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**Working Group on the Relationship  
between Trade and Investment**

**KEY ISSUES CONCERNING FOREIGN DIRECT INVESTMENT AND  
THE TRANSFER AND DIFFUSION OF TECHNOLOGY  
TO DEVELOPING COUNTRIES<sup>1</sup>**

Note by the Secretariat

*This document has been prepared under the Secretariat's own responsibility and without prejudice to the positions of Members and to their rights and obligations under the WTO*

**I. INTRODUCTION**

1. The question of the extent and nature of the contribution of foreign direct investment (FDI) to the technological development of host countries, particularly developing countries, has been considered by the Working Group on a number of occasions, notably in the context of the first Item of the Checklist of Issues Suggested for Study (“The implications of the relationship between trade and investment for development and economic growth”).<sup>2</sup> The Working Group’s consideration of this theme has benefited from studies that were presented in 1997 by several international organizations and UNCTAD on the overall relationship between FDI and economic growth and development<sup>3</sup>;

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<sup>1</sup> This Note has been prepared in response to a request made at the meeting of the Working Group held on 18 and 19 April 2002. WT/WGTI/M/17, para. 14.

<sup>2</sup> The debate on this theme is reflected in the annual reports of the Working Group to the General Council: WT/WGTI/2, paras. 28-44; WT/WGTI/3, paras. 19-32; WT/WGTI/4, paras. 9-23; and WT/WGTI/5/Add.1, paras. 23-25. See also *Synthesis of the Information Made Available to the Working Group on the Links between Foreign Direct Investment and Development*, Note by the Secretariat, WT/WGTI/W/38, paras. 18-27.

<sup>3</sup> *Implications of the Relationship Between Trade and Investment for Development and Economic Growth-Work Undertaken in other Intergovernmental Organizations*, Communication from the OECD, WT/WGTI/W/8; WT/WGTI/W/8/Add.1, communication from UNCTAD; WT/WGTI/W/8/Add.2, Communication from the World Bank; WT/WGTI/W/8/Add.3, Communication from the IMF; and WT/WGTI/W/8/Add.4, Communication from UNIDO. See also *Foreign Direct Investment and Economic Development*, Communication from the OECD, WT/WGTI/W/26.

contributions by individual Members<sup>4</sup> and two surveys of empirical research on the role of FDI in the process of the transfer and diffusion of technology.<sup>5</sup>

2. The subject of FDI and transfer and diffusion of technology to developing countries has been treated extensively in work conducted in other international fora, such as UNCTAD<sup>6</sup> and UNIDO.<sup>7</sup> A recent Background Note prepared by the WTO Secretariat for the Working Group on Trade and Transfer of Technology also addresses this issue to some extent.<sup>8</sup>

3. Against this background, the purpose of this Note is twofold: first, to offer a brief synthesis of the main themes that arise from the previous work done by the Working Group and from relevant studies concerning the channels through which FDI may have an impact on the technological development of host countries; and, second, to review the treatment of technology-related policies in current international investment agreements.

## II. FDI AND THE GENERATION, TRANSFER AND DIFFUSION OF TECHNOLOGY TO DEVELOPING COUNTRIES<sup>9</sup>

4. Recent literature has identified a series of factors that have significantly altered the general context in which the relationship between FDI and technological development needs to be analyzed, chief among them being: the increasingly important role of technology as a determinant of competitiveness; the global character of the competitive pressures faced by firms and countries; changes in the organization and management of enterprises, particularly the emergence of global value chains dominated by multinational firms; and the impact of new rules for the conduct of international economic relations. Another key element of this new context is that a more sophisticated understanding of the nature of technology and of the process of technological development has emerged. For instance, whereas earlier approaches tended to underestimate the costs of technology absorption and the importance of the tacit dimension of technology, the recent literature focuses on the tacit nature of innovation and technology and its implications for the process of technological learning.

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<sup>4</sup> See, e.g., *Effects of Foreign Direct Investment in the United States on U.S. Technology Development*, Communication from the United States, WT/WGTI/W/27; *Investment, Development and Technology Transfers*, Communication from India, WT/WGTI/W/73; *Foreign Direct Investment and Transfers of Technology*, Communication from Korea, WT/WGTI/W/82; *FDI Flows and Technology Transfer*, Communication from India, WT/WGTI/W/105.

<sup>5</sup> *The Effects of Foreign Direct Investment on Development: Technology and other Know-how Transfers and Spillovers*, Note by the Secretariat, WT/WGTI/W/65; *Survey of Literature on Trade, Foreign Direct Investment and the Transfer of Technology*, WT/WGTI/W/88.

<sup>6</sup> See e.g., UNCTAD, *Transfer of Technology*, UNCTAD Series on issues in international investment agreements (New York and Geneva: United Nations, 2001); *World Investment Report 1999: Foreign Direct Investment and the Challenge of Development* (New York and Geneva: United Nations, 1999) Chapter VII ("Enhancing Technological Capabilities). A comprehensive compilation of studies and reports prepared by UNCTAD since the early 1970s on the issue of transfer of technology and economic development is available in the *Compendium and User Guide to UNCTAD's Work on Issues of Technology for Development* (<http://www.unctad.org/stdev/compendium/index.html>).

<sup>7</sup> See, e.g., UNIDO, *Industrial Development Report 2002/2003: Competing through Innovation and Learning* (2002).

<sup>8</sup> Working Group on Trade and Transfer of Technology, *Trade and Transfer of Technology*, Background Note by the Secretariat, WT/WGTI/W/1.

<sup>9</sup> UNCTAD, *World Investment Report 1999*; UNIDO, *World Industrial Development Report 2002-2003*; Roffe, P. and T. Tesfachew, "The Unfinished Agenda," in Patel, S.J., P. Roffe and A. Yusuf, *International Technology Transfer: The Origins and Aftermath of the United Nations Negotiations on a draft Code of Conduct* (The Hague, Boston, London: Kluwer Law International, 2001), pp. 381-404.

A. FDI AND THE GENERATION OF TECHNOLOGY

5. Conventional indicators<sup>10</sup> reveal a strong concentration of innovation activity in a relatively small number of developed countries. One study reports that ten countries (United States, Japan, Germany, France, United Kingdom, Italy, Canada, the Netherlands, Sweden and Switzerland) accounted for 84 per cent of world R&D expenditures in 1993, 95 per cent of the number of patents taken out in the United States during the period 1977-96, and 91 per cent of receipts of global royalties and technology fees in 1993.<sup>11</sup> A recent UNIDO study reports that the share of these ten countries in R&D expenditure financed by enterprises declined from 95 per cent in 1985 to 91.3 per cent in 1995-98 and that the share held by the top three countries- the United States, Japan and Germany - declined from 82 per cent in 1985 to 75 per cent in 1998.<sup>12</sup>

6. The share of developing countries in global R&D expenditures is estimated to have declined from nearly 6 per cent in 1980 to nearly 4 per cent in the early 1990s, notwithstanding substantial increases in such expenditures in Korea and Chinese Taipei.<sup>13</sup> Such R&D expenditures by developing countries are highly concentrated in a handful of countries. A recent study reports that high – and upper-middle-income developing countries accounted for almost 90 per cent of total enterprise-financed R&D expenditures by developing countries in 1998. Among these countries, Korea accounted for 53 per cent of total enterprise-financed R&D expenditures in developing countries, while the shares of Chinese Taipei, Brazil and China were, respectively, 14 per cent, 12 per cent and 6 per cent. No such enterprise-financed R&D expenditures occurred in the lowest ranked 30 developing countries.<sup>14</sup> A similar picture of concentration of technological activity among developing countries is revealed by data on patents registered in the United States. While developing countries and countries in Central and Eastern Europe increased their share of patents registered in the United States from 1.5 per cent in 1977-82 to 3 per cent in 1990-96, the bulk of that 3 per cent share was accounted for by Korea and Chinese Taipei.<sup>15</sup> Similarly, in 1998, ten developing countries accounted for 86 per cent of the total spending on royalty and technical payments abroad by developing countries.<sup>16</sup>

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<sup>10</sup> Technological activity is commonly measured by R&D expenditures (as an indicator of technological input) and patents registered in the United States over a period of 20 years (as a measure of technological output). These indicators do not fully capture tacit knowledge. See UNCTAD, *World Investment Report 1999*, p. 198.

<sup>11</sup> Kumar, N., *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*, UNU/INTECH Discussion Paper Series (September 1997), pp. 5-6. See also Correa, C.M., "Emerging Trends: New Patterns of Technology Transfer," in Patel, S.J., P. Roffe and A. Yusuf, *International Technology Transfer: the Origins and Aftermath of the United Nations Negotiations on a Draft Code of Conduct* (The Hague, Boston and London: Kluwer Law International, 2001), p. 261 and UNCTAD, *World Investment Report 1999*, p. 199.

<sup>12</sup> UNIDO, *World Industrial Development Report 2002/2003*, p. 36 and p. 156. The report notes that data on R&D financed by enterprises is preferred to data on total national R&D spending because enterprise-financed R&D is more directly related to industry and because in most developing countries R&D financed by government goes to state or university libraries, with little impact on industrial innovation. *Ibid.*, p. 36.

<sup>13</sup> Kumar, N., *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*, pp. 10-11. According to UNIDO's *World Industrial Development Report 2002/2003* (p. 36), the share of developing countries in world R&D expenditure financed by productive enterprises was 5 per cent in 1998.

<sup>14</sup> UNIDO, *World Industrial Development Report 2002/2003*, p. 36.

<sup>15</sup> Kumar, N., *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*, p. 8.

<sup>16</sup> UNIDO, *World Industrial Development Report 2002/2003*, p. 38. The report explains that data on royalty and technical payments abroad capture arm's length purchases of know-how, patents, licences and blueprints-imports of embodied technology in non-equity form. Although royalty payments often reflect

7. In addition to concentration at the country-level, innovation activity is marked by a high degree of concentration at the firm level. Thus, in the United States, 50 firms, almost all multinational, accounted for almost half of total industry-based R&D expenditures in 1996, while in Switzerland three firms accounted for 81 per cent of national R&D expenditures in the early 1980s and in the Netherlands for nearly 70 per cent.<sup>17</sup> A strong correlation exists between the extent of innovation activity undertaken by a firm and its multinational character.<sup>18</sup> Multinational firms are at an advantage relative to other firms in exploiting economies of scale in the conduct of R&D, in amortizing the costs of R&D over a larger number of markets, and in accessing foreign sources of foreign technology.<sup>19</sup>

8. Most innovation activity by multinational enterprises is conducted in the home country. Although a trend is discernible toward the internationalization of innovation activities, this is much less advanced than the globalization of other corporate functions.<sup>20</sup> Moreover, such decentralization of innovation activities by multinational firms as has occurred has mainly involved foreign affiliates in other developed countries. According to one source, developing countries represented 8 per cent of the total overseas R&D conducted by foreign affiliates of US multinational firms in the mid-1990s and 1 per cent of the R&D conducted by the parents of these firms.<sup>21</sup> In addition, R&D by foreign affiliates in developing countries are concentrated in a small group of countries such as Brazil, Mexico, Singapore and Chinese Taipei. In the near future, the decentralization of R&D activity by multinational firms is likely to remain confined to a relatively small number of developing countries.<sup>22</sup>

9. The limited extent of overseas R&D by foreign affiliates in developing countries can be explained in part as a logical consequence of economic factors, including the lack of local research capabilities and institutions in most developing countries.<sup>23</sup> However, host country policies towards FDI have also played a role. Thus, for example, the fact that Brazil, which has a much lower percentage of R&D expenditure as a share of GNP than Korea, has a much higher share of R&D spending by affiliates of US multinationals, can be explained by the different policies pursued by Brazil and Korea regarding the entry of FDI and the acquisition of foreign technology in internalised or externalised modes.<sup>24</sup> R&D of affiliates of multinational enterprises in developing countries is

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intra-firm transactions, the statistical correlation between FDI and royalty payments, while positive, is not very high. As a consequence, "this variable is the best available proxy for technology purchases by local firms."

<sup>17</sup> UNCTAD, *World Investment Report 1999*, p. 199.

<sup>18</sup> Kumar, N., *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*, p. 15.

<sup>19</sup> UNCTAD, *World Investment Report 1999*, p. 199; UNCTAD, *Foreign Direct Investment and Development*, UNCTAD Series on issues in international investment agreements (New York and Geneva: United Nations, 1999), p. 34.

<sup>20</sup> Patel, P. and K. Pavitt, "Large Firms in the Production of the World's Technology: An Important Case of 'Non-Globalization,'" in Cantwell, J., *Transnational Corporations and Innovative Activities*, United Nations Library on Transnational Corporations, Vol. 17 (London and New York: Routledge, 1994). Significant differences have been noted in the R&D intensity of affiliates of parents of different nationalities. Pauly, L.W. and S. Reich, "National Structures and Multinational Corporate Behavior: Enduring Differences in the Age of Globalization," *International Organization*, Vol. 51, No. 1, pp. 1-30; Doremus, P.N., W.W.Keller, L.W. Pauly and S. Reich, *The Myth of the Global Corporation* (Princeton: Princeton University Press, 1998).

<sup>21</sup> UNCTAD, *World Investment Report 1999*, p. 215. See also Kumar, N. *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*, p. 11 (reporting that developing countries collectively represented 5 per cent of the total overseas R&D of US and Japanese multinational enterprises.)

<sup>22</sup> UNCTAD, *World Investment Report*, 1999, p. 218.

<sup>23</sup> "It is often not economical for transnational corporations to relocate R&D at the same pace as production. Agglomeration, linkages, cumulative learning and economies of scale make it costly to spread R&D overseas-particularly to developing countries short on high-level skills, advanced infrastructure and supporting research institutions." UNIDO, *World Industrial Development Report 2002-2003*, p. 36.

<sup>24</sup> UNCTAD, *World Investment Report 1999*, pp. 215-216.

geared mainly towards adaptation and technical support rather than innovation, but there have recently been cases of relocation of more strategic R&D to developing countries.<sup>25</sup> This is often associated with factors such as the availability of highly qualified scientists and engineers and shifts in corporate strategy from production for the local market to production for the world market, as exemplified by Brazil's automotive industry.<sup>26</sup>

10. In this connection, a range of specific policy measures have been identified to promote greater involvement of multinational enterprises in the local generation of technology in developing countries:

- encouraging contract R&D with local research institutions and universities;
- developing human resources for R&D in specialized disciplines, such as telecommunication software or semiconductor design;
- developing university research laboratories and research institutes;
- the granting of incentives to foreign affiliates to obtain "product mandates" from their parent companies, i.e. mandates to handle a product from the design to the marketing stage;
- the granting of incentives, including fiscal incentives, to stimulate the conduct of local R&D by foreign affiliates;
- the acceleration of technology generation through the enforcement of intellectual property rights laws;
- promoting the development of local enterprises, including clusters and networks of high-technology firms to attract knowledge intensive FDI;
- the use of official development assistance to promote local skill development in general and R&D related activities in particular.<sup>27</sup>

#### B. FDI AND THE TRANSFER OF TECHNOLOGY<sup>28</sup>

11. With respect to the role of multinational firms in the international transfer of technology, a distinction is commonly made between internalised and externalised transfers.<sup>29</sup> An internalised transfer occurs between a parent of a multinational enterprise and a foreign affiliate under the ownership and control of that enterprise. An externalised transfer is a transfer from a multinational enterprise to an entity that is not controlled by that enterprise and can take the form of licensing, minority joint ventures, technical cooperation contracts, etc. While this distinction between internalised and externalised transfers of technology is not easy to make in the case of strategic alliances involving cooperation between competing firms in the development of new technology, this is of less relevance to a consideration of the role of FDI in the transfer of technology to developing countries as such alliances predominantly involve firms from developed countries.<sup>30</sup>

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<sup>25</sup> Id. See also Correa, C.M., "Emerging Trends: New Patterns of Technology Transfer," p. 262.

<sup>26</sup> UNCTAD, *World Investment Report 1999*, pp. 216-217.

<sup>27</sup> See UNCTAD, *World Investment Report 1999*, pp. 226-227.

<sup>28</sup> The focus of this Note is on *inward* FDI as a mode of transfer of technology. It should be noted that, as illustrated by recent FDI in the United States by firms from Korea and Chinese Taipei, outward FDI in developed countries can also constitute an avenue for the transfer of technology. See e.g. WT/WGTI/W/8/Add.4, p. 7.

<sup>29</sup> UNCTAD, *World Investment Report 1999*, p. 203; Chen E.K.Y., "Introduction: Transnational Corporations and Technology Transfer to Developing Countries," in Chen E.K.Y.(ed.), *Transnational Corporations and Technology Transfer to Developing Countries*, The United Nations Library on Transnational Corporations, Vol. 18, (London: Routledge, 1994), p. 10.

<sup>30</sup> The contribution by UNIDO in WT/WGTI/W/8/Add.4 (p. 6) notes that more than 95 per cent of the strategic technology partnerships are concentrated within the industrialized countries. See also Correa, C.M., "Emerging Trends: New Patterns of Technology Transfer," p. 271.

12. Two major themes in the literature on the role of FDI in the transfer of technology to developing countries are first, the determinants and relative importance of each of these modalities of transfer of technology by multinational enterprises, and, second, their relative advantages and disadvantages from the viewpoint of the development of the host country.

13. The choice between internalised and externalised modes of transfer of technology by multinational enterprises depends upon a broad range of factors that pertain to the rent-extracting potential and the transaction costs of a technology transfer, on the one hand, and, host country characteristics and policies, on the other.<sup>31</sup>

14. *Nature and pace of change of the technology.* Internalised modes of transfer of technology predominate in the case of relatively novel technologies that are subject to rapid change, whereas externalised modes of transfer of technology are preferred in the case of more mature, standardized technologies.<sup>32</sup> It has also been reported that the internalised transfer of technology is preferred if the technology pertains to a firm's principal line of business, if the transferor is more R&D intensive, and if the firm is more experienced in the transfer of technology.<sup>33</sup> Another relevant aspect concerning the nature of the technology that affects the propensity to use internalised rather than externalised transfers is the extent to which the technology involves tacit knowledge that is not easy to codify and transfer in an externalised mode and whether the technology is product- rather than process-related.<sup>34</sup>

- *Nature of the firm.* The nature and strategy of a firm are important in determining the mode of transfer of technology in that larger, more multinational and more specialized firms tend to prefer internalised modes of transfer whereas smaller, less internationally experienced and more technologically diversified firms prefer externalised modes of technology transfer.<sup>35</sup>
- *Industry.* It has also been found that the relative significance of internalised and externalised modes of transfer of technology varies by industry. Thus, for example, one study reports that in 1989 the proportion of technology transferred internally by multinational firms from the United States varied from 44 per cent in the case of primary and fabricated metals to 97 per cent for non-electrical machinery.<sup>36</sup> An earlier study by the UNCTC of forms of technology transfer by multinational firms to developing countries found that internalised modes of transfer predominated in industries characterized by factors associated with product differentiation, such as a high R&D intensity and an important role of patents, brand names and trade marks and promotion- and marketing strategies.<sup>37</sup>
- *Host country characteristics and policies.* The capacity of firms in host countries to absorb foreign technology is one of several host country characteristics that has a bearing on the relative propensity to use an internal or an external mode of technology transfer. Where the technological capabilities of firms in the host country are limited, internalised modes of technology transfer will

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<sup>31</sup> Chen, E.K.Y., "Introduction: Transnational Corporations and Technology Transfer to Developing Countries," pp. 10-11.

<sup>32</sup> UNCTAD, *World Investment Report 1999*, pp. 204-205.

<sup>33</sup> Chen, E.K.Y., "Introduction: Transnational Corporations and Technology Transfer to Developing Countries," p. 11.

<sup>34</sup> Kumar, N., *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*, p. 25-26.

<sup>35</sup> UNCTAD, *World Investment Report 1999*, p. 204.

<sup>36</sup> Kumar, N., *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*, p. 28.

<sup>37</sup> UNCTC, "Determinants of the Form of Technology Transfer," p. 193. The industries in question were: branded food and beverage processing, man-made fibres, pharmaceuticals, automobile production (but not assembly), consumer electrical products, electrical power equipment and semiconductor offshore and point of sale assembly.

be preferred.<sup>38</sup> The relative importance of internalised and externalised modes of transfer of technology has also been affected by deliberate host country policies. Thus, while Singapore is often mentioned as an example of an “internalisation-oriented” approach that relies heavily on the acquisition of foreign technology via FDI, Korea’s past policies epitomised an “externalisation-oriented” approach that seeks to acquire foreign technology through licensing and the import of capital goods so as to encourage the development of indigenous technological capabilities and minimize foreign ownership of domestic productive assets.<sup>39</sup> An issue that is the subject of divergent opinions among analysts is the extent to which host country legislation regarding the protection of intellectual property has an impact upon the location of FDI and upon the choice between internalised and externalised modes of transfer of technology.<sup>40</sup>

- *Nationality of the firm.* The propensity of a multinational firm to use an internalised or externalised mode of technology transfer also appears to vary by its nationality. The proportion of internalised transfers in the case of German firms has thus been reported to be substantially higher than in the case of US and British firms.<sup>41</sup>

15. Although the choice between internalised and externalised modes of transfers of technology is thus influenced by a multitude of factors, analysts have noted certain general trends. In particular, it has been suggested that internalised transfers of technology by multinational enterprises have recently gained in significance relative to externalised transfers.<sup>42</sup> Thus, for example, since the mid-1980s royalties and technology fees received by multinational enterprises in the United States, Germany and the United Kingdom from their foreign affiliates have represented an increasing share of the total

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<sup>38</sup> UNCTAD, *World Investment Report 1999*, p. 204; Kumar, N., *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*, p. 26; Chen, E.K.Y., “Introduction: Transnational Corporations and Technology Transfer to Developing Countries,” p. 11.

<sup>39</sup> See, e.g., UNCTAD, *World Investment Report 1999*, pp. 219-221; UNIDO, *World Industrial Development Report 2002/2003*, p. 139. UNCTAD notes that both the “internalisation-oriented” strategy pursued in the past by Korea and the interventionist version of the “externalisation-oriented” approach as exemplified by Singapore’s policies are difficult to replicate in the current environment. The former “needs a strong base of technological skills, entrepreneurs able and willing to undertake risky technological effort, and an incentive regime that shelters learning while ensuring that there is competition, for example through ant-trust regulations ... or by imposing export discipline. It also needs a government bureaucracy and other institutions able to handle these tools efficiently and flexibly without being hijacked by particular interests; and it needs resources to finance expensive R&D.” On the other hand, the interventionist “internalisation-oriented” approach “... requires very efficient targeting and massive investments in skills and institutions, difficult for large economies with a great number of domestic firms that need incentives or support to upgrade technology.” UNCTAD, *World Investment Report 1999*, p. 219. For a detailed analysis of technology policies in South East Asia, see Westphal, L., “Technology Strategies for Economic Development,” *Economics of Innovation and New Technology*, Vol. 11, No. 4-5, August-October 2002, pp. 275-320. The “externalisation-oriented” approach has also been a central feature of the industrial development strategy pursued by Japan in the post-war period. See Safarian, E., *Multinational Enterprise and Public Policy: A Study of the Industrial Countries* (Aldershot: Edward Elgar, 1993).

<sup>40</sup> cf. Maskus, K., *Intellectual Property Rights in the Global Economy* (Washington, DC: Institute for International Economics, 2000); Lall, S., “Indicators of the Relative Importance of IPRs in Developing Countries”, UNCTAD/ICTSD Capacity Building Project on Intellectual Property Rights and Sustainable Development (November 2001); Kumar, N., “Intellectual Property Rights, Technology and Economic Development,” New Delhi: Research and information System for the Non-Aligned and Other Developing Countries, February 2002).

<sup>41</sup> Kumar, N., *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*, pp. 26-27.

<sup>42</sup> See for example Correa, C.M., “Emerging Trends: New Patterns of Technology Transfer,” pp. 268-270.

technology payments received by these enterprises.<sup>43</sup> The fact that since the early 1980s FDI inflows to developing countries have increased faster than royalty payments and technical cooperation grants has also been mentioned as evidence of the growing relative importance of internalised transfer of technology.<sup>44</sup>

16. A number of factors account for this change, including: the shift in demand by firms in newly industrializing countries from mature technologies to more sophisticated, less standardized technologies; the emergence of new technologies that are seen by their owners as critical elements of their competitiveness; the liberalization of FDI policies; the role of information technology in facilitating intra-firm communication and coordination; the growing importance of tacit knowledge that is not easy to codify and transfer; and the heightened concerns of technology owners regarding confidentiality and protection of intellectual property.<sup>45</sup>

17. Another important factor in this regard is the role of FDI in the creation of globally integrated production systems. Thus a recent UNIDO study reports that among several factors affecting industrial performance in a group of 85 (developed and developing) countries, the significance of FDI has increased in the period 1985-1998 while that of licensing of foreign technology has declined. The report comments that “[t]his corresponds with the evidence on the increasing role of integrated production systems in the world economy, on the rising importance of technology transfer by transnational corporations and on their export activity as a dynamic element in the industrial competitiveness of developing countries”.<sup>46</sup>

18. This growing relative importance of internalised transfers of technology by multinational enterprises contrasts with a trend observed during the 1960s and 1970s towards greater use of externalised transfers. That trend has been attributed to, *inter alia*, the impact of intensifying competition in diffusing technology and in reducing the relative benefits of internalised modes of transfer of technology; the increasing bargaining strength of host country governments; the introduction of restrictive FDI policies by host countries; the perception of increased risks associated with FDI as a result of changes in the world economic environment in the 1970s; and the expansion of offshore financial markets and international bank lending in the 1970s which enabled developing countries to purchase technology in “unpackaged” form from multinational firms.<sup>47</sup> Notwithstanding this apparent recent increase in the significance of internalised transfers of technology, the point has been made that it is difficult to generalize about trends regarding the availability of technology through arm’s length transactions.<sup>48</sup>

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<sup>43</sup> Kumar, N., *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*. pp. 26-27.

<sup>44</sup> Correa, C.M., “Emerging Trends: New Patterns of Technology Transfer,” p. 268.

<sup>45</sup> Kumar, N., *Technology Generation and Technology Transfers in the World Economy: Recent Trends and Implications for Developing Countries*, p. 28, and Correa, C.M., “Emerging Trends: New Patterns of Technology Transfer,” pp. 268-269.

<sup>46</sup> UNIDO, *World Industrial Development Report 2002/2003*, pp. 70-71.

<sup>47</sup> UNCTC, “Determinants of the Form of Technology Transfer,” p. 174.

<sup>48</sup> “While the rising costs and risks of R&D in some technologies are leading to greater concentration ..., there is more fragmentation and competition in other technology markets. It is not clear, therefore, whether on balance it is easier or more difficult to obtain technology at arm’s length. Within advanced technologies, older vintages are easily available from innovators and imitators. In low-technology activities, new suppliers of technology and technical services are appearing, many from newly industrialized economies. TNCs often spin off independent companies to sell specialized engineering or consultancy services. International engineering and consulting companies set up affiliates or joint ventures in developing countries. For developing countries, the bulk of whose needs are in mature, standardized activities, technologies may well be available from more sources and on potentially better terms than ever before. For newly industrialized economies that need advanced technologies, on the other hand, externalised purchases may be more difficult than before in some



19. Regarding the relative benefits of internalised and externalised transfers of technology, the argument has been advanced that FDI entails access to financial resources in addition to technology; that certain technologies, especially new technologies, may be available only in internalised form; that internalised transfers enable faster introduction of technology than externalised transfers; that externalised transfers are often subject to restrictive practices; and that internalised transfers facilitate access to regional or global markets and production networks. Moreover, by providing access to the full range of a parent firm's technology and organizational skills, including its tacit knowledge, internalised transfers reduce the learning costs of deploying a technology efficiently in a new environment.<sup>49</sup>

20. At the same time, however, it has been noted that while FDI may be efficient in respect of the transfer of operational technology, its contribution to a process of deepening of local innovative capabilities tends to be limited. From this perspective, the disadvantage of internalised transfers of technology reside in the fact that transfer of operational "know-how" often is not accompanied by a transfer of "know-why" and that the transferred technology may be suited to a country's static endowments but not to its dynamic endowments.<sup>50</sup> Externalised transfers of technology may thus provide greater scope for an upgrading of local technological capabilities, on the condition that the level of domestic skills is appropriate and that firms face a competitive environment that forces them to invest in technological learning.<sup>51</sup> Moreover, the fact that FDI entails a package of assets may mean that an internalised transfer of technology is unnecessarily costly for a host country if local firms have the capability to use foreign technology efficiently and do not need the other assets owned by a multinational firm.<sup>52</sup> The possibility of the use of outdated technologies by multinational firms in host developing countries has also been mentioned as a possible drawback of internalised transfers of technology.<sup>53</sup>

21. The content of the technology transferred internally through FDI depends importantly upon the local technological capability of a foreign affiliate and the degree of competition faced by the affiliate. The competitive environment facing an affiliate is particularly relevant to the process of upgrading of local technological capabilities. Trade policies and corporate strategies play an important role in this regard. With respect to trade policy, the proposition has been advanced that export-oriented strategies are more conducive to the introduction of state-of-the art technology and technological upgrading than import substitution policies.<sup>54</sup> Regarding corporate strategies, recent analyses have highlighted the implications for the process of technology transfer of changes in the competitive environment engendered by the integration of affiliates in global production systems. Thus "product mandating" strategies, whereby an affiliate is assigned a global responsibility for the development, manufacture and marketing of a particular product or model, can have a significant impact on the level of the technology transferred.<sup>55</sup> A recent study argues that the quality and

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product segments. In other cases, the intensity of competition among suppliers, and the fact that product cycles are becoming even shorter, are opening up access to the latest technologies via external acquisition, albeit at high prices. This appears to be the case in the electronics industry." UNCTAD, *World Investment Report 1999*, p. 204.

<sup>49</sup> UNCTAD, *World Investment Report 1999*, pp. 207-208.

<sup>50</sup> For an elaboration of this argument, see, e.g. UNCTAD, *Foreign Direct Investment and Development*, pp. 35-36; UNCTAD, *World Investment Report 1999*, pp. 41-44 and 209; UNIDO, *World Industrial Development Report 2002/2003*, p. 36 and pp. 103-104.

<sup>51</sup> UNCTAD, *World Investment Report 1999*, p. 210.

<sup>52</sup> UNCTAD, *World Investment Report 1999*, p. 209.

<sup>53</sup> UNCTAD, *Foreign Direct Investment and Development*, p. 36.

<sup>54</sup> UNCTAD, *World Investment Report 1999*, p. 43; UNCTAD, *Foreign Direct Investment and Development*, p. 36.

<sup>55</sup> UNCTAD, *World Investment Report 1999*, p. 205. The emergence of global production strategies involving regional or global product mandates to foreign affiliates has diminished concerns regarding the limited contribution of foreign affiliates to the technological development of host countries that motivated FDI

dynamic development of the technology transferred to a foreign affiliate by its parent vary according to the ownership relationship between a parent and its investment and the extent to which the operations of the affiliate are integrated within the parent's global production strategy. Based on a review of evidence of the emergence of global sourcing in industries such as automobiles, auto parts computers and electronics, the study finds that operations involving wholly-owned subsidiaries that fulfill an essential function in a parent's global competitiveness strategy entail significantly greater benefits for host countries, in terms of the pace and quality of the technology transferred and the extent of backward linkages and spillover effects, than FDI that occurs in a context of joint venture, technology-sharing and domestic content requirements.<sup>56</sup>

22. The confluence of these factors –domestic technological capabilities and the competitive environment- is illustrated by a comparison in the *World Investment Report 1999* of affiliates operating in different settings. Thus the content of an internalised transfer of technology will be minimal in the case of a foreign affiliate in a least developed country that conducts assembly operations aimed at the local market, where demand is small, the level of skill development is low, and no significant local suppliers or technical institutes exist. By contrast, a much higher level of transfer of technology will be attained if a foreign affiliate is located in a developed country with a large research tradition, produces for a regional market, conducts the full range of technological, managerial and marketing functions, while specializing in some functions as part of a parent's global strategy, conducts R&D activities, and interacts with local research institutes.<sup>57</sup>

#### C. FDI AND THE DIFFUSION OF TECHNOLOGY

23. The nature and the extent of the contribution of FDI to the technological development of host developing countries depend not only upon the *transfer* of technology by a multinational firm to a foreign affiliate or to a licensee in a host developing country but also upon the *diffusion* of technology as a result of various types of knowledge spillover effects on other firms in the host country. It has been suggested that such spillover effects may even be a more important channel for the dissemination of technology than the formal transfer of technology.<sup>58</sup> The main channels through which such knowledge spillovers can arise are demonstration effects; the establishment of vertical linkages between foreign investors and customers and suppliers in the host country; the movement of labour, and the impact of FDI on competition.<sup>59</sup>

24. Studies previously circulated in the Working Group contain summaries of empirical analyses of the incidence of knowledge spillovers from FDI:

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policy in countries such as Canada in the 1970s. Conklin, D. and D. Lecraw, *Foreign Ownership Restrictions and Liberalization* (Aldershot: Ashgate, 1997), p. 51.

<sup>56</sup> Moran, T., *Parental Supervision: The New Paradigm for Foreign Direct Investment and Development*, (Washington, DC: Institute for International Economics, 2001).

<sup>57</sup> UNCTAD, *World Investment Report 1999*, pp. 205-206. See also *ibid.*, p. 223 (“The most important determinants of technology transfer are the level of skills and capabilities of an affiliate, its competitors and the supplier network, and the competitive environment facing the affiliate. The higher the level of local capabilities and the more competitive the environment, the better the quality of the initial transfer and the more rapid its upgrading”).

<sup>58</sup> WT/WGTI/W/65, para. 10.

<sup>59</sup> While, strictly speaking, the effects of FDI on competition and market structure are to be distinguished from the technology-related spillover effects of FDI (as suggested in WT/WGTI/88, p. 13), it has also been pointed out that such a distinction is difficult to make in empirical analysis. See WT/WGTI/W/65, para. 3. The recent background Note prepared for the Working Group on Trade and Transfer of Technology also treats the impact of FDI on competition as one of the channels of technology diffusion. WT/WGTTT/W/1, paras. 67 and 73.

- A number of statistical studies conducted during the 1970s and 1980s of FDI in Australia, Canada and Mexico found a positive correlation between the level of foreign participation in an industry and the level and/or growth rate of productivity in that industry.<sup>60</sup> A positive relationship between FDI and productivity of domestic firms was also found in later studies of FDI in the manufacturing sector in Mexico during the period 1965-1982 and of FDI from the United States in the manufacturing sector in France, Germany, Japan and the United Kingdom during the period 1968-1988.<sup>61</sup>
- Whereas the positive correlation established in these studies between FDI and productivity of domestic firms was based on a cross-sector comparison, somewhat different results have been reported in studies using data on the evolution of the performance of individual domestic firms over time. A study of the impact of FDI on the productivity of domestic firms in the manufacturing sector in Morocco during the period 1985-1989 found that FDI affected the level, but not the growth rate, of the productivity of domestic firms, and that the impact of FDI in narrowing the average dispersion of levels of productivity between firms was more significant in low-technology sectors than in high-technology sectors. The authors of the study ascribed the latter finding to a lack of capacity by domestic firms to absorb foreign high technology.<sup>62</sup> A recent study of the impact of FDI on the performance of domestic firms in Venezuela found *inter alia* that the productivity of domestic firms declined in sectors with increasing levels of FDI. The authors of the study suggest that such negative spillover effects could be explained by the fact that the increasing market share of foreign-owned firms forced domestic firms to lower their output and thereby forego economies of scale.<sup>63</sup>
- A study of the relationship between the share of FDI in employment in a sector and the level of wages in that sector (as an indicator of the occurrence of technology spillovers through the labour market) found that in the case of Mexico and Venezuela the share of FDI in employment did not affect the level of wages of employees of domestic firms. By contrast, in the United States, the share of FDI in employment was positively correlated with higher wages both in foreign-owned firms and domestic firms.<sup>64</sup>
- In the case of FDI in the Czech industry, a recent study found that the impact of FDI on productivity of purely domestic firms was negative, but that, if attention was limited to the impact of majority-owned foreign affiliates on all other firms, including joint ventures, the negative effect was not statistically significant. A possible explanation of this finding is that joint ventures, which invested more in research and development than purely domestic firms, were better able to absorb foreign technology.<sup>65</sup>

25. It thus appears that the empirical evidence regarding the existence of positive knowledge spillover effects from FDI is somewhat mixed.<sup>66</sup> In this regard, some analysts have challenged the

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<sup>60</sup> WT/WGTI/65, para. 57 and WT/WGTI/W/88, pp. 14-15. However, a methodological problem with this type of study as evidence of positive spillover effects of FDI is that a correlation between the level of foreign presence and local productivity could be explained by the fact that FDI is attracted to sectors with high productivity. Thus, FDI may have been the effect rather than the cause of a high level of productivity in a particular sector. WT/WGTI/W/88, p. 15. A study of the impact of FDI in the Venezuelan manufacturing sector between 1976 and 1989 found that domestic firms were more productive in sectors with a larger foreign presence but cautioned that this might not constitute evidence of positive technology spillovers if sectors with higher levels of productivity systematically attract more FDI. WT/WGTI/65, para. 60.

<sup>61</sup> WT/WGTI/W/65, para. 58.

<sup>62</sup> WT/WGTI/W/65, para. 59 and WT/WGTI/W/88, p. 15.

<sup>63</sup> WT/WGTI/W/88, p. 16.

<sup>64</sup> WT/WGTI/W/88, pp. 15-16.

<sup>65</sup> WT/WGTI/W/88, p. 16.

<sup>66</sup> See also WT/WGTTT/W/2, paras. 125-131.

view that FDI benefits developing countries in the form of positive knowledge spillover effects.<sup>67</sup> Other analysts, however, have raised specific methodological questions regarding the design of the studies in question. Thus, for example, it has been argued that the time period covered by such studies may not have been long enough, and that the studies have focused on possible horizontal knowledge spillover effects of FDI on firms that compete with foreign investors rather than on vertical spillover effects of FDI on suppliers and customers of foreign investors.<sup>68</sup> In addition, various economic and policy-related factors have been identified that may have a bearing on the conditions under which positive knowledge spillover effects of FDI occur.<sup>69</sup>

26. In this connection, the view has been expressed that limited scope for spillover effects exists where FDI is of an “enclave” character and involves products and technologies that are very different from products and technologies of domestic firms.<sup>70</sup> Reference has also been made to empirical studies that suggest that the existence of positive spillover effects from FDI depends upon the extent to which FDI contributes to greater competition in a given sector.<sup>71</sup> The importance of a host country’s overall level of development as a determinant of knowledge spillover effects has been confirmed in cross-country studies that find that the positive impact of FDI on economic growth depends upon the existence of a minimum stock of human capital.<sup>72</sup> Several studies have found that that FDI of an import-substituting character engenders more scope for spillovers from FDI than export-oriented FDI. One explanation that has been offered for this finding is that “import-substituting foreign investors bring with them skills and technologies that are in short supply in the host country and may eventually spread to local firms, whereas export-oriented foreign investors may well employ production techniques that are not significantly different from those of local exporters”.<sup>73</sup> Another explanation highlights the difference between the conditions of competition faced by firms

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<sup>67</sup> For instance, Rodrik observes: “Today’s policy literature is filled with extravagant claims about positive spillovers from DFI... Once again the evidence is sobering. Systematic plant-level studies from countries such as Morocco and Venezuela find little in the way of positive spillovers (...). At the national level, the effect of DFI on economic growth tends to be weak, and disappears as more country characteristics are controlled for (...). Much, if not most, of the correlation between the presence of DFI and superior performance seems to be driven by reverse causality: multinational enterprises tend to locate in the more productive and profitable economies (and niches thereof).” Rodrik, D., *The New Global Economy and Developing Countries: Making Openness Work* (Washington, DC: Overseas Development Council, 1999), p. 37. In a footnote to this passage Rodrik further notes that the literature on spillover effects sometimes refers to cases that involve conventional input-output linkages and labour training but that do not provide evidence of the presence of non-pecuniary externalities. *Ibid.*, p. 41.

<sup>68</sup> Thus, it has been argued that knowledge spillover effects of FDI may be more of a vertical than a horizontal nature. See WT/WGTI/W/88, p. 27. In a recent paper, Hanson submits that the statistical studies using micro-level data undermine the empirical support for the existence of knowledge spillover effects from FDI but notes that “these results are for the direct impact of FDI on domestic enterprises in the same lines of activity. It is possible that FDI raises the productivity of domestic agents through indirect, general equilibrium effects, such as backward-forward linkages or productivity spillovers common to all industries.” Gordon H. Hanson, *Should Countries Promote Foreign Direct Investment? G-24 Discussion paper series No. 9* (New York and Geneva: United Nations, February 2001) p. 14. A detailed analysis of the diffusion of technology by foreign affiliates through backward linkages with domestic suppliers appears in the UNCTAD *World Investment Report 2001*, chapter IV. The report notes that “[t]he extent to of technology transfer appears to rise the more affiliates are committed to long-term relationships with suppliers, the greater the technical complementarity between their activities, and the more specialized or custom-made (rather than standardized) are the inputs supplied. Transfers of knowledge are also likely to be positively influenced by the size of affiliates and their export-orientation. Needless to say, the extent of technology transfer also depends on the host economy and the level of development of local firms.” *Ibid.*, p. 142 (footnotes omitted).

<sup>69</sup> See also UNCTAD, *World Investment Report 1999*, pp. 210-215.

<sup>70</sup> WT/WGTI/W/65, paras. 64-65.

<sup>71</sup> WT/WGTI/W/65, para. 66.

<sup>72</sup> WT/WGTI/W/65, p. 19 and WT/WGTI/W/88, pp. 20-21.

<sup>73</sup> WT/WGTI/W/65, para. 68.

that produce for export and firms that produce for the local market. Thus, the fact that domestic firms producing for export already face competitive pressure from the world market means that the entry of FDI in export-oriented sectors engenders a less significant competitive stimulus than in the case of production for the domestic market.<sup>74</sup> However, a recent study finds that there exists greater scope for positive externalities and vertical linkages in the case of foreign affiliates that are wholly-owned by their parent firms and that are integrated within these firms' regional or global production systems than in the case of foreign affiliates that are subject to domestic content, joint venture or technology-sharing requirements.<sup>75</sup>

27. The increasing recognition of the importance of technology in economic development, and the potential beneficial role of FDI in this regard, along with changes in the international economic and regulatory environment that may make it difficult to replicate certain policies that certain countries have successfully employed in the past, raises the question of the nature of specific policy measures that are appropriate in the current context to enhance the contribution of FDI to local technological development. Recent reports by UNCTAD and UNIDO identify with a considerable degree of detail a range of options available to countries in this regard.<sup>76</sup>

### III. TREATMENT OF TECHNOLOGY-RELATED MATTERS IN INTERNATIONAL INVESTMENT ARRANGEMENTS<sup>77</sup>

#### A. PERFORMANCE REQUIREMENTS

28. A number of free-trade agreements and bilateral investment treaties contain a prohibition of certain performance requirements, including requirements concerning the transfer of technology. This approach is exemplified by the NAFTA, which prohibits the imposition or enforcement by a Party of requirements "to transfer technology, a production process or other proprietary knowledge to a person in its territory" in connection with the admission or treatment of an investment of an investor of any Party or non-Party. This is subject to an exception if such a requirement "is imposed or the commitment or undertaking is enforced by a court, administrative tribunal or competition authority to remedy an alleged violation of competition laws or to act in a manner not inconsistent with other provisions of this Agreement".<sup>78</sup> NAFTA Article 1106(2) further provides that requirements "to use a technology to meet generally applicable health, safety or environmental requirements" shall not be construed to be inconsistent with this prohibition. In addition, the prohibition of transfer of technology requirements in Article 1106(1)(f) does not apply to government procurement.<sup>79</sup>

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<sup>74</sup> WT/WGTI/W/65, para. 69.

<sup>75</sup> Moran, T., *Parental Supervision: The New Paradigm for Foreign Direct Investment and Development*.

<sup>76</sup> UNCTAD, *World Investment Report 1999, World Investment Report 2001* and UNIDO, *World Industrial Development Report 2002/2003*.

<sup>77</sup> The present Note does not address provisions, contained in various international instruments that do not specifically deal with foreign investment, which aim to encourage the transfer of technology to developing countries. Such provisions can be found in for example, the United Nations Convention on the Law of the Sea, the Energy Charter Treaty, various international environmental agreements and a number of WTO instruments, including the TRIPS Agreement. See UNCTAD, *Transfer of technology*, pp. 44-67 and UNCTAD, *International Arrangements for transfer of technology: best Practices for Access to and measures to Encourage Transfer of Technology With a View to Capacity Building in Developing Countries, Especially in Least Developed Countries*, TD/B/COM.2/EM.9/2 (1 June 2001).

<sup>78</sup> NAFTA, Art. 1106(1)(f).

<sup>79</sup> NAFTA, Art. 1108(8)(b). The NAFTA provisions on performance requirements also prohibit a Party from imposing on an investment of an investor of a party or a non-Party of a requirement "to act as the exclusive supplier of the goods or services it provides to a specific region or world market." This prohibition does not apply to government procurement. NAFTA, Arts. 1106(1)(g) and 1108(8)(b).

29. The NAFTA provisions on performance requirements draw a distinction between mandatory performance requirements, on the one hand, and measures that condition the receipt or continued receipt of an advantage on compliance with specified requirements. Transfer of technology requirements are covered by the prohibition of mandatory performance requirements in Article 1106(1) but are not included in the list of performance requirements that are prohibited by Article 1106(3) as conditions for the receipt or continued receipt of an advantage. Furthermore, the prohibition of certain advantage-based performance requirements in Article 1106(3) shall not “be construed to prevent a Party from conditioning the receipt or continued receipt of an advantage ... on compliance with a requirement to locate production, provide a service, train or employ workers, construct or expand particular facilities, or carry out research and development, in its territory”.<sup>80</sup>

30. Aside from the above-mentioned exceptions and qualifications, the prohibition of performance requirements in Article 1106 of the NAFTA is subject to country-specific reservations which the Parties have been permitted to make in respect of existing and future non-conforming measures, as set out in each Party’s schedule in an annex to the NAFTA.<sup>81</sup> Specifically in respect of the prohibition of transfer of technology requirements contained in Article 1106(1)(f), Canada has made such reservations in relation to certain existing measures. These concern the foreign investment review process under the Investment Canada Act<sup>82</sup>, the authorization of oil and gas development projects pursuant to the Canada Oil and Gas Operations Act<sup>83</sup>; and the “benefit plan” provisions of the Hibernia Development Project Act.<sup>84</sup>

31. The above-mentioned provisions of the NAFTA concerning transfer of technology requirements have not yet been the subject of NAFTA dispute settlement proceedings.

32. Provisions on transfer of technology requirements that are identical to the NAFTA provisions on transfer of technology requirements are contained in several free- trade agreements that have been concluded during the last decade between countries in the western hemisphere.<sup>85</sup>

33. The prohibition of mandatory transfer of technology requirements is also a feature of many recent bilateral investment treaties of the United States and Canada.<sup>86</sup> In the treaties of the United States, the wording of the relevant provision is the same as in NAFTA Article 1106(1)(f).<sup>87</sup> The treaties concluded by the United States make it clear that prohibition of transfer of technology requirements does not apply to requirements that are applied as conditions for obtaining advantages. In the bilateral investment treaties concluded by Canada, there is a difference from the wording of the NAFTA in that the provision applies to requirements “to transfer technology, a production process or

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<sup>80</sup> NAFTA, Art. 1106(4).

<sup>81</sup> NAFTA, Arts. 1108(1) and (3).

<sup>82</sup> NAFTA, Annex I-C-5, para. 11.

<sup>83</sup> NAFTA, Annex I-C-26, para.5.

<sup>84</sup> NAFTA, Annex I-C-28.

<sup>85</sup> See e.g. Art. G-06 of the Free Trade Agreement between Canada and Chile (1996); Art.15-05 of the Free Trade Agreement between Bolivia and Mexico (1994); Art. 9-07 of the Free Trade Agreement between Chile and Mexico (1998); and Art. 14-07 of the Free Trade Agreement between Mexico, El Salvador, Guatemala and Honduras (2000). These free-trade agreements also include a prohibition of requirements imposed on investments to act as exclusive suppliers of goods or services to a specific region or to the world market.

<sup>86</sup> Bilateral investment treaties concluded by other countries generally do not contain any provisions on performance requirements.

<sup>87</sup> See e.g., Art. VI(e) of the bilateral investment treaty between the United States and Bolivia(1998); Art. VI (e) of the bilateral investment treaty between the United States and Trinidad and Tobago(1994); and Art. VI of the bilateral investment treaty between the United States and Nicaragua (1995).

other proprietary knowledge *to a person unaffiliated with the transferor...*.<sup>88</sup> An important difference with the NAFTA is that no provision is made in the bilateral investment treaties of the United States and Canada for country-specific reservations regarding the prohibition of transfer of technology requirements.

34. Unlike the NAFTA, bilateral investment treaties of the United States also often include a prohibition of mandatory requirements “to carry out a particular type, level or percentage of research and development” in the territory of a party.<sup>89</sup> Such a provision does not appear in the bilateral investment treaties of Canada.

#### B. INTELLECTUAL PROPERTY RIGHTS

35. Besides specific provisions on issues such as transfer of technology and the conduct of research and development that can be found only in relatively few international investment agreements, another manner in which technology-related issues may be affected by such agreements pertains to the treatment of intellectual property. Specifically, intellectual property rights normally constitute one of several categories of assets included in the provision that defines the term investment. As a consequence, in the absence of qualifying provisions, the rules typically contained in investment agreements on national treatment, MFN treatment, “fair and equitable” treatment, transfer of funds and expropriation and compensation, etc. apply to intellectual property rights as a form of investment.

36. Provisions that qualify the application of an agreement to intellectual property can be found in some agreements, especially with regard to rules on national and MFN treatment and on expropriation and compensation. The NAFTA states that the requirements to accord national and MFN treatment to covered investments do not apply to exceptions or derogations from the national treatment article in the NAFTA chapter on intellectual property. Similarly, the provision on expropriation and compensation does not apply to the issuance of compulsory licenses granted in relation to intellectual property rights or to the revocation, limitation or creation of intellectual property rights, to the extent that such issuance, revocation, limitation or creation is consistent with the NAFTA chapter on intellectual property rights.<sup>90</sup> Bilateral investment treaties of Canada likewise provide that in respect of intellectual property rights the parties may derogate from the provisions on national and MFN treatment “in a manner that is consistent with the Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations...”. They also preclude the application of the provisions on expropriation and compensation to the issuance of compulsory licenses that are consistent with the Uruguay Round Final Act.<sup>91</sup> The Energy Charter Treaty (art. 10(10)) exempts intellectual property from the application of its national and MFN treatment provisions and states that in this respect the “corresponding provisions of the applicable international agreements for the protection of Intellectual Property rights to which the respective Contracting Parties are parties” shall apply.

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<sup>88</sup> See e.g. Art. V.2(e) of the bilateral investment treaty between Canada and the Philippines (1995) and Art. V.2(b) of the bilateral investment treaty between Canada and Thailand (1997).

<sup>89</sup> See e.g. Art. VI(f) of the bilateral investment treaty between the United States and Bolivia (1998).

<sup>90</sup> NAFTA, Arts. 1108(5) and 1110(7).

<sup>91</sup> Art. VI(1) of the bilateral investment treaty between Canada and the Philippines (1995) and Annex I(IV) of the bilateral investment treaty between Canada and Uruguay (1997).