



OECD DEVELOPMENT CENTRE

Working Paper No. 26
(Formerly Technical Paper No. 26)

THE LEGAL PROTECTION OF SOFTWARE: IMPLICATIONS FOR LATECOMER STRATEGIES IN NEWLY INDUSTRIALISING ECONOMIES (NIES) AND MIDDLE-INCOME ECONOMIES (MIES)

by

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Research programme on:
Technological Change and the Electronics Sector - Perspectives
and Policy Options for Newly Industrialising Economies



**Technical Paper No. 26,
"The Legal Protection of Software-Implications for Latecomer Strategies in Newly
Industrialising Economies (NIEs) and Middle-Income Economies (MIEs)",**

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October 1990.**

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RÉSUMÉ

Le débat sur la nature et l'ampleur de la protection juridique des logiciels survient dans un contexte mondial où l'industrie des logiciels se caractérise par : a) une profonde concentration des producteurs et des utilisateurs dans les pays de l'OCDE ; b) la domination du marché par les firmes américaines, notamment dans le domaine des logiciels standards ; c) l'activité Recherche et Développement (R&D) sur les logiciels réalisée essentiellement dans les pays développés. Très peu d'entreprises de pays en développement ont réussi à s'imposer parmi les créateurs compétitifs de logiciels à l'échelle internationale. Les Etats-Unis, premier producteur et exportateur, ont mis au point un système de protection des droits d'auteur qu'ils ont cherché à exporter, alors même que la pertinence de ce système juridique reste très incertaine à leurs propres yeux. La question du meilleur dispositif de protection des logiciels demeure donc non résolue.

La plupart des entreprises de logiciels dans les pays en développement travaillent à la commande et sur mesure, domaine pour lequel la protection des droits d'auteur n'est pas nécessaire. Dans la mesure où l'apparition, dans certains nouveaux pays industriels, d'une industrie de logiciels standards est réelle, la question de la protection juridique prend un caractère plus urgent, en raison de la concurrence avec des industries "pirates", à faible coût de production. Pour la plupart des pays en développement, la question n'est pas de savoir s'ils protègent ou non les logiciels, mais quelle sorte de dispositif juridique est souhaitable, compte-tenu des conflits potentiels d'intérêt entre les utilisateurs et producteurs, et quel type de réglementation est réalisable au regard de l'économie politique internationale. Le moment est également crucial du fait de la nature et de l'ampleur du dispositif de protection dans un pays donné, qui va dangereusement dépendre du niveau de développement des producteurs locaux de logiciels. Une protection prématurée ou d'une durée excessive peut entraîner l'instauration d'un monopole des logiciels standards importés dans le marché intérieur. Chaque pays en développement doit donc déterminer le meilleur type de régime juridique de protection des logiciels, adapté aux conditions spécifiques qui sont les siennes à un moment donné, en tenant compte des contraintes inhérentes au maintien de l'investissement et des échanges internationaux.

SUMMARY

The issue of the nature and extent of legal protection of software arises in the context of a global software industry in which: a) suppliers and users are both heavily concentrated in the OECD countries; b) US firms dominate the global market, especially for packaged software; c) software Research and Development (R&D) is performed mostly in the developed countries. As yet, very few developing country firms have emerged as internationally competitive software suppliers. The leading software producing and exporting country, the United States, has instituted a system of copyright protection for software which it has sought to export to other countries, even though there remains considerable uncertainty within the United States about the appropriateness of this approach. Indeed, the issue of what sort of regime is best suited to software protection remains an unresolved one.

Most developing country software firms are involved in custom software development, for which copyright protection is largely unnecessary. To the extent that there are prospects in some NIEs for the emergence of a local packaged software industry, the question of protection becomes more urgent, given the difficulties of competing with

a low cost "pirate" industry. For most developing countries, the issue is not whether or not to protect software, but what sort of regime is desirable, given the potential conflict in interests of users and suppliers, and what is feasible given considerations of international political economy. Timing is also crucial, since the nature and extent of protection in a given country will depend critically on the level of development of local software suppliers. Protection given too soon and for too long may simply act to secure a monopoly of imported software packages in the domestic market. Within the constraints defined by the need to maintain favourable trade and investment relations, each developing country ought to consider what sort of software protection regime is best suited to its specific conditions at a given point in time.

PREFACE

The question of the legal protection of intellectual property rights (IPR) has become a charged issue in the political economy of North-South relations. This valuable paper by Carlos Correa discusses this timely topic in relation to the software industry, one of the fastest growing in the world. He explains how software has come to be protected under copyright law, even though there are serious drawbacks to this approach for all concerned. The crux of his argument is that the initiatives for strengthening and extending the legal protection of software internationally have almost completely ignored the problems that this process poses for developing countries. He professes a view similar to that contained in another Development Centre publication by R. Schware (forthcoming), that developing countries face major constraints in entering the international software market. Thus, for the most part they remain users of software and, in some cases, their own local production is for custom applications rather than more general use.

Most developing countries now recognise that some form of software protection is desirable. Yet, there are a number of difficult issues they must confront, the most fundamental of which is how to devise a framework for software protection which balances the interests of suppliers, users, and the public at large.

The topic of software protection reflects a much broader concern of late industrialising economies. The success of many of their predecessors in the 20th century has rested on their successful imitation of foreign technology, indigenising it through an active learning process. Innovation has not been the keynote of recent industrial transformation, at least in the early stages. Does the move by certain OECD countries to impose much stricter intellectual property regimes on developing countries threaten to cut off this once promising avenue to latecomer industrialisation?

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President of the OECD Development Centre
October 1990

I. INTRODUCTION*

This paper discusses, from an economic perspective, the main issues involved in the legal protection of computer programs, particularly as they concern Newly Industrialising and Middle-Income Economies (NIEs and MIEs).

Section II briefly analyses the characteristics of the world software market and production in order to set out the context in which the protection issue is dealt with. It holds that in this area there is a profound North-South technological and industrial asymmetry and that the prospects of developing countries to enter into this field are more limited than often claimed.

Section III presents the main legislative trends regarding software protection and the rationale underlying the prevailing copyright approach. It also examines the ambiguities and uncertainty created by the application of copyright law in this area, and the growing dissatisfaction with its coverage and effects.

The implications of software protection for the diffusion and local production of software are discussed in Section IV. While the granting of some form of protection seems necessary for political or economic reasons, it is argued that its effects on the access to computer programs and on their development depend on the structure of the market and the country's relevant policies.

On the premise that no universally valid form of protection is sustainable, Section V finally addresses some of the regulatory aspects that may influence the diffusion of productive software policies in NIEs and MIEs. It suggests that there is no general prescription on how to formulate an adequate legal strategy on the matter, and that the form and extent of software protection should take into account the economic and technological conditions as well as the objectives of the concerned countries.

The main conclusions are presented in Section VI.

* Research for this report has been funded by the OECD Development Centre as part of its research project on "Technological Change and the Electronics Sector -- Perspectives and Policy Options for Newly Industrialising Economies". The author is grateful to Dr. Dieter Ernst for his stimulating comments and suggestions. He would also like to thank participants of the OECD workshop on the electronics industry (Paris, June 1989) for their comments on an earlier draft of this paper.

II. WORLD SOFTWARE DEMAND AND SUPPLY

1. World Market: Main Features

Software constitutes nowadays one of the most dynamic segments of the information technology market. The world software market accounted, in 1987, for an estimated US\$48 billion; it grew at nearly 22 per cent annually in the period 1984-1987 (OECD, p. 21, 1988)¹.

OECD countries accounted for nearly 97 per cent of the world market in 1984. The United States domestic market represented 54 per cent thereof. Only a few developing countries rank according to an OECD study (OECD, 1985) among the major software markets in the world. Brazil would be the tenth major national market², quite far from Mexico (12th) and South Korea.

The United States accounts for a major part (around 70 per cent) of world software production, followed by France and Japan (US Department of Commerce, 1984). Analyses at country level indicate for most countries, including developed ones, that a significant part of the market consists of imported software distributed by local dealers or by subsidiaries of foreign enterprises. This applies particularly to basic software and various types of standard application software. Custom application programs, instead, are *de facto* reserved to a great extent to local firms.

The US software industry is the most internationalised one among those of OECD countries. A significant part of its worldwide revenues have a foreign origin. France ranks second according to the level of internationalisation of its industry (mainly based on the provision of custom software); United Kingdom, Canada and New Zealand follow. Japan presents one of the lowest levels of internationalisation within OECD (OECD, 1988, Table 24).

Although no specific information is available, it is safe to affirm that the world market share of developing countries is in a 3 per cent - 5 per cent range and that it almost entirely corresponds to application software for domestic markets. Some NIEs have initiated attempts to develop an export-oriented software industry. However, their results are still marginal in global terms.

2. Do the NIEs and MIEs enjoy any competitive advantages in software production?

The determinants of competitiveness in software markets have not been thoroughly studied yet. The dimension of the domestic market and the size and marketing capabilities of the US firms may explain their success at the national and international level (OECD, p. 51, 1988). In most other countries, including France, the limited size of the market seems to be a significant restriction on the growth of the software industry, particularly on expanding towards standard software (Correa, 1987). In the case of Japan (the second largest country by the number of computers installed), the emphasis traditionally put on custom software and the barriers imposed by language may be some of the factors that explain a very low degree of participation in the international market, notwithstanding the size of the domestic market and the

fact that Japanese programmers are reported to be many times more productive than their American colleagues (US Department of Commerce, p. 11, 1984).

In many developing countries software production has been identified as a promising field of action. Although, it is argued, newcomers face high barriers for joining the production of hardware, with low capital investment and the mobilisation of local qualified personnel, it is relatively easy to exploit the growth potential of the software sector. Paradoxically, a few NIEs have evidenced an ability to break into some segments of hardware production (e.g. microcomputers and peripherals) successfully, while the efforts made to establish software capabilities have not had, at least up to now, significant results.

A number of factors may favour the development of software in developing countries. Among them, low wage scales for computer professionals seem the most clear cut advantage. In countries such as India, Brazil and Argentina, local salaries may be many times lower than those prevailing in OECD countries (Katz, 1986; Takahashi and Pereira Lucena, 1988; Subsecretaria de Informatica y Desarrollo, 1987). There may also be advantages stemming from external circumstances, such as growing software backlogs and scarcity of personnel in developed countries, the proliferation of international subcontracting, etc. (see Table 1).

At the same time, however, there are a number of facts that considerably dilute the real possibilities for developing countries to break into the software field.

In addition to the smallness of domestic markets (an aspect which plays a part even with countries like Brazil), there is generally a shortage of professionals actually qualified to develop software in accordance with international standards, as well as for the management of software development projects of a certain complexity³. Moreover, even if those skills are available, the marketing of software, and particularly the access to extremely competitive markets such as the American one, poses extremely difficult problems (Katz, 1987). It is not enough to develop a good software; it is necessary to know how to sell it.

A survey made in Argentina with major local software producers revealed that most firms considered that their comparative advantages (availability of qualified personnel, low salaries) were not sufficient to compensate the obstacles for software development and commercialisation. The obstacles more often cited included the small size of the market, the lack of resources and capabilities in R&D and in marketing, and limitations as to capital investments⁴. In connection with the export of software, the difficulties concerning marketing and distribution and the post-sale client support were particularly mentioned (SPCALAI, 1988). Moreover, the mere identification of a concrete potential demand is problematic, when there is no proximity with the potential user. For this reason, the establishment of subsidiaries for joint ventures may be an essential instrument to enter foreign markets in this field (Correa, p. 8, 1987).

Table 1

FACTORS IN THE DEVELOPMENT OF SOFTWARE BY DEVELOPING NATIONS

FACTORS FAVORING THE DEVELOPMENT OF SOFTWARE	FACTORS RETARDING THE DEVELOPMENT OF SOFTWARE
Low wage scales	Small domestic markets
Growing software backlogs	Low capital availability
Increasing development, operating and maintenance costs	Lack of market expertise
Lack of specialized software for local conditions	Absence of an informatics or computer industry policy
Proliferation of international subcontracting for software development; joint training centers	Absence of taxation/fiscal and R&D incentives for software producers; regulatory restrictions on importation of technology and software
Local support services requirements Modifications requested by users	Shortage of labor with required skills; retention of highly skilled labor necessary
New communications technology	Shift toward semi-automated programming
R&D and marketing	Language barriers
and support	Severe competition from large companies in
	Difficulties in providing adequate maintenance

Source: Schwabe, 1987.

III. LEGAL PROTECTION

1. Main Legislative Trends

The issue of legal protection of computer software appeared when software affirmed itself as a good that could be traded separately from hardware, and particularly with the expansion of "packaged" software. Before 1983, only three countries had specifically legislated on the matter: Philippines, United States of America and Bulgaria. After that year more than a dozen countries introduced rules regarding software protection: Hungary (1983), Australia (1984), Federal Republic of Germany (1985), France (1985), India (1985), Japan (1985), United Kingdom (1985), Taiwan (1985), South Korea (1986), Spain (1987), Singapore (1987), Malaysia (1987), Indonesia (1987), Brazil (1987) and Canada (1988).

The determination of the appropriate legal framework for the protection of software gave rise to considerable debate in both developed and developing countries. In some of them, attempts were made to devise special rules for software protection, in order to take into account its functional character and the peculiarities of its commercialisation and use. In Japan, MITI proposed a special regime in 1983, in order to exclude moral rights, limit protection to 15 years and regulate the use of software on terms balancing the private and public interest. In France, the National Institute of Industrial Property also proposed a *sui generis* optional protection (1984). In Brazil and Argentina also some draft laws proposed special rules (though, in the latter country, having copyright as the general framework). Most of these proposals have been abandoned by now (see also point 2 below).

The protection of software under copyright laws is the predominant trend worldwide. Besides the cases where specific amendments were introduced to such laws, in a number of other countries judicial or administrative decisions also followed that direction (Switzerland, Belgium, Italy, Mexico, Chile, etc.).

In most cases, the adoption of the copyright approach has been instrumented by amendments to copyright laws which specify that software is a copyrightable work as are the rights relating to copies and adaptations. In a few countries the reforms have been deeper, such as Japan and France (Correa *et al.*, 1987, p. 116) as well as in South Korea, Brazil and Indonesia.

All developing countries that have already adopted legislation in order to legally cover computer programs have admitted the copyright principles. The threat of the application of Section 301 of the 1984 US Trade Act, has prompted some countries to deal with the issue in accordance with that approach⁵. In Brazil, the "Software law" of 1987 regulated the application of copyright to computer programs, but also created a detailed regime for the commercialisation of such programs in the country.

2. Rationale for Copyright Protection

Abundant literature has analysed the different legal institutes under which software may be protected, namely copyright, trade secrets, contractual law, patents and a special regime. The application of utility models has also been proposed (Higashima, p. 12, 1986). As mentioned before, the prevailing trend, after some unsuccessful attempts to establish special regimes, is software protection under copyright⁶.

The referred trend has been strongly influenced by the American position on the subject, particularly after the amendment, in 1980, of the US copyright law. In turn, the option for this form of protection has been determined to a great extent by the domestic and international interests of large software producers. The main advantages for them in relying on copyright derive from:

- the possibility to apply well-known and generally respected principles and rules;
- the assimilation of software producers' rights to those of literary, artistic or scientific authors, in spite of the functional character of programs;
- the access of established legal remedies against unauthorized reproduction;
- the long-term of protection conferred;
- the commencement of protection since the date of the creation of a program;
- the lack of registration requirements to obtain protection; and
- the existence of international conventions where protection is obtainable on a universal basis.

The last point mentioned is crucial for the international operation of the industry. To the extent that the copyright approach is admitted, under the Universal or the Berne conventions, a computer program created in one country automatically receives protection in almost any country in the world⁷. The monopoly rights granted facilitate commercial exploitation of such programs on a worldwide basis. The stronger the protection, the less is the need to be present (through a subsidiary or license) in a particular market (Correa, 1988b). The world market can thus be supplied under the highly centralised productive scheme that prevails in the software industry, at least wherever standard products can meet the users' demands and there are no other compelling factors for some form of permanent establishment.

Conversely, copyright offers some disadvantages from the producers' standpoint. The main one is that it is conceived to prevent copying and not the use of a protected work. Henceforth, the legal power to prevent unauthorized use (including private use) is limited. Another problem may arise in connection with the originality requirement. In some countries where high standards are applied (like in Federal Republic of Germany), many computer programs may not qualify for protection⁸. In fact, in many cases a piece of software is determined by functional specifications in such a way that the scope for originality is very restricted or non-existent. In addition, copyright only protects the expression of a work, but not the underlying idea. It therefore allows third parties to base any new development on an existing idea, even if the latter's expression is protected⁹.

On the other side, the impact that the introduction of protection may have in fostering a domestic industry is quite uncertain. Protection is particularly important for standard software, and especially for packages that run on microcomputers. Unauthorized copying of bigger systems is more difficult given the suppliers' proximity (through maintenance and other services) to equipment installations. For custom software - which is precisely the area in which domestic firms mostly work in NIEs and MIEs - contractual provisions may be far more important for protection than any general legal regime¹⁰.

From the point of view of the user, copyright exhibits many disadvantages which come from of the original conception of that legal system. Designed to protect intellectual works as an emanation of human creativity, it is strongly biased in favour of the author's rights. While many rights accrue to him, obligations are minimal. Unlike patents, for instance, no working obligation is generally established. At the same time, protection may be obtained even without disclosure of the work. The long terms of protection (generally fifty years *post mortem auctoris*) do not allow the society to benefit from the free use of the work (in this case a technical functional work) within a reasonable period after its development. Furthermore, as stressed by the MITI's proposal of a special regime, that system does not contain provisions to guarantee the user against defects or lack of support for the use of the programs (MITI, 1983). Finally, the granting of "moral rights" contradicts the nature of software as a living entity, which is constantly adapted and improved.

3. Copyright Questioned

In the light of the difficulties of treating software as a copyrightable work and of the shortcomings referred to, it is not surprising to find criticism and several reservations on the copyright approach, even in developed countries where it has been formally adopted.

Disatisfaction comes from many sides. Producers are unhappy with the limited effect of copyright on actual copying. Producers' associations claim continuous losses due to piracy in the United States and other countries. Surveys made in the United Kingdom and Holland, for instance, indicate a general lack of confidence in the protection provided for computer programs by copyright law. Only 15 per cent of the respondents (in the case of Holland) stated that they were prepared to enforce their legal rights in civil courts in case they were confronted with software piracy. This attitude results from the lack of a clear, unambiguous legislation (Borking, 1987). On their side, users are often confronted with too restrictive clauses, for example, in connection with archival back-up copies (Meisner, p. 397, 1988) and educational purposes (OTA, p. 8, 1986). For instance, a highly controversial draft bill was introduced in April 1988 in France in order to allow universities and graduate schools "to reproduce the software they have acquired for their educational activities, provided that these copies are not used outside of those universities and

schools" (Bertrand and Coust, 1988).

In the United States, the policy on software protection states a study of the Office of Technology Assessment, "is being made in the courts, virtually on a case-by-case basis, and the resulting ambiguities satisfy no one" (OTA, p. 34, 1986).

Case law has, in effect, a decisive role in shaping the scope of protection afforded in that country. One major development has led to a re-interpretation of the principle that confines copyright protection to the program's expression. In *Whelan Associates vs. Jaslow Dental Laboratory*, while recognizing that copyright protection does not extend to the "idea" or functionality of the program, the court held that it covers the sequence, organisation and structure of the code-program¹¹. Furthermore, in *Broderbund Software vs. Unison World* it was decided that the protection of the underlying program extends to all elements of its audiovisual display¹². Courts also face the need to decide on the imprecise frontiers of copyright protection in specific cases. After an intense debate they decided to support the copyrightability of "microcode" - which controls the sequence of operations carried out within the computer in response to a particular instruction received - in *NEC Corp. vs. Intel Corp.* (Sandison, 1987) despite its clear mechanical and utilitarian nature¹³.

In *Alloy vs. Ultratek*, moreover, the copyrightability of hardware itself in the form of Programmable Array Logic chips (PALs) is at stake. If the decision is affirmative, "then hardware - at least its low-level, step-by-step functionality - would qualify as a 'work of authorship', placing virtually all unpatented logic devices (generally presumed to lie in the public domain) under the protection of copyright law" (Siegel and Laurie, 1989).

In other pending cases (based on suits by Lotus, Development Corp., Ashton Tate Inc. and Apple Computer Inc.) judges are bound to decide whether a software company can legally protect a program's appearance, design and functionality - its "look and feel". If granted, such a protection would include visual program features as pull-down menus, graphic symbols and even certain keystroke sequences. This eventual further extension of copyright has already brought up considerable criticism, and raised questions on the capabilities of American software firms to compete on the basis of innovative ideas rather than on the basis of legal instruments (Burgess, 1989; *Business Week*, Editorial, p. 22, 1989).

The confusion on the means to ensure the legal protection of software has increased recently in the United States, due to the so far successful attempts to ensure patent protection for computer programs. Recent evidence indicates "that all software claims are eligible for patent protection unless they simply involve the use of a mathematical formula to calculate and display a number. Software patentability is a *de facto* reality today, as the Patent and Trademark Office (PTO) now commonly issues patents for software inventions" (Maier, p. 157, 1987)¹⁴.

The inadequacy of copyright protection should, in view of the US Congress Office of Technology Assessment (OTA), lead to the development of a new legal framework:

"The distinction between writings and inventions is indeed breaking down with respect to functional works such as computer software and semiconductor chip masks. Because there are many works of this type, they may require their own framework for protection. If it were based on the

distinctive characteristics of these works, the law might be more accurately targeted to achieve specific policy outcomes, thus serving as a more robust policy tool. With a new category of law, both producers and users would face less uncertainty each time a new type of work were introduced. OTA's analysis suggests, too, that a fruitful basis for a revision along these lines might be found in the distinctions between works of art, works of fact, and works of function" (OTA, p. 14, 1986).

Paradoxically, OTA recommends an approach that, as indicated before, the US government has strongly opposed, particularly in Japan. The need to look for a special form of protection was also stressed in other countries when amendments to their respective copyright laws were proposed or approved. In France, the rapporteur senator Jolibois qualified software as being of "industrial character". Moreover, it was stated that the law was "approved as a temporary measure, still remaining as an ultimate objective the search for a specific form of protection which will surely require some years to be found" (*Journal Officiel*, 1985). In Australia, the Minister of Justice referred to the 1984 amendment in his country's legislation as "a solution for the short term", which should allow to completely revise the policy adopted for the long term. In Canada the study "From Gutenberg to Telidon - A white paper on copyright" published in 1984¹⁵ understood - like some judicial decisions in several countries - that the object program was not protectable under copyright law. A special title for ten years was proposed¹⁶.

It should also be recalled that the specialized UN organisation on intellectual property, the World Intellectual Property Organisation (WIPO), proposed in 1978 a set of model specific rules on software, later on abandoned as the copyright approach became prevalent. The WIPO's recommendations have been the basis, however, of many initiatives such as the comprehensive computer draft law recently distributed by the Ministry of Justice of Israel (Levenfeld, p. 5, 1988).

Many authorities have objected to or made reservations on the application of copyright to software. Trolle (Switzerland) advocates that software is an intellectual method, not a creation. It would lack esthetic character (Ulmer and Kole, 1983). Desjeux (France) stresses that intellectual property is a "hommage" of society to "creators" (moral rights, long term of protection, etc.). The inventor receives more limited rights, like the software producers should, since the latter make an "intellectual contribution" but do not "create" (Desjeux, 1986). Van der Berghe (Belgium) argues that the lack of human communication in software conspires against the fundamentals of intellectual property (Flamée, 1985). G. Shipley (United Kingdom) affirms that software is different from protectable works both for its origin and use (Shipley, 1985)¹⁷. Jean Jonquères, Presiding Judge of the Supreme Court, in Paris, after analysing the disappointment with software protection through copyright, concludes that the protection by a patent is likely to be even more disappointing "in view of the traditional strictness in applying the criteria of patentability and the interpretation of the claims. In the absence of any general text governing the protection of intellectual property, would it not be better to move towards a protection *sui generis*? This, with the protection provided by legal proceedings for unfair competition, is the only satisfactory protection for intellectual creations" (Jonquères, p. 620, 1987).

Briefly, copyright has not yet succeeded in becoming an uncontested and satisfactory framework for software protection. It is likely, in fact, that even if it is admitted that software deserves legal protection, the debate over the form that it should assume will

continue in the future. A crucial point is how a proper balance among the different interests at stake can be reached¹⁸. Of course, such a debate is of utmost relevance for developing countries, particularly for those which intend to formulate active policies with regard to the diffusion or local production of software.

IV. IMPLICATIONS FOR SOFTWARE DIFFUSION AND PRODUCTION IN NIEs AND MIEs

The analysis made in the precedent sections indicates, first, the existence of a profound North-South asymmetry in technological and productive capabilities for software development; second, that notwithstanding some efforts, the NIEs and MIEs have not been able to achieve significant positions in the software field; third, that the existence of given comparative advantages for software development in those countries is questionable.

On the other side, Section III has showed that considerable uncertainty and ambiguity prevails in connection with the extent of protection conferred by copyright.

What implications may the prevailing software protection patterns have on NIEs and MIEs in this context? This question should be dealt with in relation to two aspects: the diffusion and the local production of software.

From the point of view of diffusion, liberal copying would arguably reduce the cost of access to software. In the last analysis, suggests Prof. Wells, for a country which is not an innovator in the field it may be convenient, from an economic perspective, to facilitate the obtention of copies at low costs to stimulate a rapid software diffusion and save foreign currency (Wells, 1987). High software prices¹⁹ may make it difficult for domestic firms to computerize and compete internationally. Important trade-offs may exist, however, whether protection is granted or not. The lack of appropriate maintenance and after-sales support, and the consequences thereof for an efficient application of computer programs, may limit the advantages of non-protection. On the other side, while licensing under copyright may slow the diffusion of certain types of software, it may at the same time support the introduction into the economy of high-quality types of software. From an international point of view, moreover, a free-copying approach would be extremely conflictive. It does not seem feasible nowadays for a country to complete by departing from generally accepted rules in intellectual work protection.

The initiatives for strengthening and internationally expanding the legal protection of software have almost completely disregarded the problems posed for developing countries. The establishment of some form of protection will, in the first place, work in favour of those enterprises already operating in the market. It will eventually reduce piracy and increase the income obtained through the distribution of a larger number of copies, at a higher price. Firms exporting software to the protected market would be among the main beneficiaries of the legal change. It is noticeable, however, that according to an OECD survey, the lack of protection by national law is not deemed by exporting firms to be a "high" obstacle for international operations, but just one of "medium" importance (OECD, p. 65, 1988).

Again, the impact of protection considerably differs according to the type of software developed. It may eventually have a significant impact if national firms intend to compete in the area of packages; this is, however a considerably limited possibility due to the size of local markets, the investments needed and the difficulties in specifying standardized

products for distant potential users. If software development basically means production of custom programs, legal protection will not add very much to the existing situation.

The surveys made in some countries illustrate the software suppliers' point of view on the issue. The information collected in Argentina and South Korea revealed a general attitude in favour of legal protection²⁰. In both cases, however, an important proportion of respondents indicated their preference for a special regime rather than for copyright (90 per cent in Argentina; 42 per cent in Korea). Moreover, in the case of South Korea, the majority (97 per cent) "feared that the implementation of such protection at too early a date would hamper the growth of the domestic information industry" (Song, p. 5, 1987).

In sum, to the extent that a local industry is confined to or concentrates itself on custom programs, the effects of legal protection will mainly reflect on imported software. Even in the case where packages are also produced, it cannot be assumed - obviously - that the introduction of protection or of a strengthened regime will lead automatically to more and better local production. The legal framework will be one factor that may influence the software development, but in no way may it be deemed to be the most important or even a significant promotional element. The protection conferred may eliminate the unfair competition of pirated programs sold for a few dollars. This positive effect may be counterbalanced, however, by a stronger competitive position ensured to importing firms and, eventually, by a larger presence of foreign companies in the local market.

Another aspect to be considered is the situation of a country that does not confer protection and is willing to export software to third countries. Under present international conventions (Berne and Universal) the Member countries are only bound to grant foreigners "national treatment". This rule would not be violated if neither foreigners nor nationals were granted protection. It is doubtful whether it can be interpreted that those conventions cover computer software within their widely defined scope. However, present initiatives of the United States at GATT precisely aim, among other things, to establish software protection under copyright as a universal standard. Japan and the EEC also share this proposal, notwithstanding some differences as to the content of the standards and norms to be developed (Correa, 1988b).

In any case, it seems clear that the development of a local software industry will not necessarily be benefited - it may also be jeopardised - by the establishment or strengthening of a legal system of protection. The promotion of a software industry will require more complex and specific instruments than simple protection. The experience of many countries - Brazil, India, South Korea - indicates that special policies had to be implemented with that aim (see point II.3 above).

V. OPTIONS FOR NIEs AND MIEs: KEY ISSUES IN DEVISING LEGAL REGIMES FOR SOFTWARE PROTECTION

The newness and complexity of the protection issue, and the confusion existing in developed countries, makes it extremely difficult for a developing country to adopt decisions on the matter. As mentioned before, dissatisfaction with the copyright approach is important and growing. The patent system does not seem to offer a better solution. It makes protection stronger since even independent developments on the basis of the underlying ideas of a program would be excluded. The setting up of a special regime, finally, faces the difficulties inherent to the creation of a completely new legal framework, particularly vis-à-vis its recognition in other countries.

Independently of the approach followed, a number of key issues need to be considered if certain industrial or diffusion objectives are sought.

1. Subject Matter and Scope of Protection

While recognising that protection extends to computer programs in its source or code form, or even embedded in a Read Only Memory (ROM), the development of the industry requires that the ideas themselves do not become directly or indirectly the property of the program title holder²¹. In this sense, the Japanese law explicitly excludes from protection the algorithms and rules employed in the development of a program. Likewise, languages should not be considered copyrightable. Only the expression of a program is to be deemed protectable, if some room for alternative creation of software is to be retained.

2. Duration

The typical duration for copyrights, as mentioned before, generally extends beyond the author's death. In the case of works of juridical "persons", periods of 50-70 years are the rule. These terms are clearly incompatible with the diffusion of computer programs while they are still economically and technologically valuable. Moreover, the recovery of investments made in the development of a program is often completed in a few years. The extension of the exclusivity would only ensure a monopoly rent for the title holder and prices for users higher than those obtainable under free competition. While adopting the copyright framework, some countries (France, Brazil, Indonesia) have limited its duration to 25 years for computer programs.

3. Adaptations

A crucial point for countries which are strongly dependent upon imported software is to allow some flexibility for adaptation of programs, either to specific types of equipment (this would be particularly important if a local hardware industry is promoted), or to local conditions. The Brazilian law, for instance, stipulates that when provided for in the contract, the rights on the technological changes and adaptations will belong to the person authorized to make them, who will exercise those rights autonomously (Art. 6, Law 7646).

4. Copies

Developed countries' laws tend to restrict the right to make copies²². Three main regulatory lines seem to exist:

1. Copies are permitted by law, under specific conditions (United States, France, Japan);
2. Copies need always to be authorized by the proprietor (Federal Republic of Germany, United Kingdom);
3. Back-up copies are permitted by law, except if prohibited by the proprietor (Australia) (Correa, 1988a).

A broader right to make copies may be necessary, however, to reach a balance between the title holder and the user's interests. The diffusion of software may, in particular, be hindered by too stringent provisions on this aspect. The Brazilian law permits the legitimate user to make all copies "indispensable for adequate use" of the program (Art. 7, Law 7546). The South Korean 1987 law, for its part, allows reproductions for use "for the individual purpose in a limited place like home" and for educational purposes, among others (Art. 12, Law No 3920, Dec. 31, 1986)²³.

5. User's points

Another important regulatory aspect relates the rights for the continuous use of a program. Since under copyright registration is neither compulsory nor ensures full disclosure, in certain situations - such as when the title holder has gone out of business or cannot be contacted - the user may be in a very difficult position. The South Korean law, in a quite original provision, stipulates that if the owner of the program copyright is unknown and cannot be located, the user may apply to the Ministry of Science and Technology for approval to use the work. In such cases, a deposit of compensation for use of the program will have to be made with the Ministry (Art. 17). In order to facilitate the access to computer programs Article 18 of that law provides, further, that a program copyright holder must allow a *bona fide* user to use a program which has already been published and distributed unless there is justification for not doing so (Art. 18)²⁴.

For its part, the Japanese law does not deem the use of a program for non-commercial purposes to be a copyright violation when the user does not know about the infringing character of the copy.

As the preceding discussion reveals, the regulation of software protection may - even within the framework of copyright principles - reflect certain policy objectives related to the diffusion or production of programs. How to obtain a balance between the private and public interests, including those of users as well as of local industry, is the crucial point for the formulation of strategies on software protection.

It should be clear, in particular, that no general prescription on the matter can be made. There is nothing in the nature of software as an economic and technological entity that would justify a universal approach, independent from the productive and technological development and from the public policy objectives of the regulating country.

Points 1. to 5., above, illustrate some of the ways in which the balance referred to may be struck. The clear limitation in the extent of protection (the expression and not the ideas or internal software structure), certain flexibility regarding the right to make copies

and adaptations, a reasonable duration and the establishment of certain guarantees in favour of such users (such as the non-voluntary license provided for in South Korea), are among the elements that may contribute to attain such a balance.

As mentioned before, the number of developing countries that have already legislated on software protection is very limited. In many cases, the issue has not still emerged or gained public attention. In others, studies are only starting at the academic or governmental level. Finally, in a third group, pressures by the United States or by organised local associations (mainly those controlled by distributors of imported software) are pushing for the adoption - by legislation, administrative act or jurisprudence - of the copyright approach. In addition, the initiatives of the United States and other industrialised countries to define international "norms and standards" within the Uruguay Round include, among other matters, rules relating to computer program protection under copyright.

If the copyright scheme is imposed in GATT negotiations, the immediate consequences for most developing countries party to GATT would be the adoption of new laws and the amendment of existing ones in order to bring their intellectual property systems in consistency with the agreed norms. This would imply the loss of GATT concessions and advantages for countries unable or unwilling to adapt their legal regimes to the minimum standards and for those unable to enforce them.

In this context, most developing countries will be confronted, in a bilateral or a multilateral framework, with the need to decide on the software protection issue. Considerable room for co-operation among such countries seems to exist. That co-operation may take various forms and imply different degrees of commitment, ranging from co-ordinated action in bilateral and multilateral negotiations, to the definition of a more substantial common position²⁵. Joint efforts to understand the implications of software protection and to devise the most appropriate legal models may therefore also be fruitfully envisaged²⁶.

In sum, the strategic options for NIEs and MIEs on software protection are limited by the newness of the issue and the ambiguities that still prevail on the form of regulation, as well as by the choice already made by the majority of industrialised countries. In view of the growing dissatisfaction with the parameters and results of protection through copyright, however, the best solution for many countries would be

just to wait until a more precise picture is available. In fact, no real urgency to deal with the matter - at least from a legislative point of view - would exist in most developing countries, if the main concern is the protection/promotion of local software production. As said before, to the extent that custom software largely prevails, contract law may be a more effective mode of protection than a general regime.

In the event that bilateral or multilateral pressures make it necessary to produce a more immediate response, it should be clear that copyright is neither the best nor the "natural" solution, and that skilful drafting of pertinent rules may permit the right balance between the private and public interests involved.

VI. MAIN CONCLUSIONS

Any analysis on the software protection issue requires full understanding of the economic, institutional and technological context in which the debate takes place. Study of the world software market reveals a number of important facts in that respect: its dynamic growth; the overwhelming importance of developed countries as users and producers, the dominant position of United States firms; the high concentration of the supply, and the centralisation of R&D activities, among others. It also indicates that NIEs and MIEs have no comparative advantage for successful competition internationally, or even domestically with imported packaged software. If substantial efforts to improve production and marketing methodologies are not made, the participation of such countries in the software area may remain illusory.

The consolidation of copyright as the basic approach for software protection, cannot be attributed to its appropriateness for the subject matter. It rather shows the power of the software leading country - the United States - to force the adoption of a legal system that basically reflects the interests of its industry - the most internationalised one among the OECD Member countries. The ambiguities and uncertainty that the application of copyright creates, has promoted the search for alternative forms of protection. Some of those initiatives were abandoned under United States' pressure. Others - like the application of patent law or the new approach suggested by OTA - indicate that even within that country the issue is still open to controversy.

Copyright protection of software is generally considered in developed countries as a means of promoting innovation and ensuring a reward for investments made in the development of new products. The attempt to transfer the legislative pattern adopted by such countries to the rest of the world, assumes that a similar legislation will have similar effects, independently of the technological and economic context in which it will be applied. It seems clear, however, that the extension of copyright would mainly benefit software exporter firms that operate on a world scale. It is questionable that the protection would foster the diffusion and local software production in all countries, particularly in developing ones.

Diffusion may, in practice, be hampered by provisions such as those concerning adaptations and copying. However, since the total exclusion of protection does not seem potentially sustainable, the problem in that respect is how to strike a proper balance between producer, user and public interests.

From the point of view of production, local firms have not too much to benefit from protection if they are basically involved in the development of custom software, for which contractual law is the main means of protection. The production of packages may introduce a different picture, since it is not possible to compete with a low cost "pirate" industry. In any case, the impact of the legislation will depend on the segments in which local production will compete and on the terms under which the protection is granted.

It is clear, on the other hand, that mere protection is not sufficient to promote and give viability to a software industry. Other specific policies may be necessary in order to overcome the often serious obstacles that NIEs and MIEs face in this sector.

Finally, to the extent that the question is not whether to grant protection or not, but what type of regime is best and when it should be implemented, the regulation of different aspects (scope of rights, duration, etc.) is particularly relevant. From a technical point of view there is considerable room to frame a legal regime that takes into account specific diffusion or productive objectives, and which pursues a balance between public and private interests. The foreign policy implications of such a national decision on the subject are, of course, a different matter.

NOTES AND REFERENCES

1. For Western Europe, INPUT estimates that the market will grow between 1987 and 1992 at an average annual growth rate of 24 per cent (INPUT, p. 4, 1987).
2. The figures for the Brazilian software market contained in the OECD study, however, should be cautiously considered. Other sources estimate a considerably lower market size.
3. In Brazil, it has been noted, for instance, that though there are capabilities to develop an ADA-like compiler, skills for managing a project for the development of an environment in that language (which would involve a million and a half lines of code) do not exist (Pereira de Lucena, p. 17, 1988).
4. Software engineering tools are very rarely used in Argentina (SPCALAI, 1988). In the long term such tools may erode eventual competitive advantages based on the availability of low cost - qualified personnel.
5. Pressures have been exercised on several Asian and Latin American countries (particularly Brazil). Thailand is still in conflict with the United States on this matter (Krim, 1989).
6. After hesitation, the Soviet Union is also likely to join those countries who support the copyright approach.
7. Countries such as South Korea, which had not adhered to such conventions, have recently revised their position thereon, in part as a result of American direct pressures.
8. In France and United States, on the contrary, a low originality requirement is applied.
9. See, however, the implications of the *Whelan* case below in this section (point c).
10. This fact explains that national producers concentrated on custom development, and did not discover the issue of software protection until pressures of package distributors emerged.
11. A similar decision was taken in the *Gem Scan* case in Canada.
12. This interpretation has also been embraced by the US Copyright Office, though other decisions have ruled that a separate protection for such displays should be sought for (Russo and Hale, p. 9, 1988).
13. In accordance with one opinion, the protection of microcode by copyright could result in an extension of the monopoly of the copyright owner beyond the termination of any patents governing the computer systems. "The lengthy copyright monopoly with its presumption of validity would be a frightening weapon having significant 'in terrorem' effect against any competitor developing a computer with an instruction set compatible with a previously developed computer or microprocessor,

whether copied or not" (Mac Pherson *et al.*, p. 4, 1986).

14. Examples of patented software inventions include a process for a management control system for multiprogrammed data processing, a method of constructing a task program for operating a word processing system, a program that checks for spelling errors, and a program that converts one programming language into another (an RPG to COBOL compiler). Perhaps the best known software patent was issued to Merrill Lynch for a Securities Brokerage and Cash Management System. Protection is conferred by the PTO without requiring the submission of full source-program, *i.e.*, only partial disclosure is being accepted at the administrative level.
15. The paper was prepared by the Department of Communications and by the Department of Consumer and Corporate Affairs, Supply and Services.
16. In *IBM Corp. vs. Ordinateurs Spirales*, a Canadian court, however, accepted copyright for an object program. In 1988 the copyright law was amended in order to fully incorporate software as a copyrightable work.
17. Arguments for a new form of legal protection in the United Kingdom, with a shorter term and tailor-made rules are presented by Staines (1988).
18. In its proposal on intellectual property in GATT, the EEC has held, for instance, that software protection should take account "of the legitimate interests of users, the promotion of international standardization, the development of compatible and inter-working systems and maintaining the conditions of competition" (July, 1988).
19. In Thailand, for instance, Lotus 1-2-3 could cost US\$715, more than twice as many Thais earned in a month (Krim, 1989).
20. The Argentine survey was responded to by 156 firms producing, importing or distributing software (Subsecretaria de informatica y Desarrollo, p. 72, 1987); in South Korea, 384 replies were obtained on the basis of a questionnaire sent to 2 780 persons including businessmen, academics, researchers and public officials with ties to, or interest in, the computer software field (Song, 1987).
21. The weakening of the competition that may result from the application of a doctrine such as that held in *Whelan* is discussed in Bulkeley (1986).

22. In the United States, for example, though the CONTU report proposed to allow the right of copying to any "authorized possessor", the law restricted it to any "authorized owner" of a copy (Meisner, p. 394, 1987).
23. Among the comments and proposals made to the Taiwan government request after the amendment of the copyright law in 1985, the establishment of a compulsory licensing system was suggested. "Under such a system, whoever needed a program could use it lawfully at a reasonable price. The software rightholder could avoid litigation expenses involved in pursuing pirates", (Chang, p. 464, 1987).
24. Limitations on the "moral rights" of a program title holder may also be found in the legislation of France (Correa *et al.* 1987).
25. The so-called "Group of Eight" Latin American countries, for instance, has agreed to co-ordinate their positions in GATT negotiations on new areas, including intellectual property ("Acapulco Declaration", 1987).
26. Representatives of Parliaments of twelve Latin American countries recommended, in 1987, the preparation of "a model of informatics legislation for the (Latin American) region". See *Informatica e Integracion en America Latina y el Caribe*, p. 19, 1987.

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