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THE INTERNATIONAL TRANSFER OF TECHNOLOGY: LESSONS THAT EAST EUROPE CAN LEARN FROM THE FAILED THIRD WORLD EXPERIENCE

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INTRODUCTION

The twin concepts of technology transfer and development are nothing new to many third world nations. Since the middle of the twentieth century, many of these nations[1] have been engaged in intense, varied efforts to import the developed technologies of the northern industrialized countries and bridge the tremendous economic gap between the north and the south. These efforts have met with relatively little success.

In recent years the demand for technology to enhance development has come from another source as well: the nations of East Europe.[2] As these countries began the struggle to reform themselves economically and politically in the late 1980s, they found that they lagged far behind the rest of the industrialized world technologically, and concluded that importing technology from the West was crucial to their reform efforts.[3]

The critical issue now for these European nations—and for the world—is to learn from the failure of attempted technology transfers to the third world so that the nations of East Europe will successfully be able to attract modern technology, absorb imported technology, and transform themselves into modern economic powers.[4]

Section I of this Recent Development will provide a general overview of the technology transfer process, including explanations of the key

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1. These nations are somewhat interchangeably called "third world," "the south," "lesser developed countries," "group B nations," or "Group of 77." *See* Mark R. Joelson, *United States Law and the Proposed Code of Conduct on the Transfer of Technology*, 23 ANTITRUST BULLETIN 835 (1978).

2. The East European nations are Bulgaria, Czechoslovakia, Hungary, Poland, and Romania.

3. *See, e.g.*, Jackson Diehl, *East Europeans Turn to West in Effort to End Technology Gap*, WASH. POST, Feb. 28, 1988, at H1.

4. Authorities have uniformly agreed that some form of technology transfer is crucial for economic and social development in nations that are lagging behind technologically. One commentator estimates that 87.5% of the growth of per capita income in the United States in the first half of the twentieth century was due to technological progress. Robert M. Solow, *Technological Change and the Aggregate Production Function*, 39 REV. ECON. & STATISTICS 312, 320 (1957).

terms and concepts involved in that process. Section II will review the third world experience with transfers of technology and explain why that experience did not result in the hoped for technological transformation. Section III will discuss the past and present situation of the East European nations and suggest what those nations can learn from past technology transfer experiences so that they may be more successful in their technological development.

I. THE TECHNOLOGY TRANSFER PROCESS

A. Definitions

1. Technology

There is no general agreement on exactly what constitutes technology or how technology should be defined.[5] The United Nations, in a document designed to help countries plan their technological development, has adopted a very broad view of technology, referring to it as "a combination of equipment and knowledge."[6] Other commentators, after acknowledging the ambiguity of technology and the fruitlessness of trying to define it with specificity, have settled on a more functional description. For example, some refer to technology as the systematic application of scientific or other organized knowledge into practical tasks.[7] The developed countries appear to have adopted this functional definition. The Organization for Economic Co-Operation and Development ("OECD"), which includes many of the developed nations of the

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5. Some scholars have employed very broad definitions designating as technology anything "patented and unpatented, [that relates] to product, production, process and facilities design, and management technique. It includes franchise methodology, conventioanl technology, know-how, and high technology." Joan I. Farcus & Lauren W. Falk, *Transfer of Technology Between the United States and Less Developed Countries*, 16 LAW/TECHNOLOGY 3, 10 (1983) (citing Martin Feinrider, *UNCTAD Transfer of Technology Code Negotiation: West and East Against the Third World*, 30 BUFF. L. REV. 753, 757 (1981)).

6. "'Equipment' comprises all kinds of tools, vehicles, machinery, buildings and what is known as process technology. 'Technological knowledge' covers all kinds of skills ... process and product know-how, institutional and organizational know-how, and information about equipment and knowledge ...." *Planning the Technological Transformation of Developing Countries*, U.N. Doc. TD/B/C.6/50 (1981) [hereinafter *Planning*]. For other extremely broad definitions of technology see ERIC W. HAYDEN, TECHNOLOGY TRANSFER TO EAST EUROPE—U.S. CORPORATE EXPERIENCE 23 (1976) ("Technology is the quantum of knowledge by which such inputs as patent rights, scientific principle, and R&D are translated into production of marketable industrial materials, components, and end products"); UN/ECE, Proceedings of the UN/ECE Seminar on The Management of the Transfer of Technology Within Industrial Co-operation, Geneva, Feb., 1976.

7. JOHN K. GALBRAITH, THE NEW INDUSTRIAL STATE 12 (1967).

world,[8] proposed that "technology means the systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of a service, including any integrally associated managerial and marketing techniques."[9]

Defining technology functionally adds an element of subjectivity. If "technology is, in fact, the use of scientific knowledge by a given society at a given moment to resolve concrete problems facing its development ...,"[10] then what constitutes technology will vary with the culture and with the level of development.

For purposes of this Recent Development, a working definition of technology will be adopted which incorporates both the broad and the functional definitions. Technology will be considered anything, tangible or intangible, that could contribute to the economic, industrial, or cultural development of a country, whether or not that technology is presently available to the country.

2. *Technology Transfer*

Authorities have had similar difficulties defining "technology transfer." There has been a general consensus that any workable definition of technology transfer must be functional rather than formal; however the specific definitions have varied. One scholar defined it as "the process by which science and technology are diffused throughout human activity."[11] Another labeled it "the transmission of know-how to suit local conditions . . . ."[12] Nevertheless, both authors were careful to point out that the transfer of technology requires a functional component—in order for there to be a true transfer of technology, there must be effective absorption of the transferred technology by the reci-

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8. Specifically, the current membership of the OECD includes: Australia, Austria, Belgium, Canada, Denmark, Finland, France, the Federal Republic of Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

9. Proposal made during the negotiations for an International Code of Conduct on the Transfer of Technology, U.N. Doc. TD/CODE TOT/C.1 WGI/CRP.3 (1979). Interestingly, this proposal, which calls only for "knowledge," seems to exclude any requirement that transfers of technology include tangible items.

10. OECD, NORTH/SOUTH: TECHNOLOGY TRANSFER—THE ADJUSTMENTS AHEAD 18 (1981) (citing OECD/Interfutures, *The Problems of Technology Transfer Between Advanced and Developing Societies, in* MIDWAY THROUGH INTERFUTURES (1978)).

11. Harold Brooks, *National Science Policy and Technology Transfer, in* NSF, CONFERENCE ON TECHNOLOGY TRANSFER AND INNOVATION (1966).

12. Kaynak, *Transfer of Technology from Developed to Developing Countries: Some Insights from Turkey, in* TECHNOLOGY TRANSFER 155 (A. Cosku Samli, ed. 1985).

pient country.[13] Another commentator elaborated, "the important factor [in defining technology transfer] is that the recipient acquires the capability to manufacture itself a product whose quality is comparable to that manufactured by the technology supplier."[14]

Thus there is no consensus on the definition of "technology transfer." Although discussed in the United Nations for years, there has not yet been any formal agreement within that body.[15]

B. Forms and Methods of Transferring Technology

It is widely acknowledged that most technology transfers take place through investment contracts with transnational corporations ("TNCs")[16] headquartered in developed countries[17] since TNCs are the sources of most of the world's technology.[18]

Although the TNCs' position of control in the world's technology market has often been criticized,[19] it is not likely to change. TNCs are able to retain their control over the world's technology supply since they conduct virtually all of the world's research and development ("R&D").[20] Of all the R&D projects begun, it is estimated that as few as

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13. *Id.* at 155–56.

14. HAYDEN, *supra* note 6, at 24.

15. *Further Consultations on a Draft International Code of Conduct on the Transfer of Technology*, U.N. Doc. TD/CODE TOT/56, at 3 (1990).

16. Over the years, these corporations have been called "multinational corporations," "multinational enterprises," and "transnational corporations," the term which has generally been used since 1974.

17. *See* Helen E. Weidner, *The United States and North-South Technology Transfer: Some Practical and Legal Obstacles*, 2 WIS. INT'L L.J. 207 (1983); JAN MONKIEWICZ, INTERNATIONAL TECHNOLOGY FLOW AND THE TECHNOLOGY GAP—THE EXPERIENCE OF THE EAST EUROPEAN SOCIALIST COUNTRIES IN INTERNATIONAL PERSPECTIVE 124 (1989).

18. *See* MONKIEWICZ, *supra* note 17; Bambang Kesowo, *Transfer of Technology: A General Overview on the Developing Countries' Problems and Attitudes; A Case Study on Indonesia* 19–20 (1983) (on file at the International Legal Studies Library, Harvard Law School, Cambridge, MA).

19. Some commentators have called the TNCs' command of the world's technology "monopolistic" or "oligopolistic." *See* Duane W. Layton, *Japan and the Introduction of Foreign Technology: A Blueprint for Less Developed Countries?* 18 STAN. J. INT'L L. 171, 174 (1982).

20. *See* PETER NANYENYA-TAKIRAMBUDDE, TECHNOLOGY TRANSFER AND INTERNATIONAL LAW 5 (1980). In a 1980 report, the United Nations estimated that industrialized countries spent between 16 and 17 times more of their gross national product on research and development than did developing countries. *Formulation of a Strategy for the Technological Transformation of Developing Countries*, U.N. Doc. TD/B/779 (1980). The report also disclosed that developing countries held only one percent of the world's patents, and that in those underdeveloped countries with patent systems in place, 84% of the patents were owned by foreigners.

twelve percent result in commercial success.[21] The established, financially secure TNCs are uniquely able to raise the capital and commercially endure the risk of conducting R&D to support these projects.[22] Finally, TNCs are the world's experts at applying science and technology to production and marketing.[23]

1. Forms in Which Technology May Be Transferred

Technology is primarily transferred in three forms.[24] First, it can be transferred via machinery or other intermediate goods.[25] This is normally adequate for manufacturing purposes where the nature of the technology is not complex and where no proprietary techniques or processes are involved.[26]

Technology can also be transferred through individual experts. Although this technique is employed relatively often, it normally goes unpublicized.[27] Transferring technology via a competent expert has the advantage of cost-savings to the recipient, but it is generally suitable only for small and medium-sized projects where the technology is simple and unpatented.[28]

Finally, technology can be transferred through technical know-how, patented or unpatented, or other information subject to proprietary rights.[29]

2. Methods of Transferring Technology

a. Direct foreign investment

The traditional method of transferring technology has been through investment in wholly owned and controlled subsidiaries.[30] Not surpris-

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21. JOHN E.S. PARKER, THE ECONOMICS OF INNOVATION: THE NATIONAL AND MULTINATIONAL ENTERPRISE IN TECHNOLOGICAL CHANGE 52 (1974).

22. Nanyenya-Takirambudde, *supra* note 20, at 18. For an extensive discussion of the TNCs' dominant position in the technological marketplace, see *Dominant Positions of Market Power of Transnational Corporations*, U.N. Doc TD/B/C.2/167 (1978).

23. *See* RUTHERFORD M. POATS, TECHNOLOGY FOR DEVELOPING NATIONS: NEW DIRECTION FOR U.S. TECHNICAL ASSISTANCE (1972).

24. These three forms are by no means exclusive. This Recent Develop[ment] will discuss other forms of technology transfer in later sections.

25. *See Guidelines for the Study of the Transfer of Technology to Developing Co[un]tries*, U.N. Doc. TD/V/AC.11/9, at 5 (1972); *see also* UNIDO, ID/98 (1975).

26. *See* Kaynak, *supra* note 12, at 165.

27. *See id.*

28. *See id.*

29. *See* Kesowo, *supra* note 18, at 24.

30. *See* JACK BARANSON, NORTH-SOUTH TRANSFER OF TECHNOLOGY: WHAT REALISTIC ALTERNATIVES ARE AVAILABLE TO THE U.S.? 1–9 (1977) (study prepared for the U.S. Department of State).

ingly, this is the form of transfer that TNCs favor. TNCs invest in developing markets in order "to protect the existing market, to create new markets, to bypass prohibitive barriers and import restrictions, to take advantage of cheap labor and skills, and to discover or protect raw materials."[31] These interests can best be fulfilled by retaining ownership and control of the technology transferred to a foreign market incident to an investment in that market. Actually transferring the production technology to the foreign country would simply create unnecessary and unwanted competition and diminish profitability.[32]

b. Turn-key packages

Transfers of technology in the 1970s were often in the form of complete packages. The supplier provided machinery, buildings, management expertise, and production plans. Thus the name "turn-key"—all the recipient had to do was walk up to the plant and turn the key. TNCs sold the entire technology package, giving the developing countries no opportunity to select only the parts of that package that they actually needed.[33]

c. Technology license agreements

Licensing covers the broad spectrum of permissions that are granted for the use of patents, technology, and trademarks.[34] Of the various methods of transferring technology internationally, licensing is the most versatile. It offers flexibility in technology choice and an opportunity for the source and the receiving institution to negotiate.[35] Technology license agreements also enable a foreign licensor to reap profits from the transfer of technology without risking capital in a sometimes volatile foreign market.

International license agreements may be divided into the following general categories:

1. Patent Licenses: Patent licenses are generally used for a specific process or method of manufacture.

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31. Kaynak, *supra* note 12, at 161.
32. *See* BARANSON, *supra* note 30.
33. *See Handbook on the Acquisition of Technology by Developing Countries 1975*, U.N. Doc. UNCTAD/TT/AS/5 (1977).
34. *See* THOMAS K. RYMES, ON CONCEPTS OF CAPITAL AND TECHNICAL CHANGE (1971).
35. *See* Kaynak, *supra* note 12, at 166.

2. Know-How Agreements:[36] Such agreements often cover information that may be classified and therefore difficult to obtain otherwise.
3. Technical Assistance Agreements: These agreements involve the supply of scientific and engineering assistance, training, and management assistance.[37]

d. Joint ventures

Joint ventures are long-term relationships involving the pooling of assets, joint management, profit and risk sharing, joint marketing, servicing, and production.[38] In a typical agreement, technology is transferred primarily through technical liaisons, training, and continuing operational support. Perhaps most valuable, the transferring firm generally provides the recipient with on-going technical changes as they are developed during the life of the agreement.[39] Foreign investors have recently become increasingly willing to participate in joint ventures and partnerships with firms in developing countries, so long as the majority of the equitable ownership remains in the hands of the TNC.

e. Purchase of equipment

The outright purchase of equipment is one of the dominant methods of transferring technology. These purchases occur continuously; buyers make initial capital investments and then pay for the maintenance and upgrade of the purchased technology.[40]

f. Management contracts

Employment of foreign experts usually involves management contracts. Depending on employer's needs, experts demonstrate the machine operations, production processes, and other more technical

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36. These are essentially agreements by which the supplier either demonstrates or delivers the plans for a particular technology.

37. Edward P. Hawthorne, The Transfer of Technology, International Seminar, Istanbul, Oct. 5–9, 1970.

38. *See* HELGARD WEINERT & JOHN SLATER, EAST-WEST TECHNOLOGY TRANSFER: THE TRADE AND ECONOMIC ASPECTS 281 (OECD 1986).

39. *See* HAYDEN, *supra* note 6, at 26.

40. *See* Kaplinsky, *Technology Transfer, Adaptation and Generation: A Framework for Evaluation*, *in* TECHNOLOGY TRANSFER IN THE DEVELOPING COUNTRIES 21 (Manas Chatterji ed. 1990).

operations. Technology transferred through this method is normally in the form of know-how.[41]

g. International organizations

A growing number of international organizations now exists to facilitate technology transfer. For example, the United Nations Conference on Trade and Development ("UNCTAD") was established to help deal with the problems caused by the technological gap that existed among member states of the United Nations.[42] UNCTAD summarized its general guidelines in a joint declaration drafted by the developing countries in the General Assembly in 1983. The major functions of UNCTAD were: to promote international trade between countries at different stages of development; and to formulate principles and policies on international trade and related problems of economic development.[43]

UNCTAD has assumed an active role in promoting the transfer of technology from developed to developing countries.[44] It has conducted a number of studies not only outlining the problem of technological disparity among nations, but also recommending particular strategies for alleviating the problem.[45] UNCTAD has now been given a direct mandate by the General Assembly to "exam[ine] and recommend[ ] modalities for favorable access to, and transfer of ... technologies, in particular to developing countries, including on concessional and preferential terms."[46]

Another international organization established to promote transfers of technology is the Advisory Service on Transfer and Development of Technology ("ASTT"). The ASTT was established in 1976 within UNCTAD's Transfer of Technology Division[47] to provide advice, tech-

41. *See* Kesowo, *supra* note 18, at 27.

42. *See* Pease Jeffries, *Regulation of Transfer of Technology: An Evaluation of the UNCTAD Code of Conduct*, 18 HARV. INT'L L.J. 309, 310 (1973).

43. *See* KAMAL M. HAGRAS, UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT: A CASE STUDY IN U.N. DIPLOMACY (1966).

44. For a detailed outline of UNCTAD's duties and objectives, see Farcus & Falk, *supra* note 5, at 5.

45. For a comprehensive bibliography of all documents released by the United Nations on the transfer of technology, see *Bibliography of Documents on Transfer and Development of Technology*, U.N. Doc. TD/B/C.6/INF.2/REV.7 (1991).

46. G.A. Res. 44/228 (1989).

47. *See Handbook on the Acquisition of Technology by Developing Countries 1975*, U.N. Doc. UNCTAD/TT/AS/5, at 57 (1977).

nical assistance, and operational assistance to developing countries on the transfer and development of technology.[48]

h. Government aid

Technical assistance is also provided by governments of developed countries. The most significant sources of this assistance are technical cooperation grants, the major components of which are technical assistance[49] and fellowships for students.[50] Such assistance has increased in recent years but is relatively insignificant when compared to the transfer potential of TNCs.

II. THE EXPERIENCE OF THE THIRD WORLD WITH TRANSFERS OF TECHNOLOGY

A. Background

Development has always been a top priority for third world nations, especially for those countries that gained their independence around the 1950s and that immediately found themselves far behind the industrialized world technologically.[51] Although there were different opinions as to how large the technological gap between the third world and the developed countries was and whether it was growing or shrinking,[52] there was general agreement that a serious technological gap existed.[53]

There was also a general consensus that outside technology was essential for development: "The assumption of almost all the proponents

48. *See id.*

49. The technical assistance provided by the United States, for example, operates according to specific principles: Projects are pursued which can start up quickly and which have an immediate impact or meet urgent needs; assistance is concentrated in a limited number of areas where the United States has a comparative advantage; the assistance provided emphasizes training in the recipient country, and further emphasizes the training and educating; and work is done with existing institutions where possible and an effort is made to create sustainable relationships between U.S. institutions and organizations in Central and East Europe. *See Aid to Eastern Europe Still a U.S. Priority*, EASTERN EUROPEAN REPORT, Mar. 25, 1991, at 7.

50. *See Recent Trends in International Technology Flows and Their Implications for Development*, U.N. Doc. TD/B/C.6/145, at 4 (1988) [hereinafter *Recent Trends*].

51. *See Planning the Technological Transformation of Developing Countries*, U.N. Doc. TD/B/C.6/50, at 10 (1981) ("Except for a few countries ... both these embodiments of technology — skills and tools — were largely absent in the third world.").

52. *See id.* at 19.

53. *See* Michael Blakeney, *Transfer of Technology and Developing Nations*, 11 FORDHAM INT'L L.J. 689, 693–694 (1988); Solow, *supra* note 4, at 320; Diehl, *supra* note 3.

of the transfer of technology is that such transfer is a prerequisite, even an imperative, for desirable economic and social development."[54] On several occasions UNCTAD has recognized the interdependence of technological change and economic development,[55] and has even conducted a study detailing the relationship between economic and technological growth of the developing nations.[56]

It is not surprising, then, that many third world nations sought to acquire technology as early as the 1950s. However, the transfer process did not proceed as smoothly as they had planned or lead to the desired result. Developing countries viewed foreign investment and the accompanying transfer of technology as a means of rapid economic transformation.[57]

The third world's frenetic attitude toward technology transfer resulted in the countries falling victim to a sort of "technological colonialism."[58] Taking advantage of the third world's desperation, TNCs drew up largely one-sided transfer agreements. For example, these agreements often linked the transfer of technology to the right to build, operate, and maintain the manufacturing plants.[59] Suffering from a lack of information about the technology and about the transfer process, many third world nations accepted these agreements. Consequently, little technology was actually transferred to the developing countries, and those countries failed to develop an indigenous technological capacity.[60]

Following this first wave of foreign investment, there was also

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54. *See* Blakeney *supra* note 53, at 693; *see also* W.A.P. MANSER & SIMON WEBLEY, TECHNOLOGY TRANSFER TO DEVELOPING COUNTRIES 2 (1979).

55. *See, e.g., Transfer and Development of Technology in a Changing World Environment: The Challenges of the 1990s*, U.N. Doc. TD/B/C.6/153, at iii (1991) [hereinafter *Transfer*].

56. *See Planning the Technological Transformation of Developing Countries*, U.N. Doc. TD/B/C. 6/50 (1981).

57. *See* S. Linn Williams, *Transfer of Technology to Developing Countries*, *in* TRANSFER OF TECHNOLOGY IN THE INTERNATIONAL MARKETPLACE 41 (1984).

58. David Silverstein, *Sharing United States Energy Technology with Less-Developed Countries: A Model for International Technology Transfer*, 12 J. INT'L L. & ECON. 363, 388 (1978) (citing R. SEIDEL, TOWARD AN ANDEAN COMMON MARKET FOR SCIENCE AND TECHNOLOGY 32 (1974) (unpublished manuscript prepared for Cornell University)).

59. *See* Williams, *supra* note 57, at 41.

60. *See* A.F. Ewing, *UNCTAD and the Transfer of Technology*, 10 J. WORLD TRADE L. 197, 198 (1976). A report by the UNCTAD Secretariat in 1975 recognized the disadvantage that developing countries were at when dealing with TNCs: "The technological and economic capabilities of the enterprises of developed countries are much stronger than those of the developing countries. In the supplier/recipient relationship, therefore, the weak position of developing countries is more exposed to the strong quasi-monopolistic power of the transnational corporations of the developed countries." *Report on an International Code of Conduct on Transfer of Technology*, U.N. Doc. TD/B/C.6/AC.1/2/Supp.1, at 62 (1975).

widespread criticism in the third world that the existing development policies had failed both to create a sizeable number of new jobs[61] and to raise the standard of living.[62]

B. The New International Economic Order

The developing nations turned to the United Nations when they recognized that existing mechanisms transferring technology had failed to achieve development and that existing technological relations needed restructuring. In 1974 the General Assembly approved a Declaration and Programme of Action on the Establishment of a New International Economic Order ("NIEO").[63] The NIEO was intended to eliminate the economic dependence of developing countries, promote their accelerated development based on the principle of self-reliance, and introduce appropriate institutional changes for the global management of world resources.[64]

The transfer of technology was an integral part of the NIEO scheme. The resolution provided that one of the fundamental tenants of the NIEO involve "access to the achievements of modern science and technology, and promoting the transfer of technology and the creation of indigenous technology."[65] The proponents of the NIEO maintained that there was to be a right of access to technology through an appropriate legal regime.[66] Although the architects of the NIEO agreed that most of the technology developed by TNCs had been developed for use in northern, developed countries and therefore would not be of much use to the third world in its present form, developing nations countered with a demand that appropriate technology be developed without regard to profits.[67]

The industrialized nations of the north never accepted the underlying premises of the call for a NIEO. The United States simply stated that "the best thing northern governments could do for the third world is to

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61. *See* NEIL HOOD & STEPHEN YOUNG, THE ECONOMICS OF MULTINATIONAL ENTERPRISE 202 (1979).

62. *See* MANSER & WEBLEY, *supra* note 54, at 2.

63. G.A. Res. 3201 (S-VI).

64. *Id.*; *see also*, Blakeney, *supra* note 53, at 695.

65. Blakeney, *supra* note 53, at 695; *see also* Hope, *Basic Needs and Technology Transfer Issues in the "New International Economic Order,"* 42 AM. J. ECON. & SOC. 394 (1983).

66. *See* WOLFGANG FIKENTSCHER, THE DRAFT INTERNATIONAL CODE OF CONDUCT ON THE TRANSFER OF TECHNOLOGY 25–28 (1980).

67. *See Arusha Programme for Collective Self-Reliance and Framework for Negotiation*, Fourth Ministerial Conference, Group of 77 (1979), *reprinted in* UNCTAD, Proceedings of the Fifth General Session, at 127–77, U.N. Doc. TD/269, at 127–77 (1981).

establish stable, continuous growth in their own, northern economies."[68] The United States was also unwilling to abandon enforcement of its patent laws[69] or to expand its controls on corporate activities outside U.S. territory.[70] The position of the United States in discussions with the developing nations continued to emphasize the importance of contractual trade relations, leaving the parties free to negotiate the provisions.[71]

TNCs generally shared the northern countries' lack of enthusiasm over the NIEO. TNCs have gone further, however, and argued that regulating and directing the international transfer of technology will actually slow the technological development of underdeveloped nations by deterring TNCs from investing abroad: "[I]t could result in loss of control leading to loss of competitive position and negative global impacts on their trademark."[72]

Only two years after the United Nations' call for a NIEO, the proposal appeared dead. The United Nations Secretariat reported that the greatest hope for third world development in 1976 was a recovery in developed nations' economies.[73] As one commentator remarked, "The Secretariat's views should be read as saying that very little had happened [by] 1976 to make third world governments hopeful."[74] Because few north-south disagreements disappeared after 1974 and little substantive debate on north-south matters occurred between governments, the south had no option but to adapt its positions to meet northern concerns.[75]

C. Third World Alternatives to the Transfer of Technology Through a NIEO

With the collapse of the NIEO[76] the developing nations ceased to deal with the issue of technology transfer as a unified, concerted coalition.

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68. CRAIG MURPHY, THE EMERGENCE OF THE NIEO IDEOLOGY 130 (1984).

69. Williams, *supra* note 57, at 42.

70. Weidner, *supra* note 17, at 222, 224; *see also* HENRY J. STEINER & DETLEV F. VAGTS, TRANSNATIONAL LEGAL PROBLEMS 987–1002 (1976); Davidow & Chiles, *The United States and the Issue of the Binding or Voluntary Nature of International Codes of Conduct Regarding Restrictive Business Practices*, 72 AM. J. INT'L L. 247, 259–260 (1986).

71. Weidner, *supra* note 17, at 216.

72. Chamber of Commerce of the United States, *International Transfer of Technology: Sources of Conflict*, paper presented by the U.S. Delegation to the Third Quadrilateral Businessmen's Conference on Economic Interdependence, London, Oct. 28–30, 1976.

73. *See* MURPHY, *supra* note 68, at 130.

74. *See id.* at 130–131.

75. *See id.* at 126.

76. There have been periodic attempts to revise and revive the NIEO in the United Nations, but none of these attempts have even met with the attention of the first program.

Although most states fell back on the conventional methods of acquiring technology, various developing nations continued to work to promote a more favorable national and international legal setting for transfers of technology.

1. Attempts at Revising the International Legal Scheme

Other attempts at enacting international legal schemes to regulate the international transfer of technology are directed both within the structures of the United Nations and through national activity. The most significant attempt was the International Code of Conduct on the Transfer of Technology ("the Code") drafted by the United Nations. In 1977 the General Assembly decided to convene a Conference on the Code[77] to negotiate "all measures necessary for its adoption."[78] To the developing countries, the critical sections of the Code are those which encourage technology transfer (Chapter I, sec. 2.1(iii)) and promote arrangements for transferring only what the receiving country needs (Chapter I, sec. 2.1 (viii)). According to its own terms, the Code is applicable to all countries (Chapter I, sec. 2.2(i)).[79]

However the United Nations failed to reach agreement on a number of key provisions of the Code. A majority of member states never agreed on Chapter IV, which demands that parties avoid specific practices related to technology transfer transactions. Furthermore, there is no agreement on applicable law and dispute settlement or even on the definition and the underlying concept of the term "international transfer of technology transactions."[80] Given the length of time that the Code has been under consideration and the fundamental nature of some of the provisions that have still not been agreed upon, it may never be given effect by the General Assembly. Even if the General Assembly does vote favorably on the Code, there is little reason to believe it will fare any better than the NIEO.

Some developing countries have also advocated revising the international law on patents, which is currently embodied in the Paris Convention of 1833. The Convention defines certain rights that holders of

77. G.A. Res 32/188 (1977).

78. *Negotiations on a Draft International Code of Conduct on the Transfer of Technology—Report of the Secretary General of the United Nations Conference on Trade and Development*, G.A. Doc. A/45/588 (1990) [hereinafter *Negotiations*].

79. For a detailed discussion of the contents and procedural history of the Code, see *Further Consultations on a Draft International Code of Conduct on the Transfer of Technology*, U.N. Doc. TD/CODE TOT/56 (1990).

80. *See Negotiations*, *supra* note 78, at 2–3.

industrial property have within signatory countries.[81] Third world countries contend that the present patent system limits their access to technology crucial to their development.[82] Instead they propose less protective international standards with which national laws should comply.[83]

2. Nationalization of Property Already Within Third World Borders

Frustrated at what they perceived to be technological colonialism and excessive dependence on TNCs, a number of developing countries have nationalized foreign-owned industrial property within their territory.[84] The media now reports that there are fears that these countries will be unable to handle their debts and will eventually default on them.[85]

3. Unilateral Regulation of Technology Transfers

Unsatisfied with the conditions of technology transfer agreements between TNCs and recipient firms within their territory, some developing nations have begun to oversee and regulate the import of technology.[86] Regulation is accomplished via legislation requiring registration of all international agreements contemplating transfer of technology. The government can then examine the agreements and determine whether it feels that they are in the developmental interest of the industry.[87]

D. Difficulties the Third World Has Experienced with International Transfers of Technology

1. First World Resistance to New International Legal Systems

Although their support is not essential for passage of the International Code of Conduct by the General Assembly, developed countries have consistently maintained that transfer of technology and development of indigenous technology should be the result of transactions among parties

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81. *See* Williams, *supra* note 57, at 42.
82. *See id.*
83. *See id.*
84. *See Recent Trends in Technology Flows and Their Implications for Development*, U.N. Doc. TD/B/C.6/145, at 3 (1988).
85. *See* Weidner, *supra* note 17, at 220.
86. *See id.* 224.
87. For a fuller discussion of these laws and some specific examples, see Layton, *supra* note 19, at 199–212.

with minimal governmental interference.[88] The developed countries simply reiterate their goal of ensuring "stable continuous growth" in their own economies.[89]

Northern industrialized nations have also been unwilling even to negotiate on modifying the international patent system or putting controls on the external activities of their TNCs.[90]

2. *Lack of a Developed Infrastructure and Market*

The third world had difficulties successfully transferring technology through the more traditional mechanisms as well. One of their problems was that many of these countries lack an infrastructure and internal market capable of absorbing and sustaining developed technology. Developing countries often lack a strong technological infrastructure, i.e., the "support systems" that are necessary for the specific technology to function effectively. These support systems include hardware, technological education, the level of process technologies in the receiving firms, the capability to perform R&D work, and the ability to maintain technology and organizational infrastructure.[91]

The supporting infrastructures found in the receiving firms and countries must be generally adapted to those of the supplying firm if the receiving firms want to be in a position to absorb and take full advantage of transferred technology. Otherwise, the receiving firm will remain dependent on the supplying firm for its support needs.[92]

Of particular concern is the shortage of human resources. The lack of education, and therefore the lack of skilled labor, in many third world nations has been widely recognized as a major impediment to the industrial development of those countries.[93] The inability of laborers to "substitute human skills for machine capabilities" has been criticized as limiting technology development and increasing capital costs.[94]

Even if the receiving firm is able to absorb and take full advantage of

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88. *See Draft International Code of Conduct on the Transfer of Technology*, U.N. Doc. TD/CODE TOT/33, at 180 (1981).

89. MURPHY, *supra*, note 68, at 126.

90. Kesowo, *supra* note 18, at 69; MURPHY, *supra* note 68, at 130, 134–135.

91. *See* Aasen & Hansen, *Analytical Perspective on Technology Transfer*, *in* TECHNOLOGY TRANSFER IN THE DEVELOPING COUNTRIES 32 (Manas Chatterji ed. 1990). Organizational infrastructure is the support systems for planning, management, coordination, and follow-up that are found in the supplying firm.

92. *See id.* at 32–35.

93. On the role of education and skills in constraining African industrialization, see OECD, STRUCTURAL ADJUSTMENT AND ECONOMIC PERFORMANCE (1987).

94. *See* W. Chudson, *UNITAR Research Report No. 13: The International Transfer of Commercial Technology to Developing Countries* 44 (1971).

the transferred technology, it may not be able to find a market for its goods:

> The capacity of a technology recipient to participate in international trade is considerably circumscribed because of several circumstances: where it lacks sufficient diversity in resource endowment to permit alteration of production sectors in response to changes in relative prices; where poor educational standards do not permit the easy transfer of labor from one sector to another; and where capital is limited to role-specific, fixed investments.[95]

Participation in international trade is necessary in order for the recipient to use its new technology to the fullest extent, because "the markets in developing countries are often not sufficiently developed to support high scale production."[96]

3. Inappropriate Technology

One of the consistent problems that third world nations have faced in successfully importing technology is that the technology acquired from developed nations is ill-suited to the third world's needs: "Technology is not usually produced directly for sale."[97] It is therefore not normally developed for use in the third world.[98] The small technology markets in developing countries and the limited profit-making opportunities they offer discourages technology exporters from adapting their technology to meet the particular circumstances of developing countries. Instead, corporations will offer the same technology that they sell in developed countries.[99]

Developing nations are also often unable to discern their technology needs. Recipients normally choose technology based on imperfect information. The breadth of choices is often so overwhelming that the recipient is unaware of the full range of alternatives.[100] This problem has become known as the "information paradox." The idea is that when

95. Blakeney, *supra* note 53, at 700–701.

96. *Id.* at 703.

97. OECD, *supra* note 10, at 19.

98. It has been estimated that over half the research that is done in the developed countries is of no immediate relevance to the development of poorer nations. *See* Griffin, *The International Transmission of Inequality*, WORLD DEV., Mar. 1974, at 3, 4.

99. *See* Blakeney, *supra* note 53, at 702, 703.

100. *See* Kaplinsky, *supra* note 40, at 19–20.

someone is looking to acquire technology, he is ignorant of exactly what he is getting, otherwise there would be no need to acquire it. This paradox reveals that in transfer agreements there is always an element of suboptimality of information, which often leads to inappropriate technology being transferred.[101]

4. Packaging of Technology

One of the common forms of transferring technology to third world nations is in a "technology package." This package includes not only machinery, but also the building, management expertise, and production plans. The purchaser has no option of selecting only those facets of the technology it believes it needs. These packages often include outdated technology or technology irrelevant to the recipient's needs.[102]

5. Failure to Develop Indigenous Technological Skills

By pursuing a "technology at any cost" strategy, developing countries failed to import technology at a rate that would allow them to study the imported information so as to develop internal sources of its production:

> The attempt by developing countries to leap stages of development by the importation of technology ... significantly in advance of the technological skills of the recipient economy will mean both that the technology is inexpertly utilized, and that the relevant expertise is not given an opportunity to develop.[103]

This failure has contributed to the underlying problem — the technological dependence of many third world nations. The dependence is likely to continue until those nations are able to increase their ability to deal with and develop technology.[104]

6. Weak Bargaining Positions, Monopolistic Suppliers, and Technological Obsolescence

The traditional economic and political weakness of the developing countries combined with the monopolistic controls TNCs have on the

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101. *See* Aasen & Hansen, *supra* note 91, at 32–33.
102. *See* Jeffries, *supra* note 42, at 315.
103. Blakeney, *supra* note 53, at 703.
104. *See* Kesowo, *supra* note 18, at 18.

world's technology has often led to the transfer of obsolete technology. Third world nations' weak bargaining position is not just a factor of their economic and political instability. They also lack the business management and negotiation skills that would enable them to bargain more effectively.[105]

Developing countries may also have to deal with de facto monopolistic suppliers of technology. Because TNCs have no legal obligation to work with developing countries, many TNCs choose to focus on developed markets. Third world nations are then left in the position of taking what they can get at the terms they can get it.[106]

One of the results of the disadvantaged position developing countries hold when dealing with technology suppliers is the import of obsolete technology. Especially in direct foreign investments, TNCs often merely import antiquated technology, the usefulness of which is limited to what is absolutely necessary for a project. There are several reasons for this. The TNC may not want to create a new competitor or risk losing market share.[107] Given the recent wave of nationalizations and defaults, TNCs are also wary of trusting their best technologies to developing nations.[108] Uncertainties and vagueness in the laws of developing nations often justify this distrust. [109]

7. Absence of a Technological Development Plan

The final reason cited for the difficulties that third world nations have had in developing technologically is that most of them lack a coherent, strategic plan for development: "The immediate post-war or post-independence period in the developing countries was marked by a total absence of any policy specifically dealing with technology."[110] Although the last decade has seen the developing countries enact laws and regulations dealing with imports of technology, the legislative policies have been largely ad hoc and uncoordinated in nature and have had

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105. *See id.*

106. The United States has conceded that developing countries probably face a monopoly problem that does not exist in developed or source countries. *See* HOWARD PERLMUTTER & TAGI SAGAFI-NEJAD, INTERNATIONAL TECHNOLOGY TRANSFER 26 (1981).

107. *See* OSCAR SCHACHTER, SHARING THE WORLD'S RESOURCES 112 (1977). The same is generally true under licensing agreements. *See* BARANSON, *supra* note 30, at 1–9 to 1–10.

108. *See* Weidner, *supra* note 17, at 220.

109. *See* Kesowo, *supra* note 18, at 36.

110. *A Strategy for the Technological Transformation of Developing Countries* U.N. Doc. TD/B/C.6/90, at 10 (1982) [hereinafter *Strategy*].

a short term perspective.[111]

III. LESSONS THAT THE EAST EUROPEAN COUNTRIES CAN LEARN FROM THE TECHNOLOGY TRANSFER EXPERIENCES OF THE THIRD WORLD

A. Past Transfers of Technology into East Europe

Transfers of technology from the West have played a significant role in East Europe's economies since the early 1970s.[112] The bulk of this technology involved low R&D intensive industrial products, which has been attributed to a lack of industrial capacity in East Europe and to political restrictions placed by the West on exports to that region.[113] According to one OECD study, during the 1970s only 2.6% of transfers involved high R&D intensive goods, while over seventy-seven percent were low R&D intensive.[114] Imports of technology dropped off significantly in the mid-1970s, however, when the East European states experienced hard currency constraints.[115]

The principal method of transfer was foreign trade transactions with TNCs, and especially the import of capital goods. Use of this method has generally been attributed to East European policy considerations, aimed at avoiding direct links with the West.[116] Another method of transferring technology is the so called "industrial cooperation agreement" ("ICA"), which the United Nations Economic Commission for Europe ("ECE") has defined as "a contractual relationship ... established for the purpose of complementary activities relating to the supply of licenses and equipment, development of new technologies, the exchange of information of and the use of those technologies, production and marketing."[117] The United Nations estimated that some 1,500 ICAs existed by the end of 1983,[118] but noted that ICAs still represented "a

111. *See id.*

112. *See* MONKIEWICZ, *supra* note 17, at 120.

113. *See id.* at 108, 112.

114. *See* WEINERT & SLATER, *supra* note 38, at 260.

115. *See id.* at 22.

116. *See* MONKIEWICZ, *supra* note 17, at 104.

117. *Legal Forms of Industrial Co-operation Practised by Countries Having Different Economic and Social Systems with Particular Reference to Joint Ventures*, TRADE/AC.3/R.10, at 5 (1976). ICAs differ from joint ventures in that ICAs are purely contractual in nature and stipulate the duration and extent of the respective parties' responsibilities and obligations.

118. *Ways and Means of Expanding Trade and Economic Relations Between Countries Having Different Economic and Social Systems*, TD/B/AC.38/2, at 26 (1984).

marginal share in East-West trade."[119]

Although it was only possible to enter an Eastern market through state-run Foreign Trade Enterprises ("FTEs") specializing in a particular product, there was very little regulation of the type of technology imported.[120] Nor did these nations oversee organized development programs. The result was a great deal of waste, delay, and the acquisition of inappropriate technology.[121]

The different political and ideological aims and values of the East and West were also fundamentally incompatible, which impeded the flow of technology. The East was viewed by the West as alien and subversive, and therefore any transfers of technology took place in an atmosphere of tension, animosity, and mistrust.[122]

B. The Current Setting in the East European Countries

When the iron curtain that shrouded the Eastern bloc fell in the late 1980s, the significant technology gap between the East and the West was formally recognized by the East.[123] Those countries have never accounted for more than about three percent of the total industrial Western patent grants, suggesting that the past decades of living under a controlled economy had failed to raise the technical level of East European and Soviet commercial R&D output.[124] The gap appears to have widened during the 1970s and 1980s.[125] OECD countries now spend approximately three times more on R&D than the East European nations; in terms of the share of world trade, the ratio is seven to one, and in terms of patenting abroad the ratio is now twenty-seven to one.[126]

By the mid-1980s the East European nations began to experiment with new forms of collaboration agreements with the aim of acquiring technology from the West.[127]

Firms based in the Western industrialized nations also show a keen

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119. *Trade Relations Among Countries Having Different Economic and Social Systems and All Trade Flows Resulting Therefrom, Review of Trends and Policies in Trade Between Countries Having Different Economic and Social Systems*, TD/B/AC.38/2, at 29 (1981).

120. *See* MONKIEWICZ, *supra* note 17, at 122.

121. *See* STANLEY PALIWODA, JOINT EAST-WEST MARKETING AND PRODUCTION VENTURES (1981).

122. *See* MONKIEWICZ, *supra* note 17, at 69.

123. *See, e.g.*, Diehl, *supra* note 3.

124. *See* WEINERT & SLATER, *supra* note 38, at 124–125.

125. *See id.*

126. East European nations are eight times more dependent on Western markets. *See* MONKIEWICZ, *supra* note 17, at 69, 71.

127. *See Recent Trends*, *supra* note 50, at 7.

interest in investing in the newly opened economies of the former Eastern bloc.[128] This interest is nothing new. Investment by TNCs in the Eastern bloc in the past had to be limited by FTEs and Western governments concerned about national security.[129] This investment interest is based on a number of factors. First, unlike in the third world, there is an abundance of skilled labor in East Europe.[130] Second, the formerly socialist countries have also already achieved at least a modest level of technical development,[131] and have a relatively sound industrial infrastructure.[132] Moreover, it appears that these countries may have as many or even more resources connected with the scientific research process than the industrialized West.[133] These factors make it easier for TNCs to transfer technology into a foreign country and maintain it. The more developed nature of the East European economies also potentially provides TNCs with more developed markets in which to sell the products of the transferred technology.

C. Suggestions for Improving the Transfer of Technology to the East European Countries

Any strategy for the transfer of technology must focus on the Western TNCs. The bulk of the world's technology remains in their hands, and those firms are left with almost unbridled discretion concerning its transfer.[134] Therefore, any attempt to formulate a technology transfer policy that favors the development of the receiving country must at the same time remain attractive to TNCs.[135]

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128. *East Europe: Land of Eventual Opportunity*, SATELLITE COMMUNICATIONS, Aug., 1990, at 13.

129. The Coordinating Committee for East-West Trade Policy ("CoCom"), based in Paris, is the traditional watchdog on strategic exports to the Eastern Bloc.

130. *See Transfer*, *supra* note 55, at iv.

131. For an extensive discussion of the current level of development of the East European countries, see MONKIEWICZ, *supra* note 17, 159–198.

132. *See id.* at 207.

133. See id. at 160.

134. "East-West economic and technological relations take place in a position clearly dominated by the Western countries ... To begin with, one can say, that it is finally the Western developed countries which determine the rules of the game on the world markets and that [East European nations] have no choice but to accept them ..." *Id.* at 71.

135. The position of American business is that if there is unattractive interference with their foreign investments, e.g., because of the host country's regulations or international technology transfer laws, they may simply choose not to invest abroad, thereby diminishing the amount of technology that is transferred. *See* BARANSON, *supra* note 30, at 1–65.

1. Transfers of Technology from the Point of View of the TNC

To the TNC, technology is an intangible corporate asset,[136] and therefore will not be transferred unless there appears to be a distinct advantage to the firm: "For the producer, technology is usually a costly but essential instrument in economic competition for an enterprise .... The transfer of technology will therefore only take place when the interests of the enterprise so demand."[137] A firm will generally look to invest abroad for a number of reasons: to gain or keep a market, to acquire factors of production at a competitive price, to gain access to regular supplies of raw materials, and to maximize the use of assets which may not have profitable alternative uses.[138] Among the firms that have invested in East Europe, the most frequently cited considerations are: entry to an Eastern market, export promotion, expansion of their own production capacity, access to low cost, labor, and materials, and the use of the Eastern country's R&D potential.[139]

2. Attracting Investment

Acknowledging that most of the world's technology is in the hands of TNCs and that the bulk of that technology is transferred through foreign investment by those TNCs, the first step in a successful technology transfer scheme must be the attraction of foreign investment.[140] Technology follows investment.[141]

Foreign investment can be attracted through a wide range of specific policies adopted by potential recipient countries. Host countries can provide a variety of tax and financial subsidies to foreign interests that invest within their borders.[142] A country can also attract investments by projecting an appearance of stability and reliability.[143]

Finally, a nation can enhance its image in the eyes of investors immeasurably by guaranteeing the protection of foreign assets, tangible

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136. *See* HAYDEN, *supra* note 6, at 22.

137. OECD, *supra* note 10, at 20. There is also a growing body of literature that supports the proposition that the most effective way to encourage transfers of technology is to convince the developed world that self-interest dictates support for a policy of assisting less-developed nations. *See* Weidner, *supra* note 17, at 224.

138. OECD, *supra* note 10, at 20; *see* Kaynak, *supra* note 12, at 161.

139. *See* WEINERT & SLATER, *supra* note 38, at 286–287.

140. For the East European countries, in which Western firms have already shown considerable interest, this section perhaps should be read as offering suggestions for not discouraging investment, rather than as providing affirmative tips to encourage investment.

141. *See Planning*, *supra* note 6, at 40–41.

142. *See* OECD, *supra* note 10, at 22.

143. *See Transfer*, *supra* note 55, at 16.

as well as intangible. Following a wave of nationalizations in third world nations, combined with the outspoken position that many of those nations have taken denouncing the protection of patents, investors are wary of any nation that has not taken a firm position on the issue of protection of foreign assets.[144] By assuring investors that their property will receive protection comparable to that which it would receive in their own country, the host nation may remove the most significant barrier to the transfer of technology today.[145]

3. Government Regulation and Oversight of Technical Development

Perhaps the single most significant factor in successful technological transformation is a comprehensive development plan adopted and implemented by the government of the recipient nation.[146] Indeed, because the market mechanism is apt to fail to provide a framework within which technological development can flourish, a comprehensive development plan is an absolute necessity for technical development.[147]

There are several ways in which the market may be unable to deal with the task of transforming the technological base of a nation. Many effects of technology on production are accompanied by powerful "externalities" on other parts of the economy. For example, in order for a transformation in the technology used in a steel plant to take place, there must be coordination with and parallel development of the means of producing, transporting, and using that steel. Development can be a very interdependent process; stagnation in one sector of the economy could hold up development in other parts. The market may also be wary of investing in entirely new technologies.[148]

Governments seeking to technologically transform their nation must be prepared to intervene at three points: the creation of incentive structures to induce enterprises to build up competence and take on new and uncertain technologies; the development of capabilities to respond to

144. Foreign interests were reluctant to invest in Indonesia, for example, simply because the foreign capital investment law was vague. *See* Kesowo, *supra* note 18, at 36.

145. *See* Williams, *supra* note 57, at 42–45. It is also interesting to note that, despite the vehemence with which some developing nations have objected to the current law on patent rights, patents may not be very important to the transfer of technology. A large part of technology being developed right now does not get patented. Moreover, technology is available from a far greater number of countries than in the past, and patent law has a limited ability to protect technology from imitations.

146. *See Planning*, *supra* note 6, at 41; *Formulation of a Strategy for the Technological Transformation of Developing Countries*, U.N. Doc. TD/B/779, at 3 (1980).

147. *See id.* at 43.

148. *See id.* at 43–44.

incentives and the support of institutions to facilitate the functioning of the market.[149] Most importantly, it is the interaction of these three factors that determines technological dynamism.[150]

An example of an effective technology plan is the one used by Japan to reconstruct its devastated economy after World War II. Immediately following the war, Japan needed a way to identify beneficial technology, acquire it on favorable terms, and absorb it into its industry.[151] To meet these needs it enacted the Foreign Investment Law[152] and the Foreign Exchange and Foreign Trade Control Law.[153] These laws basically created a Ministry to oversee and regulate all technology transfer agreements. Only those that appeared to be in the interest of national development were approved.[154] The Ministry also regulated the internal technological development of the nation, ensuring that industry absorbed the imported technology and developed technological independence.

A centralized development plan also allows a country to concentrate resources on selected industries. Especially given the financial constraints of many nations,[155] focusing available resources on developing select, critical industries is important in aiding overall development: "A primary element in any attempt to achieve the technological transformation of a developing country must be the need to reduce its dependence ... on primary production."[156] Government intervention should be highly selective, aimed at promoting the growth of particular industries whose development is critical to the rest of the nation.[157] Those budding industries should receive special commercial protection until their position in the market is established.[158]

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149. *See Transfer*, *supra* note 55, at 17.

150. *See id.*

151. *See* Torutomo Ozawa, *Technology Imports and Direct Foreign Investment in Japan*, 7 J. WORLD TRADE L. 666, 667 (1973).

152. Gaishi ni kansuru Horitsu (Law Concerning Foreign Investment), Law No. 163 of 1950, *translated in* 5 Eibun-Horei-Sha Law Bulletin Series No. 5410.

153. Gaikoku kawase oyobi gaikoku boeki no kanri ni kansuru horitsu (The Foreign Exchange and Foreign Trade Control Law), Law No. 288 of 1949, as amended 1968, *translated in* 5 Eibun-Horei-Sha Law Bulletin Series No. 5010.

154. For a fuller discussion of the Japanese technological transformation, see Layton, *supra* note 19.

155. *See* PALIWODA *supra* note 121, at 72.

156. *Strategy*, *supra* note 110, at 14.

157. *See Transfer*, *supra* note 55, at 20. Japan used this type of concentration of resources in rebuilding its industry after World War II.

158. The full force of external competition from mature enterprises can prevent new entrants from acquiring a base of capabilities and thus retard technological development. This is the "infant industry" case for providing protection during the learning period. Japan adopted this strategy as well during its industrial development period. For a full discussion of the case for selective prevention, see Howard Pack & Larry E. Westphal, *Industrial Strategy and Technological Change: Theory vs. Reality*, 22 J. DEV. ECON. 1029–64 (1986).

This type of governmental oversight and planning may be more than beneficial—it may be essential, as General Electric's ("G.E.") recent experience in Hungary demonstrates. In 1989 G.E. entered into a joint venture with Tungsram, a Hungarian lighting company, to make light bulbs in Hungary. The venture, which G.E. kicked off by investing $150 million into Hungary, served as a case study for other Western companies considering investing in East Europe. By March of 1992 the joint venture was losing thirteen million dollars a year and G.E. announced a ninety-day moratorium on new investments in the venture. George Varga, Tungsram's chief executive officer, blamed the Hungarian government for the venture's troubles.[159] Hungary had been suffering from high inflation and devaluing currency, and the government responded with a tight monetary policy. The government's actions were attributed to a lack of communication with industry and a lack of understanding. G.E. has repeatedly tried to convey its concerns to the Hungarian government but its efforts have been frustrated.[160]

Poland has also recently been criticized as maintaining an atmosphere unattractive to investors. At the Polish-American Business Forum held in March, 1992 in Warsaw, participants were virtually unanimous in their opinion that Poland is not encouraging investment. Primarily to blame are the regulations governing business, which are seen as unnecessarily bureaucratic, unstable, and unintelligible. Poland is also viewed as unstable by the West, a perception that many Poles feel is undeserved, but which discourages investment nonetheless.[161] The Polish government may actually be actively discouraging some types of investment. One former Polish minister said that the government was only interested in the largest of the Western companies, such as G.E. or General Motors ("G.M."), but not smaller investors. This attitude has

159. *G.E.-Tungsram Venture in Hungary Hits Snag*, N.Y. TIMES, Mar. 28, 1992, at 37.

160. *See id.* Despite the failing venture with G.E., it is worth noting that Hungary is leading the East European nations in the transition to a free market system. It has been the vanguard in revamping its laws so as to encourage Western investment. Advantages enjoyed by foreign investors include low cost, highly skilled labor; 100% foreign ownership; liberalization of prices for 90% of goods; a new law allowing concessions on infrastructure projects; basic financial laws; and political stability. By the end of 1991, half the total joint ventures in East Europe were with firms based in Hungary. *See Hungary in the Vanguard of Western Investment*, INSTITUTIONAL INVESTOR, Dec., 1991; *Flood of Foreign Investment Capitalizes on New Hungary; Ventures from Overseas Overshadow State Privatization*, WASH. POST, Nov. 10, 1991, at H1.

161. *See* Anna Dudbrawska with Andrzej Ratajczyk, *Polish-American Business Forum: Vital Liaisons*, THE WARSAW VOICE, Mar. 8, 1992.

discouraged smaller investors from looking into ventures with Polish firms.[162]

An example of more successful government intervention into technology importation can be found in the recent G.M. joint venture in Hungary. G.M., the world's largest car maker, agreed in March, 1992 to enter into a joint venture with the Hungarian railroad and car machine group, RABA, and the Hungarian state. After months of negotiating with the Hungarian government, it was agreed that Hungary would impose import quotas on cars manufactured outside the nation, and grant local manufacturers significant tax breaks. G.M. responded by committing $208 million to build a new automobile factory in Hungary.[163]

4. Identifying Appropriate Technology

Once a technological development plan is set and an organizational structure is in place, the next step is normally to determine what the needs of the nation are and what technology will satisfy those needs.[164] Identifying the appropriate technology is not always an easy task. The vast quantity and complexity of technologies available makes their study problematic.[165]

One possible solution to this problem that has received much attention is the creation of information networks. UNCTAD proposed that an "international technological information network" be established within the United Nations system to supply developing countries with information on all facets of technologies and technology transfer.[166] UNIDO also makes available consultants to assist nations in evaluating available technologies.[167]

Another difficulty recipient countries have in acquiring appropriate technology is that the vast majority of R&D is devoted to the particular

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162. *See id.*

163. *See* Michael Shields, *General Motors Opens $208 Million Plant in Hungary*, REUTERS BUS. REP., Mar. 13, 1992. G.M. also recently entered into a joint venture with a Polish firm to build cars in Poland. *See id.*

164. *See Planning*, *supra* note 6, at 41.

165. *See* Weidner, *supra* note 17, at 217.

166. *See Strategy*, *supra* note 110, at 8. A somewhat related idea is the establishment of regional networks for the collection and sharing of acquired technology. *See, e.g., Planning*, *supra* note 6, at 60, calling on developing countries to establish regional centers on technology to promote collective technological self-reliance.

167. *See Legal Aspects of Technology Transfer: Current Activities of International Organizations within the United Nations System*, U.N. Doc. A/CN.9/269, at 22 (1985).

problems of the developed nations of the West.[168] Technology that is suitable in one environment is not always suitable in another.[169]

Appropriate technology was identified and acquired in the past by countries that had a clear understanding of their needs and a strong political will to satisfy them. For example, South Korea demonstrated both of these faculties in developing its scientific and technological capabilities since the early 1960s. Today South Korea is one of several countries with a strong technological foundation.[170]

5. *Technological Development Through Cooperative Agreements*

The third world experience demonstrated that simply opening up a nation's markets and receiving isolated investments from TNCs is not sufficient to transform a nation's economy.[171] Joint ventures between firms in developed and developing economies are beginning to receive considerable attention as a more successful approach.[172]

The import of Western technology pursuant to these agreements to date has been negligible. In Rumania, for example, up to 1987 nine joint ventures were established between West and East European firms, and four of those were subsequently dissolved.[173] This is due to the long-standing policy of East Bloc countries to limit the share of foreign capital to forty-nine percent. The only exception to this policy was in Poland. Poland's law on foreign investments envisaged wholly foreign-owned undertakings. As of 1989 there were 695 companies in Poland

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168. *See* Gerald K. Helleiner, *International Technology Issues: Southern Needs and Northern Responses*, *in* THE NEW INTERNATIONAL ECONOMIC ORDER: THE NORTH-SOUTH DEBATE 295, 307 (1977).

169. UNIDO, *National Approaches to the Acquisition of Technology*, U.N. Doc. ID/187, at 12 (1978). This may not be as much of a problem for the countries of East Europe as it has been for the third world. The East European nations are already in possession of many of the things that make for a smoother transfer of technology, such as a developed infrastructure and a skilled labor force. *See* Weidner, *supra* note 17, at 209.

170. *See* Kwa Hang Ko, *Korean Laws and Policies on Importation of Foreign Technology*, a dissertation, University of Washington, 1978, *cited in* Kesowo, *supra* note 18, at 47.

171. *See Transfer*, *supra* note 55, at 5, 8.

172. Although there are slight legal differences between joint ventures, partnerships, and industrial cooperation agreements, the term "joint venture" applies to all three. The ground common to all three arrangements, and the definition of the term "joint venture" is any sustained, cooperative, business-oriented agreement between one or more firms based in a developed country and one or more firms based in a East European country where the object is to make a profit for the joint venturers.

173. *See* Jan Monkiewicz, *Western Direct Investment in Centrally Planned Economies*, 20 J. WORLD TRADE L. 627 (1986).

with Western participation, by far the most of any East European nation.[174]

Where joint venture agreements have been entered into in good faith and on equitable terms, this method of technology transfer has drawn widespread support. Firm to firm cooperation agreements are generally believed to reinforce the absorptive capacities of the less-developed firm.[175] The Western firm gives its Eastern partner access to technologies that may not be available through normal transactions and that may not normally be sold or leased.[176] Furthermore, the joint venture is likely to last for a long time, allowing the lesser developed firm to absorb technology at its own pace.

From the perspective of the Western firm, the incentives to enter into these types of agreements are also strong. The Western firm hopes to achieve "access to markets, political and social stability, stable labor conditions, comprehensive education, lower operating costs, and new technology."[177]

These types of agreements are also particularly relevant to the situation of East European states because of the hard currency shortages experienced in those nations.[178] East Europe is presently faced with severe economic problems. The energy price increases resulting from the Gulf War have cost Hungary two billion dollars and Czechoslovakia $1.5 billion so far.[179] Moreover, oil exports to East Europe from the former Soviet Union have virtually disappeared since 1990, forcing the East European states to enter into private agreements with the individual members of the new Commonwealth of Independent States. These agreements are costly, and devour funds which could otherwise be used to advance technological development.

The economies of the East European states are also suffering from the economic deterioration of the former Soviet Union, East Europe's largest trading partner. East European exports dropped forty percent in the first half of 1991, and imports dropped forty-one percent.[180] Given the current state of economic affairs in East Europe, entry into a joint

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174. *See* MONKIEWICZ, *supra* note 17, at 131, 133.

175. *See* BARANSON, *supra* note 30, at 1–29.

176. *See Co-operation in Third Markets of East-West Joint Ventures Domiciled in East Europe*, TRADE/R. 469 (1983).

177. MAKTIN SCHNITZER, U.S. BUSINESS INVOLVEMENT IN EAST EUROPE, CASE STUDIES OF HUNGARY, POLAND, AND ROMANIA 29 (1980).

178. *See* WEINERT & SLATER, *supra* note 38, at 273, 316.

179. *See* William Eggers, *A Five Plank Plan for Trade and Investment with East Europe and the Former Soviet Republics*, THE HERITAGE FOUNDATION REP., Oct. 23, 1991.

180. *See id.*

venture may for many firms may be the only means of acquiring technology.[181]

After entering into a joint venture with a Western firm, there are a number of procedures that the Eastern firm can follow to ensure that technology is actually transferred. The recipient's own experts should become involved in the process of the transfer, modification, establishment, and development of the technology. Unless the recipient country's experts become actively involved in studying the transferred technology, the Eastern firm will simply grow technologically dependent on the Western supplier.[182] The Eastern firm must also make sure that know-how as well as hardware is transferred.[183]

6. Balance Imports with R&D and Internal Development

The third world experience with transfers of technology demonstrated the technological dependence and lack of development that can result from a policy of technology transfer absent absorption and internal development. The attempt of these nations to leap ahead technologically caused them to ignore essential stages in technological evolution that are necessary in order for a nation effectively to absorb and to utilize technology.[184] When technology is imported too rapidly or is too advanced

181. *See id.* at 286.

182. UNIDO, CASE-STUDIES IN THE ACQUISITION OF TECHNOLOGY 48–49 (1984).

183. These types of arrangements are already beginning to emerge between East European firms and firms based in the European Economic Community. *See Transfer*, *supra* note 55, at 14. Some U.S. companies have begun to explore similar arrangements in East Europe. *See, e.g.*, *East Europe Seeks Way to Pay Environment Cleanup Tab*, L.A. TIMES, July 12, 1991, at 1.

For those interested in exploring technology-related business opportunities in East Europe, some possible contacts include: Dr. Z. Palmai, Innotech, P.O. Box 350, H-1519, Budapest, Hungary. In Poland, contact K. Zasiadly, Wielkopolska Innovation Centre, Al. Niedpoleglosci 16/18, PO-60967 Poznan, Poland. For information concerning technology transfer in what used to be East Germany, try Dr. Lehmann or Prof. Daumichen, Zentralinstitut f. Hochschulbildung, Aristotelessteig 4, D-O-1157 Berlin. Phone: (49) 504 29.28. The patent service at the Technical University of Dresden will help locate small and medium-sized enterprises that might be interested in engaging in joint ventures, etc. Contact Dr. Heyner, Patent Service TU Dresden, Mommsenstrasse 13, D-O-8027 Dresden. Phone: (37) 463 37.25. For Saxony, try the Sachsische Landesgewerbebeforderungsgesellschaft mbh (SCG), which assists in cooperation arrangements in engineering, electronics, and consumer goods. Contact P. Suchy, SGC, Markt 5, PSF 659, D-O-9010 Chemnitz. *See Who to See in East Europe*, INSIDE R&D, Dec. 26, 1990, at 4. Readers should be advised that some of these contacts may no longer be operable and that neither the author nor the *Harvard Journal of Law & Technology* warrant their effectiveness or reliability.

184. *See* Daniel Todd & James A. Simpson, *The Appropriate-Technology Question in a Regional Context*, 18 GROWTH & CHANGE 46 (1983).

it is inexpertly used.[185] A balance between making and buying capital goods is important for long-term technological dynamism and economic competitiveness.[186] The transfer of technology should be a dynamic process, one that doesn't stop when the technology arrives in the recipient country. In order for modern technology to be absorbed, it must be studied, modified, and developed locally:[187]

> The extent to which investment-related transfer projects contribute to the technological capability depends not only on the objectives of suppliers but also on the efforts of importers to intervene and interact with the investment of transfer process ... Without active intervention and interaction in the technology transfer process, the increments of capability which accrue to firms are likely to be trivial and of little value other than for acquiring basic operational technique.[188]

Study of imported technology may also be the best means of promoting local R&D, which in turn is "the core of a developing country's ability to generate its own technology."[189]

There are several ways in which a government, as part of its technological development plan, can promote the internal development of technology and technological self-reliance. Developed nations have frequently given tax relief as incentives for the promotion of R&D, usually through deduction of R&D operating expenditure from taxable income. These incentives can be used either to stimulate R&D in a particular sector or to encourage expenditure generally.[190] While the smaller financial resources may appear to make this method difficult for the countries in East Europe, tax incentive plans have been successfully employed by several nations that have traditionally had limited fiscal resources. In South Korea, firms that engage in R&D may choose a ten-percent tax credit for those expenditures or a fifty-percent accelerated depreciation

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185. *See id.*

186. *See Transfer*, *supra* note 55, at 22.

187. *See Planning*, *supra* note 6, at 35–36.

188. Chantramonklasri, *The Development of Technological and Managerial Capability in the Developing Countries*, *in* TECHNOLOGY TRANSFER IN THE DEVELOPING COUNTRIES 48 (Manas Chatterji ed. 1990).

189. *Planning*, *supra* note 6, at 35–36.

190. For example, the Australian government introduces a 150% tax concession for the first six years of a company's expenditure on a R&D project. Tax credits ranging between 25% and 50% for R&D expenditures are available in the United States, Canada, and Japan. *Promotion and Encouragement of Technological Innovation. A Selective Review of Policies and Instruments*, U.N. Doc. TD/B/C.6/139 ¶ 7 (1986) [hereinafter *Promotion*].

allowance.[191] In Malaysia firms are offered an allowance of 33.3% on their R&D related capital expenditures. Mexico offers a twenty-percent tax credit for R&D expenditures.[192]

A number of developed nations also offer direct financial incentives to firms in order to encourage expenditures for R&D.[193] These incentives include grants, loan assistance, and risk-sharing investment.[194] Direct financial assistance schemes are employed more widely by developing countries to encourage R&D than tax incentives. For instance, in 1981 Singapore enacted a Research and Development Assistance Scheme to promote R&D projects of "national importance and technological significance."[195] Brazil established the *Financiadora de Estudos e Projectos*, a state-owned financial institution, to provide funding for technological projects. This institution provides financial credits at low interest rates to firms engaged in research through universities or research institutes.[196] Additional funds for programs of this type can be obtained through the United Nations Financing System for Science and Technology.[197]

Finally, some nations have established national research institutes to undertake infrastructure research that may not be attractive to private commercial enterprises.[198] These institutes normally provide personnel training, technological advice, and production support services for industrial firms. They may also provide product testing, quality control, and product modification.[199] These institutes have proven disappointing largely because they have a poor linkage with industry.[200] The greatest challenge in order for them to be more effective in the future will be to identify the particular R&D needs of indigenous industries, a task which

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191. *See id.*

192. *See id.*

193. A recent study of a number of key industries in the United States stresses the importance of government procurement in influencing innovation and industrial change. *See* GOVERNMENT AND TECHNOLOGICAL PROGRESS: A CROSS-INDUSTRY ANALYSIS 460 (Richard Nelson ed. 1982).

194. *See id.*, ¶¶ 10–16. In particular, direct financial assistance is used in France, the Federal Republic of Germany, and the United States to promote R&D in high technology industries.

195. *Id.* ¶ 27.

196. *Policies, Laws and Regulations on the Transfer, Application and Development of Technology*, U.N. Doc. TD/B/C.6/133, ¶ 42 (1986).

197. G.A. Res. 218, 34 U.N. GAOR (Supp. No. 46), at 153, 155–57, U.N. Doc. A/34/46 (1979).

198. Examples of these kinds of institutes include the Centre for Technological Innovation in Mexico and the Institute for Industrial Technology Research in Peru.

199. *See Promotion, supra* note 190, ¶ 31.

200. *See* UNDP/UNIDO, INDUSTRIAL RESEARCH AND SERVICE INDUSTRIES, EVALUATION REPORT NO. 6 (1982).

should benefit immeasurably from the creation of a technological development plan.[201]

7. Regional Cooperation

East European nations could benefit technologically through the creation of regional technology centers. These centers would parallel the movement toward national acquisition of technology and technological self-reliance by striving to achieve collective self-reliance. Among the functions that technology centers could provide are: the joint acquisitoin of technology;[202] cooperative arrangements for consulting, design and engineering services; joint research and development; establishment of information systems; and the establishment of intergovernmental centers in economic sectors of critical importance.[203] The development of infrastructures could be delegated to these centers because such projects are not generally of interest to commercial firms.[204]

CONCLUSION

The difficulties that many third world nations have experienced with transfers of technology and technological development have not gone unrecognized. They have produced a wealth of literature detailing ways to improve these transactions in the future. Many of these proposed solutions apply as well to the situation of the East European nations.

This Recent Development outlined a number of methods of improving on the third world's experience with technological development. The precise methods used by an individual country will differ depending on its unique characteristics. The only generalization that can be made at this point, therefore, is that all of these methods may have some place in a successful process of technology transfer. Before selecting specific methods and rejecting others, any nation intent on technological development is encouraged to consider establishing a national, comprehensive technological developmental scheme.

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201. *See* Carl Dahlman & Larry E. Westphal, *Technological Effort in Industrial Development and Interpretive Survey of Recent Research, in* THE ECONOMICS OF NEW TECHNOLOGY IN DEVELOPING COUNTRIES 105–37 (Frances Steward & Jeffery James eds., 1982).

202. Joint acquisition of technology allows the purchaser to take advantage of economies of scale and added bargaining power.

203. *See Planning, supra* note 6.

204. *See* Blakeney, *supra* note 53, at 721. The nations of East Europe, because of their physical proximity and their history of being members of a unified coalition, may be in a better position to establish these centers than third world countries.