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Social images of modernization and technological change: two commentaries

In 1989 and 1990, the ECLAC Social Development Division carried out a study in five Latin American countries –Argentina, Bolivia, Brazil, Chile and Ecuador– on the social images of modernization and technological change. Six companies were selected in each country, taking care to include among them State enterprises, domestically-owned private companies and foreign-owned private companies. Care was also taken to ensure that the companies represented a range of economic activities: manufacturing, mining, agriculture, services and transport. In each company, interviews were held with the entrepreneurial side, an engineer or technician, and union leaders. As a result, it was possible to identify some items and aspects which may be of importance.

An analysis of the results of this study was published by the Social Development Division in January 1991 under the title “Imágenes sociales de la modernización y la transformación tecnológica” (LC/R.971).

This article presents the comments by Enzo Faletto and Carlos Filgueira on this study. The text of these comments is based on the presentations made by the two authors at a seminar on this subject organized by the Division from 25 to 27 March 1991.

Social images of technological change Enzo Faletto*

I. Innovation and styles of development

In the Latin American political and economic debate, there is general agreement that the main challenge facing the region is that of revitalizing its economic development in order to begin to overcome the adverse conditions which caused the 1980s to be termed “the lost decade”. This objective has to be pursued, however, at a time of profound world changes in which the great economic, social and political blocs which emerged after the Second World War have been completely re-defined and have evolved into other groupings –not yet fully defined but nevertheless possible to foresee in their broad lines– such as the Asian bloc, led

by Japan; the European bloc, which may possibly expand eastwards; and the North American bloc: Canada, the United States and Mexico, with the gradual selective incorporation of other Central American and South American countries. The biggest question marks hang over much of Africa, substantial areas of Asia –especially China and India, whose almost continental size must not be forgotten– and many of the Latin American countries. It must also be noted that, as most of the specialists point out, these blocs will not be built up as closed autonomous entities, but will be linked with each other and will tend to predominate over the others in certain production, financial or services functions.

This is not the appropriate place to refer to the current political changes, which are covered extensively in the daily press. What should be noted is

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that the geopolitical and geoeconomic changes which are taking place coincide with a process of profound technological change affecting the development of what used to be called the forces of production: that is to say, not only the means of production but also the social forms in which this is carried out.

Consequently, it would not be overbold to say that in one way or another the Latin American countries are virtually obliged to reformulate their development schemes. In order to do this, they must face up to the task of embarking on a broad process of changes in production patterns, within which there can be no doubt that technological change in its broadest sense –i.e., change in both the means and forms of production– is an indispensable requirement.

It has also been stated, however –for example, in the current ECLAC proposal– that the objective of changing production patterns must be accompanied by others, such as the achievement of greater social equity, since in this respect the region displays marked degrees of social inequality in comparative terms, outstanding features in this being the tendency towards the concentration of wealth and the exclusion of considerable sectors of the population. The ECLAC proposal also maintains that the process of changing production patterns must be accompanied by the consolidation of the democratization processes that are taking place in the region.

These objectives naturally give rise to a number of queries which call for dialogue and debate. One of these is directly linked with the objective of undertaking a broad process of change in production patterns. From the sociological standpoint, the problem is posed in terms of the verification of the social capacity for innovation; in this respect, Schumpeter's theories on the role of the entrepreneur as innovator immediately come to mind: a role which could be played by private or public entrepreneurs. It is also well known, however, that no matter how important the role of the entrepreneur may be in this field, innovation is not confined to entrepreneurs. Other social groups or agents also play a role in this respect: public figures, government agents, engineers and technicians, manual and non-manual workers, and many others. Moreover, innovation is not a process which is limited to the purely economic sphere, since political and cultural factors are of the great

test importance in order for it to take place. Consequently, it is generally preferred now to talk about the systemic nature of innovation processes, emphasizing through the use of this term the fact that it is society as a whole which is the true agent of this process and that although the initiative of some particular group may give rise to a spurt of innovation, the full development of the process will depend on the conditions offered by the totality of the society in which it is taking place.

Consequently, innovation takes place in a historical and social context which makes it possible, conditions it or hinders it, and the determination of this context may be essential in order to understand the possibilities of the innovation process.

Naturally, if our main concern is with the Latin American countries, we cannot but acknowledge the big differences that exist among them, both in their economic structure and in their particular historical, political and social features. Some general features which call for special reflection are usually singled out, however. One of these is the well-known structural heterogeneity of the countries of the region. This is reflected in profound social differences which not only imply very different possibilities of access to the benefits of development but are also reflected in unequal possibilities of acquiring knowledge and obtaining the skills deriving from it. In this respect, the region has lengthy past experience: in spite of the undeniable achievements in certain fields, it has not been possible to overcome this heterogeneity, and in many cases it has even got worse. What, then, can be expected from the technological innovation process which is underway? Will it be possible to correct past experience, or will this heterogeneity be still further accentuated? What does the most recent experience in this respect indicate? The repercussions that such facts will have on the possibility of achieving the objectives of social equity and the full functioning of a democratic system are clearly evident.

An item which is closely linked with the foregoing is that of the extent to which the process of change is endogenous or exogenous. It is not just a question in this case of defending an urge for originality in the innovation process. The topic is a controversial one, and there has been quite longstanding controversy in this respect in Latin America (one of the most recent examples of this was the discussion on informatics in Brazil). Some more

general comments are called for on the endogenous or exogenous nature of innovations, however. It is well known that technology is normally designed in the light of the needs and demands of the society in which it originates, and these do not necessarily coincide with those of a different recipient society. This often leads to the introduction of still greater distortions in the structural and social heterogeneity already referred to, thus giving rise to a "modern sector" which satisfies the demands of the small population group in which wealth is concentrated but does not seek to meet the demands of the much more numerous but much poorer sectors. It will readily be understood that when the process is excessively exogenous, this further aggravates the dependence of our nations on the countries which act as the centre in these matters.

Another point of interest in the subject under discussion—different from the foregoing considerations in some respects but not unconnected with them, since to some extent it incorporates them—concerns important patterns of social conduct. It is well known that in the years following the Second World War the question of industrialization gave rise to an extensive debate in most of our countries, and it has even been said that whole new ideologies grew up with regard to this process. It would be interesting to know if something like an "ideology of technological change" is now taking shape, or rather, whether there are different ideological options with respect to it. If such options do exist, then the question arises of what their main elements are and what tendencies they stress; who the possible supporters of these options are, and what differences there are between them; what the points of conflict and consensus are, and what interests are reflected by the various actors in the process of technological change and the new modernization. The fact that such ideologies exist, although they may not be clearly defined, is the reason why the phenomenon in question may be viewed as a social process.

It should be stressed, however, that what is involved is largely a modernization process which is still underway and which, although it may not perhaps yet have reached the level of intensity attained in other parts of the world, is nevertheless significant. This modernization process naturally creates possibilities, but it also generates conflicts, which already exist to some extent. How will our societies behave in the presence of these possible conflicts?

There are some items which have a strong impact on the objectives of equity and democratization. If these objectives are to become a reality, they cannot be simply added on to the economic objectives. Their full validity will depend largely on their being incorporated into economic life itself, and there are naturally many difficulties standing in the way of this.

We live in societies where the masses are very prominent. Do these masses enjoy access to the knowledge and skills which will enable them to participate in tasks connected with the management of the economy and society, however? If not, then we are living in mass societies which are actually run by a relatively small élite.

The question therefore arises of whether the new technology—understood in the sense not only of new machines but also new forms of organization and management: in short, a new social division of labour—favours only a few, incorporating them in a highly positive manner but reducing the others to a passive role.

The existing literature on this subject shows that the new technology—whether instrumental or connected with organization and management—has not yet clearly defined its predominant orientation, but what does seem to be certain is that to a large extent everything will depend on the social use made of the technology. In other words: the so-called "scientific nature" of the new technology is emphasized, but this may mean in practice that the form of work may be imposed from outside on those who carry it out. It is the machine itself which incorporates within it the way of carrying out the work. The really important part, which requires creative capacity, is the programming of the machine. Who has the chance to do that programming, and who has not?

In many cases, the new technologies have meant that "know-how" is no longer a quality of those who do the work: reference has even been made to the "expropriation" of the worker's knowledge, which is now incorporated in the machine. What is at stake here is the cultural significance of labour: an item of extraordinary importance in shaping the social identity of groups and hence defining their role in society. Naturally the subjects of equity and democracy are closely related with the foregoing: if the masses have no chance to participate and are condemned to a passive role, this takes away all the substantive content of democ-

racy and means that equity –or the search for it– is determined only by the possibilities for gaining access to consumption.

It was noted earlier that equity and democracy are objectives which must be made a reality within economic life itself: in this respect it must be borne in mind that there is a well-defined institution where work usually takes place: namely, the enterprise. This is at once a technical system, an economic system and an administrative system. The enterprise combines functional organization with differentiation of spheres of authority. The foundation for all this is what is known as the social division of labour, and the most visible form which this assumes is the separation between an order and its execution. Consequently, from the sociological point of view the enterprise is also obviously a power system.

The new technologies –and above all the organizational technologies– affect the functioning of the enterprise as a system, so that what is involved today is not just a more efficient organizational model, but also forms of power, that is to say, forms and capacity of control over the technical, economic and administrative aspects of the enterprise. This affects both the definition of spheres of competence at the management level and the relations established between management, those responsible for supervising the execution of work, and manual and non-manual workers. Consequently, the new technologies redefine the levels of participation in the establishment of objectives and the determination of the means of attaining them. To put this in more traditional language: the new technology may lead to redefinition of the relations between capital and labour, with obvious repercussions on society as regards equity and democracy.

Naturally, not everything takes place at the level of the plant or enterprise. In the new social relations established, important roles are also played by legislation, definition of the role of the State, the entrepreneurs and the trade unions, and even the possible forms of ownership and its exercise.

It would be easy to go on at greater length with regard to various aspects of the repercussions of modernization and technological change, but it is sufficient at this point to stress that we are not talk-

ing about technological change in the narrow sense, but rather a type of change which has wide-ranging repercussions that raise the question of a global development strategy: to use the traditional terms employed by ECLAC, what we are dealing with are alternative styles of development.

II. Views and attitudes of the entrepreneurs¹

For almost all entrepreneurs –as one of them remarked– modernization is one of the facts of everyday life, so that it is more or less unavoidable. The fact that there may be opposition to it –not only in entrepreneurial circles but in society as a whole– is therefore probably merely the expression of a conservative mentality or the result of prejudice. It is necessary to place this view on record because, as we shall see, it influences entrepreneurial attitudes to trade unions or workers who may express critical views on the way in which “modernization” is taking place.

Entrepreneurs identify themselves with the modernization process and often define themselves as “men with a mission of change”. In the process of innovation, of which they consider themselves to be important agents, they display two fundamental features: the capacity to break with present practices and the capacity to adapt to what is taking place in the outside world. In other words, it is a question of casting aside traditional ways and, implicitly, assuming that the model of modernity is already in place in the countries which they consider to be most highly developed.

With regard to the possible impact of modernization on society as a whole, they believe that the new technologies will raise the general standard of living, which they ascribe to increased productivity and efficiency. It is interesting to note that two items which are objectives at the enterprise level –productivity and efficiency– are also considered important elements in what might be called the success of society itself.

Entrepreneurs say that they need certain global conditions in order to be able to take the right deci-

¹The term “entrepreneur” is used here in a very broad sense. It is not restricted to the owner of the enterprise, but includes the upper-level management too.

sions on technological investment. They consider the political and economic stability of the country to be primordial in this respect, since they seek factors of security which will guarantee their investments. They also consider that a climate of growth is necessary, since in its absence there would be limits on the possible development of the enterprise. They also think that in the absence of economic growth technological innovation could even have negative effects by causing unemployment among those workers not absorbed by expansion of the economy. It could therefore be said that there are three fundamental conditions which entrepreneurs consider to be necessary for promoting technological development and modernization: stability, growth, and a guarantee of relative security for investments.

There is another factor which is perhaps the most important of all in the search for technological innovation by entrepreneurs, however. They feel that if they do not modernize their activities they will not be able to compete in the market, especially the external market to which most of them aspire. This widespread desire to establish links with the external market influences the type of technological development chosen in various ways. Entrepreneurs believe that in the external market the patterns are already defined and that the technology to be used is to some extent already imposed by a system of international production which has already fixed the patterns for the various processes. They therefore see the possibilities for domestic technological development as being very limited.

They also consider that incorporation into the external market obliges them to pay great attention to the quality of their products, and that this quality can be ensured through the new technologies. Most of them have doubts about the possibility of developing their own technologies: in the words of one of them, "it's no use trying to reinvent the wheel". What they are looking for are ways to secure good forms of transfer of new technology, while making the best possible use of existing techniques. These views lead them to attach great importance to association with foreign firms or enterprises, since they consider that the most important contribution by the latter is precisely their technological capacity.

Likewise, entrepreneurs are not very optimistic either about the possibility of developing scientific

and technological research within their own countries. In many cases, they justify this view by referring to the shaky economic condition of the country or the lack of sufficient capital to cover the heavy investments which they say would be required in order to implement an autonomous technological research policy. They also tend to consider that the research itself—such as that carried out in the universities—would be of an abstract nature and therefore of little practical use.

If we look at the image that entrepreneurs have of the various agents taking part in the process of modernization and technological innovation—such as the role of the State *vis-à-vis* private enterprise—we see that there is not in fact a single "entrepreneurial ideology" on this topic, as may sometimes have been assumed. This is partly due, of course, to the fact that in this study we also consulted public entrepreneurs, but in fact the diversity of views goes beyond this factor. Quite often, one and the same entrepreneur expresses favourable views on State action in some aspects and favourable opinions on the action of private enterprise in others. The tasks which entrepreneurs feel should be carried out by the State are mainly those of promoting development, creating infrastructure, and to some extent defining development strategies and priorities.

The above image should be contrasted with the idea that many entrepreneurs have of their option as entrepreneurs in the field of technology. As already noted, they feel that the most viable course is the adoption of existing technology, and although they do not deny the possibility that a global technological development policy may be justified, they consider that such development is the responsibility of the State and not of the business world. With regard to the question of State action, it may be said that entrepreneurs try as far as possible to separate the spheres of competence of the enterprise and the State.

With regard to the image of the various agents connected with the innovation process within the enterprise, it is interesting to note the image that entrepreneurs have of themselves in respect of these items. Quite often, they mention the persistence of traditional approaches among entrepreneurs as a whole and contrast this with the need to seek greater technical competence and efficiency. They consider that the main responsibility of entrepreneurs is to ensure the success of their enter-

prises, and that achieving such success is also a social responsibility.

They believe that the new technologies spread much more than just information, in that they change the forms of management and call for greater participation, but they strongly demand, as a basic attribute of entrepreneurs, the right to take their own decisions, especially with regard to investments and the orientation of the enterprise's activity.

With regard to engineers and technicians, the entrepreneurs consider that these specialists will be increasingly important in the enterprise as a whole as technological development advances, and that the role they currently play is almost that of promoters of the new technologies. Because of this, they believe that changes could take place in the structure of command, meaning a redefinition of the current forms of authority.

With regard to the workers, the entrepreneurs generally consider that the new technologies operate in their favour by reducing the need for physical effort and offering them the possibility of gaining new skills. With regard to the latter topic, most entrepreneurs are in favour of the diversification of jobs rather than restriction to a single task, and they consider that the new technologies both require and permit this. They also believe that in the immediate future one of the most important groups within the enterprise will be that of the technically skilled workers.

The entrepreneurs insist that the aim of introducing new technologies is not to eliminate the need for labour, but to improve the quality of production. They acknowledge that there may be problems with the older workers whose traditional skills may become obsolete, and for this reason many entrepreneurs see a close relationship between technological renewal and renewal of the labour force, although of course they do not rule out the possibility of retraining. Once again, however, the problem is with the older workers, whose skills, they feel, are more fossilized.

The entrepreneurs see their biggest problems in their relations with the trade unions. The most controversial issue is that of the degree of control that the trade unions can exert on the labour market. They are fully aware that most of the problems in the area in question derive from the trade unions' fears that the new technology will be used to save labour.

The entrepreneurs' preferences are for a type of trade union of a primarily professional nature. They would like the discussions with the unions on the subject of "modernization" to be kept on a strictly technical level. As in the case of the functions of the State, the entrepreneurs also try to determine clearly what they feel should be the entrepreneurial function and what should be that of the unions, and they reserve for themselves the right to take decisions on the running of the enterprise. Their views could be summed up in the words of one of the entrepreneurs interviewed: "in an organization or enterprise there are different estates or functional groups with different functions which are perfectly well known. Once this is accepted we can begin to talk".

III. The images held by engineers and technicians

Engineers and technicians define themselves as possessors of knowledge: in their view, it is they—almost by definition—who have the necessary technical knowledge. In the interviews it was clear that they feel real enthusiasm for the new technologies, although differences were sometimes observed, especially between those directly connected with production and those connected rather with service activities. Among the former, the attraction of novelty is very strong, but among those carrying out service functions there is sometimes a feeling that the new machines are taking over functions which previously belonged to them, especially in the case of the taking of certain decisions (as for example the taking of decisions on discounts, collection and transactions in the banking sector). In almost all cases, however, whatever the activity involved, there is a high degree of identification with their work as engineers or technicians, and they feel to some extent responsible for the functioning of the whole system.

In the light of this positive image of their own role, some of those interviewed referred to the structure of authority in the enterprise, especially when that structure is of an excessively vertical nature, indicating the need for greater participation in decisions, which they considered to be justified by their special mastery of the technological aspects.

It is interesting to note that some of them –not necessarily the majority– consider that this enthusiasm for technology, which they see as a generalized feature of modern society and not just of their own group, may in certain respects be a source of distortion. These technicians feel that the advances made or the systems and methods introduced are not in keeping with the environment and therefore generate poles of development which benefit certain minorities. Those who hold this view consider that the present manner of training engineers and technicians has a technocratic slant biased towards individualism and the paramount importance of efficiency, and that it lacks a suitable social component.

The image they have of the technological development process currently underway tends to be a positive one. Many of them even feel a certain compulsion to incorporate themselves into the existing technological development, and a phrase which is frequently used is the need “not to remain behind”.

The model of the most highly developed countries seems to them almost inevitable, and they consider that it must be followed. It should be noted, however, that they draw a certain distinction between the acceptance of technology as an instrument and the objectives to be attained through it. Thus, their objectives often include certain notions of national development, especially that of achieving “national production”.

These ideas are more typical of those engineers and technicians who have a certain image of “public service” in their work, regardless of whether they are employed in the public or private sector. Others, however, only see modernization from the more limited viewpoint of a single enterprise.

When their ambition is that modernization should assume a more global character, they propose that an objective of this type should be formulated at the institutional level. The idea of the social function of certain activities is an important element which justifies an active role by the State, in the eyes of those who hold this view. Thus, they consider that the State should promote technological development by encouraging research, science and general education and should even take concrete economic actions to this end. It is therefore

not surprising that many hold the view that the State should exercise a global planning function.

With regard to the role they assign to the entrepreneurs, they feel that an important element in entrepreneurial functions is the incorporation of innovations, breaking with traditional forms of behaviour, and the formation of an “enterprise culture”. They often feel that the enterprise should fulfil an economic function in terms of national objectives, however. In the real forms of conduct which are most frequent today, they see the predominance of a strictly economic attitude and an individualistic approach. Even so, however, most of them believe that the power to make decisions is a basic function of the entrepreneur.

With regard to the endogenous or exogenous nature of technology, they take it for granted that most of it is exogenous and that in practice there is considerable dependence on suppliers, but at the same time, the idea of seeking self-sufficiency in this respect seems to them to be out of date and not justified in terms of costs and benefits. Autonomous technological development seems to them to be very difficult to attain, and they note that this is at least partly due to certain domestic shortcomings of our countries, including the weakness of private enterprises, the absence of incentives for research at both the global level and within the enterprises themselves, and even a relative lack of interest on the part of engineers and technicians. Nevertheless, they believe that an effort should be made in this direction, and they consider it desirable to establish a national technological development programme and develop the capacity of the universities in this field.

With regard to the significance of technological development at the enterprise level, they coincide with the entrepreneurs in emphasizing the objectives of competitiveness and productivity.

As far as the relationship between the new technology and the labour force is concerned, they consider that the workers of our countries have some good qualities, such as adaptability and even a certain capacity for innovation. They feel, however, that the workers often do not have much motivation for entering enthusiastically into the process of modernization and technological innovation. They are conscious that the workers do not influence the decisions on the use of new

technologies, and that generally they have very little participation in these matters.

With regard to the effects that the use of new technologies could have on the labour force, they feel that these technologies are favourable to the workers, pointing in particular to the possibility of gaining new skills. They see some resistance among the older workers, but they consider that generally such resistance is due to lack of information and to the fact that the workers are not appropriately compensated in line with the benefits that technological modernization brings to the entrepreneur.

As already noted, most of the engineers and technicians have a very favourable attitude to technological modernization, but in service activities or activities which are not directly concerned with production, such as in banking, the technicians noted that there is a tendency to bring down the level of skills of the staff and that they are replaced in their functions by machines such as cash dispensers.

As far as the problem of employment is concerned, some of them feel that with the new technologies there are actually greater possibilities of growth and hence of absorption of unemployed workers, but others consider that unemployment is almost inevitable as a result of the use of the new technologies and that the only way out is to seek some other form of compensation.

With regard to their views on the trade unions, they consider these to be valid instruments but tend to disagree with the specific ways in which they carry out their activities. They have particular misgivings about the question of politics in the trade unions, and most of them would prefer to see the unions operating on a purely professional and corporative level. They hold this view both with respect to unions for manual workers and their own trade union organizations, if these exist. Some of those interviewed, however, consider that the process of modernization will bring with it a certain degree of participation by the trade unions in the more global issues of the enterprise, so that their function will not be limited only to immediate demands. However, they consider that the manual workers' trade unions are not currently equipped to engage in discussions in the technological area.

IV. The views of trade union leaders

It was among the trade union leaders of the enterprises surveyed that the greatest doubts regarding the new technologies were expressed. The crux of their attitude is that they contrast their social position as a workers' group with what has been called "modernity". As a trade union leader pithily said: "yes, we are trendy, but we are not modern". The problem, for many of them, is the way the possible benefits of technological development are distributed. Some of them consider that technological development, as it is currently taking place, is reflected mainly in an increase in the power of those groups which already possess it.

With regard to the effects of the new technologies on the labour force, the union leaders point to the existence of a high degree of instability due to a constant process of change; the tendency towards reduction of the manual labour force; and the fact that although less physical effort is required (which is considered a positive aspect) other kinds of occupational health problems have arisen. The fear of unemployment due to technological change is a recurrent theme mentioned in almost all the interviews.

It is important to note that all those interviewed usually expressed both positive and negative views on the new technologies. Among the advantages, it is noted that these technologies give rise to a certain amount of interest among workers in improving their skills, which is considered positive, and it is likewise mentioned that they give rise to an interest in assuming new responsibilities, while it is also considered that in some cases they make it possible to use new forms of knowledge which open up fresh work prospects. Among the disadvantages, reference is made to the tendency towards a heavier workload in terms of speed, pressure and other similar aspects; an increase in the workers' responsibility, because they are using very expensive equipment, and—in almost all interviews—the existence of new occupational diseases.

In many cases, positive views of the new technologies expressed by union leaders are connected with some degree of identification with the objectives of the company, such as achieving higher quality. They often note that the technologies allow the workers to be more efficient, which is not the case when old and outdated machinery is used.

With regard to the question of skills, they also express both positive and negative views, such as the idea that unless workers are given a chance to take part in the programming of machinery, the use of a programmed machine may turn them into mere button-pushers. Many workers have an image of loss of skills: one of them expressed this in the words: "it's true that there is less effort, but what kind of a job is this?".

With regard to the new forms of organization of labour, they express various critical opinions. They frequently refer to the breakdown in the exchange of knowledge and experience among workers in the course of their daily work. Naturally, in these attitudes there are differences which depend on the real degree of incorporation of the workers into the new technologies (for example, those who have already been incorporated into them have a certain feeling of privilege compared with those who are not in this position). In direct relation with the foregoing, there is a very widespread idea that a significant separation is taking place between those who have access to the new skills and those who are losing their skills. This loss of skills may even take place in occupations which were previously considered highly skilled, such as turners and toolmakers.

In view of the foregoing, it is very important to union leaders that new patterns of skills should be worked out in line with the new technologies. Likewise, they emphasize that there is a big demand for training, and they demand greater access to knowledge. It is not only a question of knowing how to do something, they say, but rather of knowing why one is doing it. The most generally held opinion among labour leaders interviewed is that most of the enterprises or other institutions do not have suitable training facilities which allow workers to face up to technological change in a positive manner.

The foregoing does not mean that they reject the new technology, however, but rather that they have a clear image in their minds of what the technology should be. What the trade union leaders interviewed wanted is that technology should be oriented towards society—that it should play a leading part in improving education, medicine, transport, etc.—and they also want the power given by technology to be democratized. This attitude may be influenced by the fact that those

interviewed were trade union leaders, but at all events it is interesting to note that it exists.

Naturally, there are also more specific demands connected with the sphere of the enterprise itself, including participation in the benefits of the increased productivity that the new technologies can bring, security of employment, and a higher degree of humanization of work through the new technologies. The question of working conditions is considered to be of the greatest importance.

The majority of the trade union leaders tend to be critical of the way they feel technology has been handled by the entrepreneurs. They consider that the latter have concentrated the modernization process in their own hands and the workers have been left on the sidelines of the decisions taken. They take the view that the benefits of modernization are favouring almost exclusively the entrepreneurs, and they do not see any real modernization of labour relations. Specifically, they perceive that there is great interest on the part of the entrepreneurs in improving technology, but not in modernizing labour relations.

They are also conscious of some shortcomings on their own side, however, and they therefore want more training on this issue and its implications, both for workers and for union leaders themselves, for which purpose it is necessary that the latter should change their traditional form of behaviour and try, for example, as some of them suggest, to participate in the formulation of a national technology policy.

They consider that the issue of technology has been absent from the discussions at the grass-roots trade union level, and they note that the precarious economic situation of the workers makes it more difficult to arouse interest in this issue, since it does not seem so important to them as that of wages.

Finally, it should be noted that most of the trade union leaders interviewed assign considerable importance to the role of the State in these matters: they consider that it should guarantee the fulfillment of national objectives in the formulation of a development policy, and they perceive that State action could ensure better distribution of the benefits of technological development. For this reason, the preferred image they have of the latter is that of endogenous technological development in which global interests predominate.

V. Some general observations

By its very nature, the study carried out does not allow of definitive conclusions, but it is not unreasonable to highlight some of the features emerging from it. Both among entrepreneurs and among engineers and technicians, there is a certain identification with the technological change underway, which is taken as an indicator of the degree of modernization of society.

Thus, both entrepreneurs and engineers and technicians feel identified with the process. The former consider themselves to be agents of such change, because through their economic function they are helping to modernize society, while the latter tend to consider that they are among the main personalities of the "new society" because of the type of knowledge they possess. In contrast, trade union leaders –although not rejecting modernization and technological change– express greater doubts about the specific form these developments are taking.

In their views on modernization and technological change, the entrepreneurs predominantly take an attitude which could be called "enterprise-oriented". The same attitude is also found among engineers and technicians, although they quite often express more global views, such as the need for national technological development aimed at objectives of this nature. The views of trade union leaders, for their part, are often conditioned by the potential that technology may have for satisfying certain broad social demands and improving living conditions, while they are also naturally strongly influenced by the fear of adverse effects such as possible unemployment, the loss of acquired skills, deterioration of working conditions, etc.

The incorporation of new technologies is considered to be an absolute necessity by entrepreneurs, since they see in it a way of increasing their competitiveness, especially if they are thinking of entering the external market. Achieving greater efficiency, higher quality and more competitiveness in the enterprises is also prominent among the views of engineers and technicians. For many trade union leaders, however, the acceptance of these objectives is strongly dependent upon the possibility of sharing in the benefits obtained by the enterprise.

The idea of advancing towards modernity, which also means entering the international market, causes entrepreneurs to have many doubts about the possibilities of promoting technological development of an endogenous nature. As well as pointing to domestic difficulties in doing this, they feel that the model has already been set and that true technological development takes place above all in the central countries. Engineers and technicians also see the incorporation of the advances made in the more highly developed countries as inevitable, but they have greater expectations with regard to the possibilities for domestic technological development. Among trade union leaders, the idea that technological development should be more closely adapted to national conditions is more widely held.

To a certain extent, the topic of the role of the State is conditioned by the foregoing: trade union leaders tend to see in the State a possibility for ensuring that technological development satisfies their social demands of a general nature (living standards) or of a more specific character (employment, training, etc.). In some cases, engineers and technicians feel that the State should play a more forceful role in planning and promoting technological development aimed at national development objectives. The entrepreneurs, in contrast, are interested rather in defining the respective areas of competence of the State and private enterprise in this field.

There is also an awareness that the new technologies will to some extent affect the traditional forms of definition of functions within the enterprise. In this respect, engineers and technicians call for greater decision-making capacity on matters where they feel that they are particularly well fitted to intervene because of their special knowledge. The entrepreneurs recognize that changes will take place in the decision-making structure, but they reserve for themselves the right to take the decisions on investment, including investment in the technological field. The trade unions consider that they are generally not taken into account in decisions on the incorporation of technology, and they demand greater participation in this respect, at least in matters that may directly affect them.

The trade unions are much more sensitive to the possible adverse effects of the use of new tech-

nologies, such as new occupational diseases, loss of skills, unemployment and heavier workloads. In contrast, the entrepreneurs and also many engineers and technicians generally tend to take the view that the problems which arise are connected rather with the adaptability of the workers.

The possibility of these issues being tackled jointly by the three sectors –entrepreneurs, engi-

neers and technicians, and workers– is strongly conditioned by the attitude of the former to the trade unions. The biggest problem is the reluctance of the entrepreneurs, and also of many engineers and technicians, to accept that the functions of the trade unions are not purely professional and that they must necessarily include in their demands matters which are not strictly of a technical nature.

Attitudes to technical change

*Carlos Filgueira**

The main queries raised by the study commented upon here may be summed up as a common concern: that of determining if the incorporation of the countries of the region into the current processes of technological change favours the reversal of a long-standing pattern of development characterized by marked inequity, or if on the other hand it may help to strengthen it still further. This concern is reflected at various levels of economic and social, cultural and political life.

The study examines one of the issues which causes most controversies at present: whether technological change, which is needed in order to further the international competitiveness of enterprises and countries, can be made compatible with equitable social development and the political stability of pluralistic regimes. The possibility that the region may run the risk of repeating past experiences in the face of a new orientation or division of labour brought about by technical change which accentuates social segmentation or structural dualism is one of the main questions raised.

Other questions arise on the cultural level itself and concern the effects of the new technology on the cultural significance of labour (loss of a sense of individuality in one's work, or the new multi-purpose nature of the worker), the way their influence is felt on the traditional shared identities, and their repercussions on the forms and content of the action of the collective actors. Consequently, the question arises of how the culture of workers, entrepreneurs, and of the intermediate groups of

technicians and professionals will be redefined. At the enterprise level, the effects of technical change will undoubtedly affect the organization and structure of power and the degree and type of participation by the workers; this therefore raises the question of the extent to which the gradual separation between orders and their execution brought about by the appropriation and concentration of new knowledge could give rise to a loss of autonomy, significance and control with regard to labour. Finally, the question also arises of how micro-social processes are transferred to the macro-social level and the effects on development deriving from the accumulation and combination of responses to direct impacts on labour.

In the study under consideration, a number of conclusions are drawn from the features of the new technical and economic model which has been taking shape in the developed countries. Some of the central questions raised in this respect concern the conditions for the application of this model in the countries of the region, since it imposes certain requirements (a new form of global regulation, a new "common sense" shared by the main actors, the reorganization of the system of production enterprises, etc.) which do not correspond to the features of the "typical" enterprises and entrepreneurs nor the behaviour and ideologies of the other collective actors of the region. In particular, mention is made of the new role that the trade unions have played in the face of this "new model" in so far as their action is not merely one of support for or resistance to the new technologies: what is involved is the limiting role that they can play through their capacity for obstruction (regulations

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on dismissals, new standards for job classification, or new union demands, especially wage demands associated with increased productivity and reduction of working hours).

Finally, various socio-political requirements of the "new model" are explicitly stated. Among them, the most important in my view is the need for agreement on fundamentals among the main individual and collective actors. In the countries in question, this agreement was possible thanks to a long tradition of negotiation and concertation between the State, entrepreneurs and the trade unions, or else the full sway of neo-corporatist political systems.

I. Social images of technological change

In this section I shall try to summarize and comment upon the main results of the interviews analysed in the study under discussion. As the sources are secondary –they come from various studies carried out by other authors– and moreover the universe of units does not claim to be representative, the analysis of the interviews must be adjusted to what the procedures followed allow. The presentation adopted in the study under analysis comprises a set of main topics which make it possible to compare and contrast the social images held by entrepreneurs, technicians and professionals, and union leaders. In table 1, I have tried to establish a simplified summary matrix of the images on 14 topics.

As this is a methodology which is usually called qualitative, I have decided to use some simple signs in the table to represent favourable views (+), unfavourable views (-) and seriously divided views (+-). In order to distinguish certain shades of opinion, totally favourable or unfavourable views are indicated with a double sign (++ or -- respectively). When there is one predominant view and another which is relatively marginal, the latter is given in parentheses.

II. A general approach

In principle, the pattern of the social images held by the three types of agents interviewed shows clear polarization between the societal images of entrepreneurs and those of trade union leaders. As a rule, the views of the intermediate sector of tech-

nicians and professionals are midway between the other two groups, although they show greater affinity with those of the entrepreneurs; only in a few cases are they closer to the views of trade union leaders.

The images held by entrepreneurs are totally positive in respect of i) technological change, ii) its effects on the workers, and iii) its consequences on labour relations.¹ They have a favourable view with regard to the productive and societal function of the enterprise and the advantages of training as reflected in the performance of the workers.

In contrast, their views are sharply negative with regard to the participation of workers in the management of the enterprise –except in the case of limited participation in collective management units covering their specific tasks or in working groups– and also negative regarding endogenous technological modernization. The tendency which they display to have greater confidence in imported technology, together with their view that there is only limited potential for mobilizing domestic research and development resources, confirm the findings of other researchers (Argenti, Filgueira and Sutz, 1988), whose studies emphasize the lack of demand stimuli and the limited interchange between research and production.

With regard to the other items, in general the replies reflect divided views.

It may be stated, in short, that the entrepreneurs interviewed display general optimism with regard to both technological change itself and its effects on the working environment and society as a whole, and they consequently also have a high opinion of the function of entrepreneurs. On the other hand, entrepreneurs do not seem to be willing to entertain new forms of co-participation (or co-management) by the workers in the technological management of the enterprise, although some modern entrepreneurs did show a certain willingness to increase the level of information on the performance of the enterprise (an item considered to be secret by the others), and there are some "social innovation" initiatives in this respect.

¹ The positive view regarding the consequences on labour relations is influenced by the greater weight of the replies by Brazilian entrepreneurs. In some cases, Chilean and Argentine entrepreneurs reported serious labour conflicts; these results were probably influenced by the characteristics of the labour force in these two countries (more traditional, older, and with its own subculture) and its trade union organization and tradition, which is also related with other political actors such as political parties and the State bureaucracy.

Table 1

**ENTREPRENEURS, TECHNICIANS AND PROFESSIONALS AND TRADE UNION LEADERS:
VIEWS ON 14 TOPICS^a**

	Entre- preneurs	Technicians and professionals	Trade union leaders
1. Technological modernization	+ +	+	+ -
2. Endogenous technological modernization	-	+ -	+
3. Role of the State	+ -	+	+ +
4. Function of the enterprise and the entrepreneur	+	+	-
5. Motivations of entrepreneurs	+ -	+ -	-
6. Impact on workers	+ +	+ +	- (+)
7. Labour relations	+ +	+	- -
8. Participation of workers	- -	- (+)	+ +
9. Training	+	+	+ +
10. Views of entrepreneurs on technicians and professionals	+ -		
11. Views of technicians and professionals on entrepreneurs		+ -	
12. Views of trade unions on entrepreneurs			- -
13. Views of trade unions on technicians and professionals			+ -
14. Views of entrepreneurs on workers	+ (-)		

^a + = favourable views; - = unfavourable views; +- = sharply divided views; ++ = totally favourable views; -- = totally unfavourable views. In cases where there was one predominant view and another relatively marginal one, the latter is given in parentheses.

If these views of a small and not necessarily representative group of entrepreneurs were valid for describing the dominant attitudes in the whole region, then the contrast between an attitude fully favourable to "technological innovation" and another attitude of resistance to "social innovation" could indicate one of the characteristic features of "conservative modernization".

The pattern of the social images held by trade union leaders is in marked contrast with that of the entrepreneurs in some areas of particular importance. It would not be overbold to say that there seem to be certain leanings of an antiliberal and anticapitalist nature behind the views of these leaders: strong aspirations for full State intervention, resistance to the functions and motivations of the enterprise and the entrepreneur, and a predominantly negative view of the effects produced on the workers by the introduction of new technologies. The only country where the views of trade union leaders were more favourable to entrepreneurs was Chile, and in this respect this country is probably a lone exception to the Latin American rule.²

² These features were noted in CEDEAL/FLACSO/CEDES/CIESU, 1988. This study also showed that in Chile the population as a whole—not only the trade unions—took a view of the entrepreneurs which was in clear contrast with those held in Uruguay and Argentina.

With regard to the positive images held by trade union leaders, they take a strongly favourable view of worker participation in the technological management of the enterprise and of better training for their work. In the first case, this represents an extreme contrast with the views of entrepreneurs, but in the second instance this represents an interesting point of consensus which could serve as the basis for future policies designed to encourage this type of activity. Finally, trade union leaders are the only agents interviewed who were markedly favourable to endogenous technological modernization.

The images held by middle-level staff (technicians and professionals), as already noted, reflect a kind of "middle ground", albeit closer to the views of the entrepreneurs than to those of the trade unions. Generally speaking, most of the items viewed in a positive or negative manner by the entrepreneurs were seen in a similar light by technicians and professionals, although not as strongly. It is not surprising that technicians and professionals differ from the entrepreneurs precisely in their views on the need to promote endogenous change, in which their position is closer to that of the trade unions. The same is true with regard to their

attitude to the functions to be assigned to the State and the participation of workers in technological management.

III. The nature of the different images

The entrepreneurs believe implicitly in an "unquestionable modernity" which they consider as one of the basic facts of life. Some of their views may be more enthusiastic or more critical than others, but the predominant assumption is that an irreversible cultural change is underway. In the final analysis, they see its consequences as beneficial both for the enterprise and for society as a whole.

At all events, the main concern of the entrepreneurs is the certainty or uncertainty of the profitability of investment in new technology, the response of the market, and the continuity of public policies.

In contrast, the trade union leaders see modernity as a doubtful development which gives rise to fears among the workers. They recognize that it is inevitable and may be beneficial—perhaps as the lesser of two evils— but analysis of the document shows a clear division between the abstract world of technological modernization and its possible benefits and the concrete consequences which it is likely to have on the daily life or more recent work history of each worker.

On this point, the trade union leaders coincide with entrepreneurs regarding the inevitability of change, but—to use a classical concept of sociology—they see it as a new situation which is severely detrimental to existing structures and gives rise to "anomy", that is to say, the loss of validity of a system of rules (anomy in the original sense as coined by Durkheim, or similar to Seeman's notion of "alienation").

I think that the best way of grasping this sense of anomy is to see it in its dual quality of i) a cultural conflict which puts the worker in a position where he is torn between the well-regulated world consistent with his early socialization, his reference groups and shared identities, and another world governed by a new system imposed from outside which breaks with the time horizons of individual orientation; and ii) a generalized feeling of "not belonging", loss of control, loss of meaning, and above all lack of group references

through which he can project and confirm his personal identity.

The subjective insecurity deriving from the new conditions imposed by the changes in work (employment, wages, labour relations, etc.) gives rise in practice to a common syndrome similar to that caused by other situations of the collapse of personal structures which have been analysed in the sociological literature (migration, economic crisis, disintegration of the family, etc.).

For technicians and professionals, in contrast, technological change and the growing content of knowledge which it involves mean the raising and enhancement of their role as well as of their prestige and power in the organization.

Even so, their favourable views are subject to a number of reservations caused by various conflicts which derive precisely from this feature, especially because of the gap between the mutual expectations of entrepreneurs and technicians and professionals with regard to their power attributions within the organization. This topic of the conflicts that arise with regard to the place of technicians—or technocrats—in complex organizations is also a traditional field of sociological research.

In so far as knowledge becomes increasingly a power in itself, the tension between entrepreneurs and technocrats over the different sources of power becomes one of the main areas of conflict within the enterprise. The settlement of this tension affects such crucial aspects as the identification of professionals with the enterprise, their commitment and loyalty, their productivity and efficiency, and ultimately the success of innovative management of the enterprise.

In recent publications, mention has been made of certain kinds of "new" production enterprises, generally small but successful, which have been set up by professionals and technicians with the initial aim of pursuing teaching or research activities. Their success is generally attributed to the accumulation of know-how from another source and its application to production activity. Little attention has been paid, however, to the fact that these enterprises are virtually free of the tensions referred to.

Nevertheless, generally speaking the views of technicians and professionals coincide with those of entrepreneurs, and they do not suffer from the insecurity over the possible loss of employment expressed by workers.

Even in their most pessimistic views, entrepreneurs and middle-level staff tend to see technological modernization as a challenge but not as an externality imposed from outside.

These are, briefly, the different views held on technological modernization. Each of the groups in question has something like a "statement of position" subjectively evaluated in line with the place occupied in the new process.

With regard to the other topics included in the matrix, the views of the three groups which were interviewed may be examined in the light of this "statement of position", the longer-term trends of the interests of each group, and their cultural patterns. I think that within these more general interests and cultural patterns, this statement of position is the key element which makes it possible to understand the different positions assumed with respect to the new conditions deriving from technological change. It even makes it possible to understand the differences which exist behind certain apparent agreements shown by the matrix. Thus, for example, certain entrepreneurs and trade union leaders take a positive view of the role of the State. For these entrepreneurs, however, the importance of the State's role lies in the organization of the economy, the stimulation, planning and financing of research, and the coordination of the scientific and technological system. For others, the function of the State is to promote competition and ensure the free play of market forces.

The trade union leaders, however, see the function of the State as one of active intervention in the general guidance of the economy and stimulation of research, since they feel that this cannot be left to the initiative of the entrepreneurs and that the redistributive effects of technological change must be taken into account.

These contrasts between and within the groups in question are also reflected in their images regarding the motivation of the enterprise and the entrepreneur. Entrepreneurs point to considerations of an economic and productive nature (opening up to the external market, need to improve product quality, competitiveness, limitations of the domestic market). The trade union leaders, in contrast, point to the lack of a "social responsibility" on the part of the enterprise, traditional speculative forms of behaviour, dependence on State support, and, in the case of innovative enterprises, unequal distribution of the benefits derived from higher pro-

ductivity and the monopoly of the knowledge corresponding to a new "modern culture", from which they feel that they are excluded.

The comments could also be extended to other topics set forth in table 1, but this would merely mean repeating many of the considerations already set forth.

It must be borne in mind that social images are only one of many manifestations of the tensions which exist within the enterprise or within society as a whole. Analysis of them is not enough to permit the determination of the true level of real or potential conflict in the area studied, and this is not only because we are dealing with a very special "sample" of interviewees which naturally limits the scope of the conclusions.

The main problem lies in the fact that social images, or representations and attitudes, are not necessarily reflected in corresponding behaviour. The real tensions in the enterprise or in labour matters are modified by the behaviour of the collective actors (the trade unions, trade associations, the State) and by the systems of "representation of interests" of each particular political system. The trade union traditions (more or less ideological, bureaucratic or corporative); the relations between trade unions and political parties; the entrepreneurial ideologies (traditional, modern, neoliberal) and above all the presence or absence of institutional mechanisms for settling conflicts (such as the existence or absence of facilities for negotiation among corporative interests and the role of the State in negotiations), make up the frame of reference within which the social images must be considered.

From what we have seen so far, the representations of the three groups in question, and above all those of entrepreneurs and trade union leaders, differ so much that sometimes it would seem that those interviewed are not talking about the same phenomenon. Among the entrepreneurs, there is a predominantly optimistic view of technological modernization; they do not see any problems in its effects on the organization of labour and the position of workers (except for some mention of minor unemployment of a temporary or frictional nature, or the time needed to adapt to the new system); they do not expect more labour conflicts; they are not willing to try out any form of co-participation or co-management of the enterprise, and they take a positive view of the type of

management and functions carried out by entrepreneurs.³ They also demand that the State should provide the economic and management conditions needed to ensure the profitability of investment in new technologies.

Trade union leaders, and to a lesser extent technicians and professionals, take a different view which, in the case of the former, is clearly contrary to that of the entrepreneurs, since they expect the State to act as a guarantor of the "social responsibilities" of technological change, demand participation in the management of the enterprise, and question the basic motivation of the entrepreneurs.

There are two particularly important points which arise from these respective definitions of situations: on the one hand, the repercussions they have both on the tensions and conflicts within the enterprise and in the more general area of labour matters, and on the other hand their cumulative effects on the levels of equality and social equity.

If the other factors remain unchanged, the social images in question suggest a special form of insertion of the workers in the process of technological change of the enterprise. To use classical Weberian terms, this represents "negative integration" into the system. To put it in more general terms, this occurs when a social group or sector which has some degree of power forms part of a system of collective actors but tends to exercise its power rather in the form of a veto, obstruction or resistance. This "negative integration" particularly affects the efficiency of a given system of actors in achieving the sought-for objectives.

Such "negative integration" is probably not a new phenomenon, at least if the tradition of labour conflicts and definition of the actors, especially of the trade unions, has traditionally been in line with this pattern. There can be no doubt, however, that technological change may form a new element which either strengthens this form of integration or, on the contrary, provides an opportunity to reverse it.

³It is significant that, in spite of this general tendency, some entrepreneurs do mention the advantages of certain practices of giving general information to the workers on the performance of the enterprise and its operating results, especially with regard to production and markets, which leads to the reduction of conflicts or to more flexible mechanisms for settling them. Generally speaking, as pointed out in the study under analysis, the firms which adopt these practices are transnational corporations and not local enterprises.

"Negative integration" at the level of the social images is not necessarily associated with a lack of institutional machinery for channeling conflicts, but there generally is such an association, however, so that "negative integration" reflects not only attitudes or feelings of "not belonging", but also the lack of effective institutional facilities for expressing interests or for the mutual recognition of these in specific negotiation and concertation bodies.

It is interesting to note that it is in fact certain trade union leaders (from Argentina) who think that the reduction of labour conflicts depends more on the participation of the workers in the process of technological change than on other factors. The group of "modern" entrepreneurs also attach importance to the redefinition of the rules governing labour relations in order to ensure the success of technological change, but it is not possible to distinguish how these views—or views to the contrary—are associated with the modernization characteristics of the enterprise to which those interviewed belong.

With regard to the second point, however, the aggregate consequences of technological change and its effects on the more or less regressive distribution of social assets are different. There are at least three aspects on which the views perceiving growing inequity at the aggregate level are centered: the increasingly marked differences between the profitability of capital and labour; the unemployment caused by technological change; and the unequal distribution between entrepreneurs and workers of the benefits produced by such change. Other trade union leaders highlight the loss of skills and do not see the increasing versatility of the worker as a positive feature. On the other hand, the more positive images assume that the intrinsic effects of the changes in the material world are beneficial not only in the sphere of work, but also through the general improvement in the quality of life that the new technologies make possible. This optimism is based more on the aggregate effects of the potential of the new technologies than on the actual sphere of work, although there are explicit references to certain advantages in respect of occupational health, reduction of physical effort, and the acquisition of new skills.

I think, however, that there is a prior query which calls for a more detailed answer. Up to what

point can the question of equity be reduced to exclusively technical or technological variables? In other words, we wonder if it is really possible to examine the question of equity as though each particular technique was naturally associated with certain degrees and types of equity, regardless of other factors (technological determinism).

There are ample reasons for holding that the new technologies can add new components to the problem of equity, displace others, or change the type of conflict over the distribution of social goods. Ultimately, however, the degree of equity is the result of processes which take place on the political level.

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