can be as easily located centrally in the firm as at home. Many reports are already available on the possibilities of home working (e.g. FOP 177).

There is, however, *no necessary identity* between home working and self employment since many examples of home working reveal only a relatively autonomized conception of the production organization without any major changes on the level of the labour contracts.

In only one major example of a home working type of organization, F-International, a U.K.-based software company, out of 850 employed people (nearly all of them women), 700 are self employed but at present this seems to be an exception to the norm, both in ratio and numbers involved.

Diagram 3: The Relation between the Three Forms of Self Employment

TRADITIONAL		NEW	
Non-binary Information Processing		Binary Information Processing	
Low Info. Content	High Info. Content	Execution Functions	Data Trans-formation
A	B	C	D
A'	B'	C'	D'
TRADITIONAL ORGANIZATIONAL		NEW ORGANIZATIONAL	

On the other hand, self employment is not necessarily done at home. All kinds of independent advisory and expert work need, at least part of the time, a presence on the spot, be it the shop floor or elsewhere. We have furthermore already pointed out that regular full time labour contracts can be transformed into self employment positions executed, as before, inside the collective production unit. The conclusion clearly is that traditional, as well as new self employment, can be organized in very different geographical situations ranging from the home, collective working arrangements, to the firm. *If self employment is linked with the production process of one particular firm* (as is often the case), we speak of *organizational self employment* independent of the locus of the self employment activities. Summarizing the different defining elements we can, as visualized in *Diagram 3*, distinguish between traditional (A and B), new (C and D), and organizational (traditional) self employment (A' and B') and organizational (new) self employment (C' and D').

CONCLUSION

One of the consequences of *RATO (the relative autonomization tendency in/of organizations)* is the integration of self employed workers with global production organizations. In order to qualify some of the changes in the organization of work and employment, we distinguish between *traditional, new and organizational self employment.* In the context of this chapter we emphasized mostly the third one. Using five criteria (and combining them with the different forms of self employment) we could construct a typology representing the principal relations between the nature of the execution of work and the

organizational structure in which the work is executed. The *five criteria or variables* determining the work organization are:

- the legal status under which work is executed (self employment on labour contract);
- the degree of utilization of information technology;
- the physical link (direct or indirect) of (self) employed with the organization;
- the nature of data/product transmission to the organization (telematically of mechanically);
- the organization of the work environment (individual/home based or collective/shared).

Probably the most profound issue emerging in relation to the restructuration process of the work environment described above, concerns the way people are (subjectively and objectively) connected to each other, the organization and global society. In other words we are touching here upon *social solidarity/integration patterns* and, more specifically, how they are affected by RATO. Without going into further details, we expect that a quite different type of social solidarity will develop along with the dominant type of collective solidarity in industrial society. The growing importance of network structures implied by RATO in all subsystems of society (with the emphasis on interlinking interaction patterns instead of globalizing ones) becomes the basic feature of societal and work organizations. This tendency is largely responsible for the shift in social cohesion models we are witnessing. Elaborating on Durkheim it is indeed possible to hypothesize that the forms of collective solidarity, characteristic for the global industrial-production organization model of society, are more and more outplaced by *selective solidarities* in meta-industrial society. The organization of social integration in such circumstances might well be the core problem future society is facing.

*) This contribution is based on J. Vilrokx, Self Employment in Europe as a From of Relative Autonomy: Significance and prospects, Brussels, EC/FAST, 1987.
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INDEX

Literature on the development of new technologies highlights to a great extent alterations of the industrial structure, the labour relations and interrelations of firms, especially whore the span of control of organizations and the labour process are concerned. It is said that new information-technology enables concentration and centralization even beyond the firm. According to these statements the position and role of small and medium sized enterprises (SME) and self-employed will be more dependent on larger structures. On the other hand research has made it evident that more decentralized control-structures are emerging from the use of modern technologies. Furthermore, the attention for small scale job creation and self-employment is increasing, supposedly caused by the growing "alternative" need for more autonomous, independent, self-reliant work. The debate concentrates on the meaning of independence and autonomy in the quality of working life in relation to industrial restructuring and new forms of work organisation.

This volume highlights several topics in this debate. The contributors from different European countries focus on subjects like the role of SME in European Communities social and economic policy; smalltech - human touch, investigating if there is a special technology in which small enterprises are competitive; autonomy and hierarchy in industrial organisation and on the labour market; the technological administrative task environment of small enterprises; autonomy and flexibility of small enterprises; work autonomy in small enterprises; women and independent work; worker cooperatives and technology; and future perspectives: small enterprises and industrial organisation; relative autonomy and new forms of work organisation.

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