Policy Agenda for the Information Revolution and Exclusion Phenomena in Developing Countries

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ISSN 1564-8370

International Workshop on
The Information Revolution and Economic
and Social Exclusion in Developing Countries
Maastricht, 23-25 October 1996

A Workshop funded by the
Ministry of Development Cooperation of the Netherlands
Editor's Note

With pleasure we present to our readers the special series of UNU/INTECH Discussion Papers: *Information Revolution and Policy Implications for Developing Countries*. Papers of the Series were originally developed for the International Workshop on The Information Revolution and Economic and Social Exclusion in Developing Countries, held in Maastricht on 23-25 October 1996. The Workshop was an important event organized by UNU/INTECH and financed by the Dutch Government. Insights developed from the Workshop have not only been benefiting UNU/INTECH research work, but also contributing to many other initiatives in the area of innovation policy for information technology in developing countries.

There are six papers in the special series. The first five papers have been widely circulated and are provided here in the latest modified versions. These are outcomes from the two major themes set for the Workshop: ‘The Developments of Access and Effective Use of Information Technology and Exclusion’, and ‘The Gender Dimension in Exclusion’. The sixth paper, by Ludovico Alcorta, is a summary of the three country cases on Burkina Faso, South Africa and Tanzania organized for the Workshop.


#2002-2* Constantine Vaitsos, “Policy Agenda for the Information Revolution and Exclusion Phenomena in Developing Countries”


#2002-4* Carlos M. Correa, “Implications of Intellectual Property Rights for the Access to and Use of Information Technologies in Developing Countries

#2002-5* Cecilia Ng Choon Sim, “Making Women’s Voices Heard: Technological Change and Women’s Employment with Special Reference to Malaysia”

#2002-6* Ludovico Alcorta, “The Information Revolution and Economic and Social Exclusion: The Experiences of Burkina Faso, South Africa and Tanzania”

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CONTENTS

INTRODUCTION 7

1. SETTING THE STAGE 9

2. THE ECONOMIC/INSTITUTIONAL SPACE OF ICT APPLICATIONS 13

3. THE UNIQUE CHARACTERISTICS OF ICT 17
   3.1 ICT’S PERVERSIVENESS 17
   3.2 ICT: CONTINUITY OF CHANGE 19
   3.3 ICT AND THE KNOWLEDGE REVOLUTION 21
   3.4 ICT AND THE INTERNATIONALISATION OF BUSINESS OPERATIONS 22

4. SOCIAL COHESION AND EXCLUSION/INCLUSION PHENOMENA OF ICT 23

5. CONCLUDING REMARKS: ALTERNATIVE POLICY APPROACHES IN VIEW OF THE ICT CHALLENGES 33
INTRODUCTION

An attempt to synthesise the main findings of the three-day UNU/INTECH workshop on the social and economic exclusion implications of information and communications technology (ICT) in developing countries constitutes a rather formidable task. During the conference, distinct views were expressed by specialists from a variety of social science, natural science, and engineering disciplines. A number of country experiences were analysed, each with distinct development-specificities and characteristics of socio-economic inclusion/exclusion. It turns out that each country is being affected significantly but differently by the radical technological changes transforming the world’s economic and social structures, and so are various groups and individuals within each society.¹

For these reasons, a unifying overall target was selected in attempting to present a synopsis of the relevant themes and issues of the workshop. This target has to do with the policy context, relevant for developing economies, emerging from the ICT revolution. This synopsis will thus come close to what Prof. Waardenburg underlined during the opening session of the workshop as being a main concern of Minister Jan Pronk in sponsoring this conference.

The present synopsis consists of five main sections. Section 1 sets the stage by focusing on broad expressions of policy concerns about the impact of ICT in transforming the overall economic base of the world production and exchange systems. Section 2 defines the economic and institutional space of the ICT applications, while Section 3 deals with the uniqueness of the ICT revolution in comparison to other radical technological changes. Section 4 presents some of the main concerns about the impact of ICT on socioeconomic cohesion and exclusion. Finally, Section 5 contrasts alternative approaches to development policy and their relevance in view of the challenges of ICT.

¹ Being a synopsis of the workshop proceedings, the pages which follow do not attempt to present direct quotations and references from the written contributions and discussions of the conference. References are given, though, with respect to other relevant publications.
1. SETTING THE STAGE

There exists widespread agreement that ICT constitutes an exceptionally important cluster of innovations. In describing these innovations and their related fundamental social implications, some authors have used the expression “change of techno-economic paradigm”, while others prefer Schumpeter’s terminology of “successive industrial revolution”. ICT’s radical changes have brought about far-reaching structural and economic transformations, which are evident in emerging major secular trends in output levels, and even more so in the context of output and employment, in competitiveness and efficiency considerations, and in business strategies and corporate organisation.

Similarly, key institutional changes induced by the ICT revolution are affecting the very core of the economic governance of world business and international economic affairs.

Furthermore, and as a direct result of such ICT changes, the world economy is experiencing a well noted, even if poorly measured, alteration in the very structure and capacity for its reproduction, namely in the composition and content of aggregate investments. This change involves three main expressions:

- First, a marked shift is observed toward greater reliance on intangible assets. These involve investment activities which develop the knowledge and competence base to introduce entirely new products and processes. They also require investments in human resources, organisation and information structures, software, and in the abilities to respond to and reach markets.
- Second, important and growing complementarities exist between physical and intangible assets as well as an increased content of high technology in both of them.
- Finally, investment and production activities are noted for their growing reliance on an elusive synthetic capability which some authors call “knowledge/competence”.

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implies that changes in the technological infrastructure of an economy do not simply result through the replacement of existing hardware by capital goods embodying new-vintage know-how. Instead, the whole process is conditioned by the generation, organisation, and use of “knowledge/competence”.

These changes are also transforming the nature and degree of competition as well as its space and time horizons. Technology-driven competition and, to use the Schumpeterian term, the “creative waves of destruction”, imply a new market context, which involves fierce competition on a world scale prompted by shorter technology and product cycles. The competitive arena is extended geographically through selective globalisation processes in markets and production systems. It is also expressed by strategic alliances among big firms so as to cope with the size, risks, and new patterns of investment requirements in knowledge creation and its applications. Finally, the new market context has produced increased market concentration in key economic areas and novel exclusion mechanisms. Several of these exclusion mechanisms stem from the practices of the main corporate ICT suppliers and the strategic alliances between them. The resulting and active pursuit of restrictive business practices is taking place at a time when governments are reducing barriers to trade and investment while they are also diminishing their own direct participation in productive activities through diverse forms of privatisation initiatives.

Moreover, the leaders in the new “techno-economic paradigm”, especially the transnational corporations, regard their global strategies as a form of strategic “arms race” in which they are all attempting to accumulate new resources faster than their rivals.

Similarly, governments use their power to impose new international institutional norms so as to support their national champions and achieve an extension of their national economic space in third-country markets and resources. This is largely achieved through integrated production systems operating across national boundaries. Such systems are supported by transnationally extended related party transactions which displace the market mechanism through the internalisation of the corresponding trade relations. These internalised exchanges presently account for significantly more than one-third of world trade in goods. Even more, they are becoming dominant in a number of important services. For example, in technology licensing

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contracts, related party transactions presently account for 95% of the fees involved in total sales to developing countries of such disembodied know-how from Germany, the U.K. and the U.S.\textsuperscript{6}

Undoubtedly, the market mechanism constitutes a fundamental social institution which contributes significantly to the advancement and application of creative initiatives and to the promotion of rational decisions in resource allocation. Yet, given the pervasiveness of the ICT revolution, the successful diffusion and application of the corresponding constellation of innovations are not simply or even mainly the outcome of corrections in market failures or of creating competitive markets. Instead, they require a number of organisational and institutional changes. Such changes involve the spheres of public policies and management practices, the nature of industrial relations, the quality of the factors of production, and the competence of corporate organisation. Equally critical are the structure of industrial communications, the quality and efficiency of information flows, and the longer-term creation of skills and knowledge in societies. All of these involve novel forms of complementary actions between public policies, institution-building efforts, and private sector initiatives. However, the exclusion of countries and population groups which are less knowledgeable, weaker, and poorer in assets and/or income, constitutes the other side of the same technological, economic, organisational, and institutional evolutions.

Furthermore, since markets are themselves social institutions, their functioning depends on a series of prior decisions and rules which govern economic relations and business initiatives. These involve regulatory provisions, the definition and means of protection of property rights on both tangible and intangible assets, new norms and standards, etc. Consequently, given the importance of ICT in all branches of the economy, the corresponding functioning of markets requires important political decisions and initiatives as well as institutional arrangements. These in turn express key interests and power relations, both nationally and internationally. Such interests and power relations tend to shape the future of every economy in crucial areas through the redefinition of the rule of the law (“état de droit”) applicable in each society. In other words, these issues are not market driven but market determining and depend on public policy considerations and initiatives.

Finally, it is well recognised that markets and their signals (i.e., prices and volumes) do not respond to or reflect the full range of important social costs and benefits of technology. On

these matters expert opinions differ and, in the last analysis, their positions often reflect value judgements expressing ideological, political, and ethical considerations.

Similar concerns arise in other areas, as in the case of environmental protection, calling for more comprehensive analytical and policy approaches. Markets cannot be expected to anticipate future social costs and benefits resulting from technological change. Consequently, public awareness, political debate, and corresponding decision making are not only unavoidable but absolutely essential. This is especially so in cases like ICT, which involve radical and pervasive technological breakthroughs.

The new growth opportunities and economies of scale which have emerged from the application of ICT provide important new options and generate additional resources for improving social conditions. At the same time, though, there are also regressive structural implications. These arise from the same cluster of innovations and their economic applications, but lead to countervailing effects which, as discussed below, have disintegrating ramifications on socio-economic cohesion through increased inequities, marginalisation, and exclusion, all part of the ICT revolution and its applications.
2. THE ECONOMIC/INSTITUTIONAL SPACE OF ICT APPLICATIONS

A very large number of diverse “end users” of ICT services and products exist among businesses and institutions, households, the public sector, etc.. In addition, in each economy the relevant economic/institutional space involves two broad categories, namely, the suppliers of ICT and of its applications and the supporting infrastructure.

For the suppliers of the new technologies, the dynamics from the immense drive for growth are such that expanding activities has become an imperative. Standing still is not feasible in view of grave risks of being displaced by the competition. Moreover, the quality of the needed growth has become such that fewer and fewer industries can remain both profitable and efficient on a purely domestic basis. Growth becomes synonymous with internationalisation, with corresponding inclusion/exclusion effects.

The wave of technical change has produced six different categories of very significant suppliers of ICT goods and services.\textsuperscript{7}

1. A continuous and rapid pace of dramatic improvements is taking place in large-scale integration of electronic circuits (VLSI). This enables both the reduction of costs and the improvement of quality. It also results in an immense enhancement of capacity and of speed in data processing in the products embodying such circuits.

2. As a consequence, successive generations of new computer hardware are being generated, incorporating dramatic improvements in storing, processing, and communicating vast quantities of information. These evolutions have implied the availability of cheaper, faster, more powerful, and more reliable microprocessors, and of small and super-computers. The new applications of computers prompt, in turn, the development of new generations of software and related service activities.

The utilisation of the new hardware and software in electronic computing facilities has facilitated the design and production of new generations of diverse capital and consumer goods (e.g., word processors, electronic instruments, VCRS, robots, machine tools).

Together with the continuous development of new-generation computers, these electronic goods and their components represent the most dynamically growing sector in the world economy, surpassing the corresponding performances of more “traditional” industries such as the automobile sector, petrochemicals, metal products, etc.8

3. The new capital goods together with developments in communications technology affect every function within each industry and firm as well as their interactions (e.g., the integration of R&D, design, production, administration, and marketing). This has greatly strengthened the introduction of various activities involving new Management Information Systems, Computer-Aided Design, Flexible Manufacturing Systems, new systems of production planning and inventory control, procedures of total quality control, etc.

4. The concomitant development of optical fibres, and the convergence of informatics/computers with telecommunications technology through telematics, have brought new activities to the forefront. These involve the whole sector of telecommunications and its hardware together with a novel set of products and services related to computer-based networks, data banks, information services, etc. Their combined presence opens up new venues of co-operation among users in different locations, and in ways, speeds, and functions previously unthinkable.

5. Finally, the combination of technical and organisational changes have introduced important economies of scale, which have emerged from:
   
   (i) expanding the innovation frontier, its dimensions and their combinations;
   
   (ii) introducing rapid changes in the applications of these innovations; and
   
   (iii) providing a more varied mix for the resulting products and services.

Such economies of scope create a series of new economic activities, which can be grouped into three categories:

- company-based R&D and co-operative research efforts, which include not only new arrangements and alliances between firms, but also joint research efforts between governments and enterprises together with banks, universities, and other institutions;

- new services and skills (in-house or through consultancy) in design, software engineering, and development; and

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networking among and between knowledge creators, producers, and users of goods and services.

Given these six groupings of suppliers, the corresponding infrastructure for the use of ICT in each country involves the following four main areas:

1. The “soft” infrastructure refers to the regulatory conditions and norms, both national and at regional or international levels, which enable and/or restrict access to and use of distinct applications of ICT. The institutional requirements of this “soft” infrastructure are considerable.

2. They often involve highly specialised and interdisciplinary knowledge which the rest of the institutional and political system might be lacking. Furthermore, they tend to express strong pressures from businesses and governments with vested interests on the suppliers side. Finally, they might be the outcome of company practices which explicitly or implicitly (e.g., compatibility requirements) define the size, structure, and prospects of markets and of productive activities.

3. The “hardware” infrastructure involves the stock of tangible investments and equipment in computers, telecommunications, and other capital goods which embody the new ICT.

4. The educational, knowledge, and competence base of a society undoubtedly constitutes the most strategic infrastructural component in this rapidly changing technological area. The development of these elements and their organisational inputs require sizeable and continuous investment commitments and institutional support.

5. Finally, the customisation of capabilities, through organisational development, productive restructuring, and learning processes, is facilitating access to ICT and its applications. Such initiatives constitute a key infrastructural element as far as inclusion/exclusion phenomena are concerned. This customisation of capabilities translates the availability of knowledge, resources, and institutional potentials into societal conditions which enable the matching of effective demand with the opportunities offered by the ICT revolution.
3. THE UNIQUE CHARACTERISTICS OF ICT

During the last two centuries, industrial revolutions have brought about fundamental changes in the economic and social structures of societies as well as drastic changes in their institutional and political environments. Thus, it is valid to ask what makes the ICT revolution unique in comparison to other radical technological changes. Four main reasons will be presented here. Of these, the first constitutes the most fundamental one, influencing all the rest.

3.1 ICT’s Pervasiveness

Despite the far-reaching socio-economic effects of previous radical technological changes (in energy use, in transportation and metal mechanic products, in the chemical treatment and use of natural resources), they did not match the pervasive nature of ICT in world economic activities and social relations. The crucial difference of ICT is that it transcends and penetrates all aspects of contemporary economic and social affairs. This pervasiveness gives a generic character to ICT which enters into the “production function” of all human endeavours.

Three overall implications originate from this generic nature of ICT:

- As far as output composition and growth patterns are concerned, important and sharp differences obviously continue to distinguish the various parts of the world economy. Yet all major economies, which are also the main suppliers of ICT goods and services, as well as the few developing countries which participate actively in related activities, have registered their fastest growth in broadly the same sectors. All of them show an intensity in ICT applications even if they are expressed in distinct families of products. Differences in national innovation systems and in systemic efficiency capabilities explain differences not simply in transition phases toward the new techno-economic paradigm; more importantly, they express variations in longer-term performances and competitive strengths across a large number of sectors. Furthermore, trade relations are increasingly taking place not between sectors, as in the nineteenth century, but within them, thus instancing major intra-industry specialisations. Such specialisations are now being intensified by moving even more at the intra-firm level through transnationally integrated production systems and related party transactions.
Nevertheless, a key question still calls for an answer. Despite the dynamism propelled by the new technologies, overall national productivity and income growth rates have declined in relation to the late 1950s and 1960s. This is particularly so among industrialised economies which lack the suppressed demand of the developing countries and the potential for even fuller use of their already installed production base.

This productivity paradox is not simply a lag phenomenon. Instead, the potentially very important benefits to be derived from the new technologies and their applications are not inevitable and automatic. It turns out that their realisation depends on organisational restructuring and superior organisation in research, design, development, production, and marketing at the level of the firm. It is also dependent on the quality of organisation in the support infrastructure, and in public policies.

Still, organisational patterns and attitudes are notoriously hard to change, despite the recognised need to do so. They certainly have a pace of evolution much slower than that of technological change. Also, transformations in organisational and institutional matters do not constitute a unilateral initiative, but have to take place systemically. They involve, in an integrated manner, public policies, the strategies and organisational structures of firms, educational institutions, labour practices, financial and communications infrastructures, etc.⁹

- Not only production levels per se but also the quality of economic activities and of the content of output have been greatly affected by the ICT revolution. This applies to both private goods and to social services. Such qualitative changes have altered and redefined fundamental economic expressions. One of them concerns the very essence of international competitiveness.

In the past, at both the micro and macro levels, competitiveness had basically to do with issues of relative costs and relative prices. Thus, in the context of production and market realities originating from previous industrial revolutions, comparative advantages at the level of firms and of national economies counted on comparisons in relative quantitative use and the pricing of scarce resources.

With the advent of the ICT revolution and its applications, competitiveness is becoming more a matter of capabilities and of flexibility to adapt and take advantage of a fast-changing techno-economic environment.

Instead of relative costs, the competitive edge reflects abilities in productive delivery with respect to quality, timing, and quickness in responding to market changes. Mass production gives way to mass customisation and product differentiation, just-in-time production, quality standards, and flexibility in specialisation.

- Knowledge and technological change are not socially neutral. Fundamental changes in production processes, in the scope of economic activities, and in the content of output imply crucial changes in social relations. Consequently, given the pervasiveness of the ICT revolution, key implications are also generated in terms of the organisation of societies. Power relations do not simply shift from one socio-economic group to another; they are transformed. Discriminatory practices, inequities, and market segmentations are all affected, thus leading to novel conditions characterising social cohesion. Furthermore, the reproduction of societies and of their economies is altered. Among other key reasons, this change takes place in view of the power, income, and wealth redistributive effects of ICT both between and within (national) economic systems. Also, since opportunities for productive employment are so seriously affected by the ICT revolution, so are the conditions of human development and of the ability to lead fulfilling lives. Finally, social and cultural patterns are also affected by evolutions in the knowledge base of societies. Section 4 below will discuss the social cohesion implications of ICT.

### 3.2 ICT: Continuity of Change

It is generally acknowledged that a key characteristic of the ICT revolution is the speed of the innovation, diffusion, and application processes of new productive know-how. This high rate of change has radically shortened, as noted above, technological and product cycles. More than that, though, what is perhaps more central is the continuity of change: competition is driven by innovation. As a consequence, economies do not simply move from one equilibrium position to another, as happened during previous industrial revolutions. Instead, they find themselves, at least in the foreseeable future, in a continuous and dynamic disequilibrium.
Such a radical change poses special life-long demands on the learning processes of societies and of their populations. Learning to learn, learning to cope with change and to organise for it in view of its continuity, and learning to invest and produce, emerge as strategic resources. In the final analysis, capabilities turn out to be the distinguishing advantage, in production and in economic survival, within the context of such a dynamic disequilibrium.\footnote{See Charles Cooper’s contribution in the introduction of this volume.}

At the enterprise level, continuous asset accumulation is not simply a goal in itself complementary to or antagonistic to profit maximisation; it can turn out to be a critical medium to cover the resource demands for continuous capabilities development, and risk coverage. The limits posed in this accumulation of assets by individual firms pushes them to strategic alliances with others. At the national level, investments in education, in science and technology systems, and in supportive infrastructure services assume a commanding importance. Finally, flexibility in public policy decisions, as well as in corporate ones, becomes a key factor in improving micro/macro interdependencies and in expanding the scope of policy implications.

Previous industrial revolutions were noted for one critically important impact: the significance of scale economies in plant production. Such economies of scale reduced unit costs, thus improving the then-prevailing conditions of competitiveness. In view of the considerations noted above, ICT is characterised by two other types of economies:

- First, **dynamic economies of scale** that is, benefits arising from the size of activities over time and not simply in individual production periods become strategic. This is due to the importance of learning and the needs of knowledge accumulation. In turn, such intertemporal benefits place particular emphasis both on access to the opportunities which arise world-wide and on endogenous growth patterns. This duality raises more complex questions about the nature of protectionist policies and the pursuit of liberalisation practices. The required pragmatism in structuring appropriate policies extends beyond the boundaries set on decision making by simplistic distinctions of previous decades between import substitution versus export promotion strategies.

- Second, **enterprise scale economies**, instead of plant sizes, turn out to be strategic. The former become more relevant in view of the need to accumulate resources to cover increasing demands in research, design, development, and world-wide marketing
networks. Thus, corporate power, together with capabilities, turn out to be of paramount importance. Plant sizes, on the other hand, can move in the opposite direction. They may be reduced to enable more vocational and production flexibility, facilitated by the new technologies.

3.3 ICT and the Knowledge Revolution

Just prior to the take-off of the ICT revolution, a seminal article by K. Arrow interpreted some of the fundamental properties of knowledge in economic analysis. At that time, knowledge was viewed as a close equivalent to information. The latter is analysed as having the properties of a durable public good. This means that, once produced, know-how can be reproduced and used, by its creator and/or by others, without additional cost and independently of the scale and frequency of activities. On the basis of this, important differences exist between the private and social effects of the innovation process. Furthermore, market outcomes depend on the expected profitability of the innovating firm and of its imitators on the basis of the market structure and the volumes of operations relative to the costs of creating and/or procuring knowledge.

This emphasis on competence and on learning requirements, instead of on the informational character of knowledge, leads to different conclusions and policy implications. Knowledge, in this case, is perceived as being idiosyncratic to specific individuals, organisations, and applications, while others might be excluded. Furthermore, the transfer of learning is not a costless procedure, as the transfer of information could be, nor can it be repeated independently of the scale and frequency of the corresponding activities. These tacit elements of knowledge imply that the latter cannot be simply codified and easily reproduced or transferred. Furthermore, technology draws from the development of diverse knowledge sources and depends on the capability to synthesise them.

Even imitation, undertaken through reverse engineering, calls for important prior cognitive elements and capabilities on the part of those who undertake it.

As a consequence, the process of innovation has its own internal logic and is not simply the automatic and “linear” outcome of cost/benefit comparisons defined by markets. Even more,

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market structures turn out to be expressions of knowledge generation. All these properties and conditions are particularly present in, and reflect the specificities of, the ICT revolution. Its policy implications will be examined in the concluding section below.

3.4 ICT and the Internationalisation of Business Operations

The last particularity of ICT to be underlined here concerns the intensity by which it has prompted the internationalisation of business operations. This has, in turn, modified and blurred the definition of national economic spaces in view of the emergence of complex integrated production systems operated by transnational corporations across national boundaries. This intensified search for internationalisation, greater that in any previous period in history, turns out to be the direct result of ICT, which provides the enabling conditions for expanding geographically and, at the same time, for integrating and more tightly controlling corporate spaces. And internationalisation becomes a critical factor in resource accumulation, since the boundaries of national markets turn out to be limited and restrictive. The available evidence indicates that in the two decades 1974-1993, the standardised value of world production increased by slightly more than 75%, while the equivalent for world merchandise exports increased by about 150%. In comparison, the correspondingly standardised foreign direct investment flows surpassed all other aggregate world indices, with the exception of finance capital involved in international investments. Foreign direct investments went up by significantly more than 500% during this period.\(^{13}\) The resulting internationalisation process, moulded within the structures of integrated and tightly controlled production systems, creates its own patterns of inclusion/exclusion and of concentration on a global scale.

4. SOCIAL COHESION AND EXCLUSION/INCLUSION PHENOMENA OF ICT

• the degree or lack of access to opportunities and resources;
• the nature and extent of control over decisions and productive assets; and
• the dynamics and structural characteristics of development trajectories which create and/or reproduce socio-economic conditions for more or less equitable participation in the fruits of progress, or for marginalisation and exclusion from them.

One of the central issues which transcends diverse social cohesion concerns has to do with the determination of employment opportunities offered in a society, the conditions of the labour markets, and the content of work. Poverty and equity outcomes are largely determined by the employment evolution.

From the available evidence, it is well recognised that ICT reshapes work in fundamental ways, involving the total volume of employment as well as the distribution of workers across occupations and firms. ICT also reshapes work by changing the very nature of the skills required and the interrelationships among jobs and functions within a firm and sectorially.

As far as the volume of employment is concerned, important differences exist between the effects of ICT at the levels of the firm, the industry, and the nation as a whole\(^\text{14}\). Employment creation and displacement phenomena are likely to occur simultaneously and in different intensities. The end result will depend on:

• whether an economy participates in the generation and supply of ICT and of its applications or is only a user;
• whether firms are led to downsize their employment practices to meet competitive pressures or introduce new human resource management practices related to the novel opportunities offered by ICT, together with the reorganisation of their activities;

• whether sectorial restructuring takes place so that the redistribution of employment opportunities between sectors can serve to offset labour displacement effects in some ICT uses by enhancement in others; and

• whether aggregate demand management and the macroeconomic environment favours sustainable growth and employment creation.

From the beginning of the ’70s, trends in the OECD labour markets indicate important ABN-AMRO structural changes in employment patterns and in the content of work opportunities. Major factors in these longer-term trends are associated with the productive restructuring taking place in view of the ICT revolution.

To start with, serious changes are noted in the employment share of distinct sectors, and in magnitudes which far exceed corresponding variations in output shares. As a result strong differentials emerge in relative productivities, leading to a widening gap in wage and salary differentials, particularly in the context of weakening trade unions. The latter are significantly affected by major shifts in policies on the welfare state. Consequently, multiple forces strain simultaneously the conditions of social cohesion prevalent in an economy and bring about corresponding conflicts, which elevate confrontations between workers and governments.

Second, in a number of countries, net job creation is strongly related to the knowledge-intensive parts of the economy, while shrinkages of work opportunities are evident in more traditional activities. Such activities tend to be affected by liberalisation policies, thus reinforcing protectionist pressures during sectoral adjustment periods. Other countries, though, especially the developing ones, confront new realities in their external sector with trade liberalisation taking place in their imports without corresponding opportunities in export promotion. Exceptions exist for a few developing countries, mainly in Southeast Asia, in ICT-related export activities.

\[\text{For example in the European market economies, the share of manufacturing value added was 30.6\% of the total GDP in 1973, 28.2\% in 1985, and was projected to be 28.8\% in 2000. In contrast, the employment share dropped consistently from 29\% in 1973, to 26.3\% in 1985, and is expected to reach 22.1\% by 2000. This was the largest relative drop in employment. It was compensated by increases in collective services (the highest increase) followed by trade and finance. Data from the Economic Commission for Europe cited in Sanders, C., Matthews, M., and Patel, P. (1991) “Structural change and patterns of production and trade”, in Freeman, C. et al. (1991) Technology and the Future of Europe, 18-36.}\]

\[\text{See Industry Canada (1993 and 1994), Ottawa.}\]
Third, one of the most worrisome findings of the recent OECD Jobs Study\(^\text{17}\) is the strong tendency in the ‘80s toward polarisation in the labour markets. This phenomenon is mainly expressed on two fronts. In certain countries, e.g., the U.S. and the U.K., relative wages for less skilled workers have dropped dramatically. As a result, not insignificant parts of the labour force have become working poor, while, at the same time, unemployment rates are not easy to combat. In other countries, especially continental Western European economies, polarisation in terms of relative wages was not as dramatic as it was in terms of unemployment, which was especially high among unskilled workers and new entrants in the labour force. Thus, knowledge, learning, and unequal access conditions are key factors in contemporary labour market segmentation.

In such a context, exclusion phenomena become endemic, even among industrially more advanced countries. These phenomena tend to be highly correlated with the manner by which “learning economies” adjust to the new techno-economic paradigm.\(^\text{18}\)

In the case of developing countries, the contrasts in the conditions of exclusion in labour markets tend to be even more pronounced. A few countries, especially in Southeast Asia, have been able to assume an active role in the ICT revolution. They represent the counter example, with inclusion phenomena both internationally and domestically. Conditions for such a “special” performance among emerging economies as world players in the ICT era rested on the prior existence of longer-term policies on education, income, and wealth redistribution, hence improving access opportunities for the majority of their populations. Furthermore, they were based on stable macro-environments, supported by high domestic savings rates. They also involved outward-oriented economic policies founded on active and non-neutral trade and investment policies. Such policies placed a high priority on the support and protection of endogenous growth poles and of domestic productive actors. Finally, they included proactive and selective public sector policies at the sectorial and institutional levels.\(^\text{19}\) Key among such policies are diverse interventions on technology and human resource development.\(^\text{20}\)


But for the majority of developing countries in Latin America, Africa, and parts of Asia, the experience has been quite different. Summarising the experience of several economies studied by the International Labour Office, and with special references made to Latin America, the following main conclusions were reached on the realities of the labour market:

- **First**, during periods of aggregate macroeconomic and structural adjustment, employment performance was seriously and negatively affected while poverty and inequity increased. Production rationalisation, improved competitiveness, and technology introduction led to employment downsizing.

- **Second**, growth is a necessary condition for reducing unemployment, yet the rhythm and sustainability of growth are also critical. Even more, employment generation during recovery periods concentrated mainly in the informal sector, thus leading to low and slow growth in productivity. Technology-driven activities remained at the margin of labour absorption. In fact, during the last 15 years, eight out of ten new jobs created in the whole region of Latin America were in the informal sector.

- As a consequence, the quality of the new jobs generated is quite different from the corresponding ones in economies which actively participate in the generation of ICT and in the supply of the corresponding goods and services.

- **Third**, real wages were determined more by the degree of success in controlling inflation than by evolutions in the labour market. Macroeconomic and structural conditions turned out to be far more important in determining real earnings as compared to the effects of technological change on productivity and wages.

- **Finally**, although strong recovery is associated with poverty reduction, it does not follow that equity is improved. Quite often income differentials continue to increase even further, as also happened in a number of industrially advanced economies.

The lessons to be drawn from these broad conclusions on the labour market and the state of employment opportunities stress the **contingent nature** of technological change and of its...

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20 For example, Singapore doubled in 1996 the public commitments for subsidising R&D activities by both national and foreign-owned subsidiaries operating in the country. It also more than tripled the corresponding public resources to help the development and introduction of new products by private firms. See *Financial Times*, 31 January 1977.


22 Between 1980 and 1990, on average, wages in the manufacturing sector of Latin America dropped by 13% in real terms and the minimum ones by 31%. The corresponding drops between 1980 and 1995 are reported to be 8% and 27%, respectively.
impacts. The immense opportunities offered by the ICT revolution are potentially realisable for those individuals, firms, and economies who have or can develop capabilities, organisation, resources, and/or power to be included. For most of the others, though, such opportunities are not automatic, nor can the required techno-economic changes simply be transplanted independently of the socio-economic context. Even more, the dynamics of exclusion can accentuate existing inequities, discrimination, and marginalisation. As a consequence, structural constraints are reproduced and reinforced, placing severe limits on efforts to attain acceptable levels of social cohesion in a country.

In this respect, there exist a number of interrelated areas of policy issues which bear on the phenomena of exclusion as far as the ICT is concerned. First, the potential for introducing ICT in the fight against poverty might prove in practice severely limited if access to elementary technical provisions cannot be satisfied resource-wise. For example, the cost of installing even a simple telephone line in an already existing telecommunications system can prove to be higher than the level of annual per capita income in some countries. It can also exceed the corresponding per capita income of significant sections of the population in many developing countries, namely the lower half of their income brackets.

Thus, the level of privately available resources can prove such as to exclude a large number of people from participating in the fruits of technical progress. On the other hand, the use of ICT applications can contribute to overcoming other resource shortages, e.g., the use of telematics to confront problems about the availability of qualified primary education teachers needed to cover widespread rural areas. In these cases, public resources have to be committed in an appropriately focalised and localised manner so as to develop socially viable solutions in which technology can open up previously unavailable options. Again, the use of technology is not automatic. It requires public policy commitments, as well as different priorities in resource distribution and usage in a country, all of which are issues of an eminently political nature. It also calls for the development of particular organisational capabilities and for changes in human resource management.

Second, it has already been noted that the ICT revolution has redefined educational needs. This is highly relevant for the introduction of economic activities which depend upon ICT applications, not to speak of the more demanding requirements for specialised knowledge and human capital in sourcing, operating, and innovating technology itself.
The use of ICT in productive activities as well as the demands posed for life-long learning capabilities have brought into the forefront the critical importance of appropriate secondary education, available to a wide spectrum of a country’s population. Previous industrial revolutions, with their emphasis on standardised mass production and on knowledge embodied in physical assets, had placed corresponding demands on literacy levels and primary education. The two areas continue nowadays to be among the more strategic development challenges for a number of countries. This is true not only among the least developed economies in Africa or elsewhere, but also in major developing countries, such as Brazil. Yet, in the context of the ICT revolution, primary education is not enough to match the new work requirements. The quality upgrading and the quantitative requirements need to be extended to cover, at least, the level of secondary education.

On the other hand, educational reforms and human resource improvements require longer-term societal investments, both public and private, with sustained policy commitments. Meanwhile, the less fortunate in a country’s population can remain largely excluded from access to educational upgrading. This situation leads to their corresponding exclusion from the major opportunities offered by the ICT revolution. As a consequence, socio-economic inequities and marginalisation conditions are not only reproduced but could be accentuated by the educationally induced unequal access to ICT and its applications.

Third, the overall context of social cohesion is greatly influenced by what roles are set and what power relations are imposed in a society. Such roles and power relations affect the participation of distinct groups of the population in the fruits of progress. In this respect, gender-related considerations turn out to be seriously affected.

The gender bias of radical changes in ICT has to do with the following structural issues in role definition and power relations:

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23 In 1960 only 2% of the Brazilian population had attained secondary education. In the early 1980s the corresponding figure had increased to only 7%. In contrast, the Republic of Korea, in the immediate post World War II years, reported only 13% of its population having had any type of formal education. Yet, after four decades of continuous commitments on human resource development, in the early 1980s the Republic of Korea reported that more than 55% of its population had attained secondary education. For the case of Brazil, see Barros, Mendouca, and Santos (1992), “Consequencias do Desiquaidade a seus Mecanismos de Auto-Reproduca”, in En Perspectives da Economia Brasileira—1992, IPEA, Rio de Janeiro. For the case of the Republic of Korea, see Lee, J.-W. (1995) “Economic Growth and Human Development in the Republic of Korea, 1945-1992”, paper prepared for UN DP (1996) Human Development Report, New York.
• Child bearing and raising as well as household responsibilities increase the probability that the access of females to the labour market will tend, throughout their economically active lives, to take place more via the informal sector. This is particularly confirmed by evidence drawn from developing countries and from societies in which informality in work opportunities is closely linked to efforts for overcoming poverty and destitution. For example, single working mothers often tend to be the poorer and less privileged among the poor in developing countries.24

• At the same time, the informal sector displays structural characteristics which, on the whole, make it less susceptible to the applications of ICT. Thus, the productivity potentials of the use of new technologies will tend to bypass several informal sector activities and, consequently, the workers in such activities. In disproportionately large numbers such workers are females who will find themselves excluded from the benefits of the new technological breakthroughs. This indirect gender bias of the new technologies is obviously not uniform. In other cases, qualified females can be facilitated by ICT to undertake more effectively and with more flexibility their multiple roles in external, remunerated work as well as within their families. The heterogeneity of implications of the new technologies is, again, related to capabilities, human resource advancement, and access characteristics.

• Furthermore, biases in the definition of skills and discrimination at the workplace can further be accentuated through the use of the new technologies. For example, greater dexterity has been shown by females in assembling integrated circuits and other (micro) electronic products in “free industrial zones”. This has led to their massive and highly competitive hiring in such work stations, often under very poor work and environmental conditions. Yet, females are excluded from higher-paying and potentially more rewarding jobs in the same economic activities.

Moving at a more aggregate level, the economic geography portrayed by a country implies differentiated access to and impacts from the new technologies. Thus, in view of infrastructural requirements and diverse economies of agglomeration, differential accesses exist in the use of ICT between the urban centres and dispersed rural areas. If additional discriminatory factors are also taken into account (e.g., lower educational levels in rural areas, higher incidence of poverty and lower resource availabilities, gender and racial biases, etc.), then further serious inequities arise through the differences in the opportunities offered by ICT applications. To overcome such an intensification in unequal socio-economic development within a country, explicit rural

support programs need to be introduced, with special focus on the more vulnerable groups of the population.

Finally, at the international level major inequities result from the concentration of production of ICT goods and services in specific industrially advanced economies. With a few notable exceptions, mostly in Southeast Asia, such ICT-related productive activities turn out, at least for the time being, to be out of reach of most developing countries or, at best, with the latter having only a marginal role. For example, in 1991, the U.S., the European Union, and Japan accounted for 98.8% of world production and 97.7% of world exports of packaged software. All other countries represented 7.7% of world consumption and 17.7% of corresponding imports.25

In the areas where some penetration by newcomers could take place, important barriers to entry have been erected. A major such institutional barrier involves the newly imposed norms on intellectual property rights (IPRs). More changes have taken place on this front during the last 15 years than in the previous 150. Such changes were sanctioned by the World Trade Organisation after the last round of GATT negotiations.

The corresponding “TRIPs Agreement” represented a major achievement of U.S. industrial groups, and a “conceptual leap”, linking IPRs to trade issues, backed by multilateral trade retaliation for noncompliance.26 Furthermore, bilateral pressures have been exerted by governments against a number of developing countries so as to extend protection even beyond the “minimum” WTO norms. Such has been the case of the procedures initiated under Section 301 of the U.S. Trade Act against Brazil, Thailand, and, more recently, China. The overall intention is two-fold: to restrict the access of the newly emerging economies in productive activities and to increase payments from users in the rest of the world.

The primary concern of the new approach to IPR is not to protect creativity and ingenuity but to reward investors. This creates new exclusion mechanisms beyond the range of innovation or of market concentrations established on the basis of knowledge and scale requirements. Instead,


the combination of technical and legal developments could create access barriers to potentially all types of information, as epitomised by institutional trends in databases and in information in “cyberspace”. Some have argued that evolutions in these fields could “distort the public service mission [even] of libraries”.  

The evolving institutional framework and the combined industry-government initiatives from major supplying countries aim at solidifying differences in access and rewards between producers and users of ICT goods and services. International inequities are, thus, further accentuated through institutionally imposed restrictive business practices.

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5. CONCLUDING REMARKS: ALTERNATIVE POLICY APPROACHES IN VIEW OF THE ICT CHALLENGES

Within the context of the market system and the central role that markets have assumed in contemporary development, contrasting policy approaches have emerged. Their recommendations can be grouped into three alternative schools of thought, and their key policy components need to be explicitly reckoned with in formulating appropriate policy initiatives which address the implications of radical ICT changes. These three alternative approaches refer to:

- minimalist state interventions and “free” functioning of markets, as proposed by the neoliberal tradition;
- market-friendly and market-supporting functional interventions, as proposed by the revised World Bank position on structural adjustment programs; and
- the evolutionary school of eclectically combined functional and selective interventions suitable to the market and institutional realities and needs of each economy, with primary examples being those of the Southeast Asian countries.

The first approach, founded half a century ago on the theses of the Austrian school of political economy, has been extended in recent years by neoliberal positions based on two fundamental premises: First, the working of the market system is too complex to be grasped or manipulated, and, consequently, it is not possible to intervene adequately; and, second, the expansion of capitalism constitutes an organic dynamic process hindered by any attempt to intervene in the “free” functioning of its markets. The market’s distortions and failures are mainly the result of government interventions and of excesses in public sector participation in the functioning of economies. Policy guidelines emanating from the above lead to the following conclusions:

- Appropriate signals relevant to business decisions need to be dictated by international market forces. Their appropriateness is accepted regardless of their origin and/or the institutional context from which such signals emerge and are applied. The prevalence of international market forces has been translated into the quick and non-discriminatory liberalisation of external trade, direct foreign investments, technology and financial

market regimes. This is the policy essence of the neoliberal prescription emanating from the Washington Consensus reached a few years ago between heads of governments of the Western Hemisphere economies.\(^{29}\)

- For policy makers, this approach often involves a misrepresentation of the Southeast Asian experience. The latter’s export orientation was misinterpreted to imply neutrality in trade policies, which was, instead, presumed to mean openness and free trade. In turn, this led to a preference for “government-free” and non-interventionist economic environments, thus proposing minimalist government policies and very limited public sector roles. As a consequence of this approach, the most active industrial and overall development policy would be one which is limited in assuring a stable macroeconomic environment and some basic infrastructure. On that basis, market forces will be free to lead business enterprises to undertake the most appropriate investment and operational decisions.

A second broad approach has resulted from the redrawing of the acceptable policy lines as introduced by the World Bank in its structural adjustment programs of the 1990s. According to this approach, public policy interventions are considered appropriate as long as they offset generic market failures. These market-friendly or functional interventions are, consequently, acceptable and come to complement other efforts which reduce government interference in the functioning of an economy. These latter interventions are characterised by the World Bank as being market-distorting and hence market non-friendly due to their selective nature. Compared to its own policy prescriptions of the 1980s, the change in the Bank’s position originated from the need to give a convincing answer to the pervasiveness of selective and proactive interventions in most high-performing Asian economies. Their successful performance took place not only along with multiple interventionist government policies but also, it is being claimed, precisely because of them.

- At the technical level, the distinction between market-friendly (functional) and non-friendly (selective) interventions although spurious, since any intervention which corrects for market failures is “friendly”—addressed the following four major areas of generic market failures:
  - factor market failures, especially in education and information gaps, thus accepting public support for human capital formation and for institutional development to enhance informed decisions;

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scale economies, thus calling for the regulation of inevitable (and/or “desirable”) dominant market positions by large firms in certain activities in which lumpiness of investments is required;

non-appropriability of know-how by firms, thus justifying public support for national innovation systems and intellectual property protection regimes; and

interdependence of certain investment decisions, thus requiring measures which promote infrastructural investments and interrelated fixed capital formations.

In addition, the World Bank correctly stressed the crucial importance of certain “fundamentals” in the policy context of an economy. Such “fundamentals” concern the presence of sound macro policies, the discipline provided by an export orientation, and the pivotal role of a well-educated and adequately trained workforce. Thus, together with these key macro considerations and aggregate resource conditions, the Bank’s revised position accepted three types of government measures to improve restructuring decisions:

- removal of policy distortions;
- interventions to offset generic market failures; and
- market-supporting and market-creating institutions.

Such measures are discipline-strengthening (by increasing competition), mobility-enhancing (through liberalisation policies) and, at least in the short run, resource-augmenting (by the inflows of capital, technology, and information).

A third policy approach recognises that the core of the development process centres on the complex requirements for advancing diverse capabilities in an economy.³⁰ In the current historical context, the long-term success of productive systems depends on their ability to harness new technologies. Such harnessing does not restrict public and private sector policy initiatives only to the requirements of the new technologies. Instead, it also calls for the development of new management and organisational skills, the presence of a multiskilled and adequately trained workforce, collaborative linkages between enterprises, and access

opportunities in third markets. It also involves effective relations of enterprises with capital markets, technology generators, and information flows.

In these circumstances, the development of productive and competitive capabilities in an economy calls for the adequacy of policy initiatives with respect to three essential properties of the development process:

- Technology, and productive know-how more generally, are not codified to be simply picked up from some shelf of the international market and transferred the way physical goods are exchanged. Instead, the tacitness of knowledge implies considerable enterprise-specificity. In turn, this calls for the need to develop diverse capabilities of learning-to-learn and of learning from investment and production activities.

Consequently, the accumulation process in the knowledge base of an economy calls for specific policy instruments which support the longer-term and efficient presence of productive enterprises and of institutions in a country. Otherwise, the unwarranted disappearance of firms and/or of certain activities means the destruction of accumulated capabilities. Their replacement is not likely to be satisfied simply through corresponding market penetration by imports sold at world competitive prices.

- Innovation and learning endeavours are costly, risky, and largely unpredictable processes. This calls for adequately designed protection mechanisms to promote the critically important resource commitments which advance technological and organisational innovation in a society. Yet such protection generates costs for other economic actors in that country. Also, if not properly handled, it could distort longer-term resource allocation in an economy. The resolution of these trade-offs represents a key policy challenge which goes beyond the confines of market failure questions raised by the World Bank. It concerns the priorities and requirements in following a trajectory of dynamic economies of scale and in seeking non-static advantages in resource allocations. Both acknowledge the importance of externalities in the development process.

- As noted in the first point above, knowledge applied in economic activities is not an exogenous factor but, instead, is endogenously mastered by and advanced from enterprise, sector, and country specific resource commitments and initiatives. Furthermore, technological and productive deepening does not simply result from the mere multiplication of inputs. Rather it calls for more complex and activity/sector-specific interventions and competencies. As a consequence, there is a definite need to
design distinct combinations of functional and selective interventions and this because sector conditions and technological requirements differ among them and over time.

- The different policy framework implied by the capabilities development approach, as contrasted to the other two noted above, was clearly present in the industrial policy strategies of the high-performing Asian economies. This is also true for a number of successful OECD experiences. Such an approach eclectically combined functional and selective interventions. The exact nature of these interventions needs to be country- and sector-specific. Knowledge and comprehension lend themselves to abstraction and generalisation processes. On the other hand, in order to be effective, policies require their own knowledge elements as well as specificity and differentiation to account for the socio-economic and institutional context within which they are applied. Part of this context involves the presence of not only market but also of serious government failures, and the need to advance government capabilities so as to promote development through public sector reform.