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**SUBSTANTIVE DISCUSSION SEGMENT: "COMPETITIVENESS IN THE MODERN
ECONOMY: CHALLENGES FOR THE UNECE REGION"**

Competitiveness and Innovation

Note by the secretariat

Executive Summary

Global changes, including trade liberalization, the spread of new technologies and the fall in transport and communication costs, have increased competitive pressures in the world economy. This dynamic environment creates new opportunities for increased prosperity but it also raises challenges. Fostering innovation occupies a central position in any strategy to enhance national competitiveness, serving to increase productivity and providing the foundation for sustained economic growth.

The UNECE reform established a new subprogramme on Economic Cooperation and Integration. Work under this subprogramme will aim to contribute to strengthening the competitiveness of member States' economies by promoting the knowledge-based economy and innovation.

This document identifies and discusses the main concepts, policy issues and intervention instruments pertaining to competitiveness and innovation. It aims to clarify the terms used in the policy debate and present an overall view of the options considered and their implications, reflecting the topics and issues identified as strengthening competitiveness in the programme of work. It is presented to support the Substantive Discussion Segment of the first session of the Committee on Economic Cooperation and Integration.

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Introduction

1. The concepts of competitiveness and innovation often appear intertwined. Innovation is a major source of competitive advantage and economic dynamism, particularly in a fast changing world where technological change and trade liberalization have increased the scope for economic interaction. Factors that have a positive impact on the ability of firms to compete overlap to a large extent with those that have been identified as favouring innovation. Government policies play a major role in fostering an environment conducive to competitiveness and innovation.

2. This document presents the main issues relating to competitiveness and innovation. The primary emphasis is on the clarifying the concepts in order to create a common ground for an informed debate on these questions. The document also discusses the rationale for policy intervention and some of the instruments often used as part of strategies to foster competitiveness and innovation.

I. COMPETITIVENESS

A. Competitiveness: firms, industries, nations

3. Competitiveness has become a guiding idea in the formulation of economic policies in recent decades. It has served as an all-embracing notion in the debates on how to improve economic performance. However, the concept of competitiveness is often used ambiguously, reflecting different emphases on the multiple dimensions of a concept that is frequently defined in very broad terms.

4. At the firm level, the notion of competitiveness is clear and uncontested, denoting the ability of companies to consistently produce goods and services that are accepted by the market and can be sold for a profit. A more competitive firm would be able to increase market share at the expense of its competitors, while uncompetitive firms would lose market share and eventually disappear.

5. One can compare the competitiveness of a certain industry (understood as the aggregate of all firms performing a certain type of activity) across different countries in a similar way, looking at the dynamics of market share in global markets.

6. Applying the concept of competitiveness at the national level has been more controversial. Countries do not compete among themselves in the same way as companies; e.g. they cannot disappear under the effect of competition. They are host to a great number of companies producing many different types of goods and services with different degrees of success. Competitiveness issues in a particular industry cannot be identified with problems of national competitiveness.

7. The increased competitiveness of an individual company is unambiguously detrimental for its direct competitors, as it takes away business from them. However, this is not the case between nations, as the prosperity of one country creates market opportunities for others. International trade is not a zero-sum game in which there are winners and losers. Trade balances cannot be taken as a measure of success without reference to the underlying economic

situation. Thus, a surplus may just reflect a recession, rather than being necessarily an indicator of economic strength.

8. Competitiveness has nonetheless survived as a useful concept in the assessment of national economies. However, ultimately, competitiveness is a notion that is rooted in the position of individual firms.

9. Two main approaches can be distinguished when considering national competitiveness:

- (a) A “narrow focus”, which considers cost measures and external performance; and
- (b) A “broad focus”, which emphasizes factors that have an influence on productivity and, more generally, the drivers of the growth in per capita incomes.

10. The narrow focus is on the ability of countries to compete in world markets. It looks at the dynamics of exchange rates, unit costs and prices, as the most immediate determinants of the competitive position of the domestic industries. A number of synthetic measures that help to explain international trade trends have been devised. This approach usually disregards the importance of non-price factors in influencing foreign trade competition, which are in any case more difficult to assess. Moreover, absolute cost or price levels across a range of industries are not easy to determine. International comparability can also be a problem. In order to obviate these difficulties, attention is most often focused on changes in aggregate indicators relative to some benchmark country or international average.

11. Relative changes in unit labour costs in the manufacturing sector, expressed in a common currency, are a popular measure of the dynamics of international competitiveness. Such an indicator focuses on a sector that is exposed to international competition and costs that can be easily measured.¹ The real exchange rate, based on either relative consumer prices or relative unit labour costs, is perhaps the most widely used indicator to determine price competitiveness.

12. However, it is not clear that over the long-term, an increase of unit labour costs vis-à-vis other countries leads to a lower market share. An appreciation of the real exchange rate can go together with strong economic performance, reflecting non-price competitive advantages. On the other hand, exchange rates can be volatile, resulting in gyrations in these narrow measures of competitiveness that do not reflect a change in structural factors.

13. Retaining a focus on firms, as the ultimate agents of competitiveness, it is clear that they become more competitive not only by lowering costs but also by introducing new goods and services, improving existing quality or moving into new markets. Innovative activities of firms may allow them not only to preserve or increase their competitiveness in the domestic market, but also to penetrate foreign markets. This means that their exports increase as a share of their total sales. The foreign competitiveness of firms is often reflected in their growing market shares in export markets. Thus, the dynamics of the trade balance, exports shares and import

¹ The share of manufacturing in value added tends to decline as the level of economic development increases. Thus, measures based on manufacturing are less closely linked to overall economic success the richer a country becomes.

penetration in domestic markets, are often used as a measure of a country's competitive performance.²

14. The dynamics of manufactures' exports, coupled with diversification and increases in technological sophistication, provide a reasonable indicator of increases in competitiveness (See Addendum. I.A. Development and quality ladders). The change in the structure of domestic industry tends to be partly reflected in changes in the composition of a country's exports. As its industry undergoes technological upgrading, the structure of its exports also tends to shift towards products that are more technologically intensive and/ or of better quality, with a higher value added content.³ This is reflected in the growing importance of products with higher value added and the relative decline of products with lower technological content, which brings about a shift in the international specialization pattern of the country. Another facet of this process is the increase in unit values of the country's exports.

15. The international competitiveness of a country is often understood as the result of the aggregation of the international competitiveness of its exporting firms. A country is considered to be internationally competitive if one (or more) of the following circumstances is verified:

- (a) Exporting firms are capable of maintaining or increasing their market shares in foreign markets;
- (b) High value added or high technology goods account for a relatively high share of total exports; and
- (c) The average unit value of its exports increases consistently.

16. However, even using a narrow concept of competitiveness, measurement requires further qualifications, depending on the aspect of competition that is being analysed. The resulting indicators need to be interpreted in view of the general economic conditions of each individual country.

17. The broader focus on international competitiveness, which underpins the current debate and policy considerations on competitiveness, considers factors that have a positive influence in increasing per capita incomes in an economy in a sustainable way, subject to the test of external competition. Competitiveness appears as a means to an end, with increased income being the expected outcome.

18. The narrow concepts of competitiveness discussed above focus mainly on cost advantages or external performance. Broader measures take into account a wider range of factors and introduce an explicit link with raising income in a sustainable way. This broader approach,

² UNECLAC and the World Bank have developed a "competitive analysis of nations" tool that focuses on the trade performance of individual countries, looking at the dynamics of market growth and market share, to identify competitive positions.

³ At the same time, exports ensure wider markets for the output of firms and thereby tend to strengthen the position of firms in the domestic markets, as they increase their capacity to further invest in innovation. Thus, there is a feedback between a country's industry structure and its export structure.

ultimately, leads to a consideration of the determinants of economic growth in modern economies.

19. While not all countries can improve at the same time the relative competitive position of their companies or sectors vis-à-vis other countries, all of them can increase productivity and wages, thus ameliorating living standards without a change in relative positions. Unlike that of firms, national competitiveness in the broader sense, which reflects the ability to deliver sustained economic growth, is not enhanced at the expense of other countries.

20. An important distinction is made between current or short-term and potential or long-term competitiveness. The emphasis is usually put on the latter, looking at the structural factors that support a sustained increase in income, beyond transitory aspects, such as a devaluation, that may temporarily boost competitiveness.

21. National competitiveness implies:

- (a) Positive economic performance, as demonstrated in terms of sustained improvement in living standards, resulting from continued economic growth;
- (b) Successful economic performance is achieved in a competitive international environment; and
- (c) Sustainability of competitive advantages, which do not derive from short-term influences. The notion of sustainability may also be widened to encompass not only economic but also social and environmental factors.⁴

22. Economic openness exposes countries to global competition but also allows them to participate fully in the international division of labour and access foreign capital and technology. It makes possible concentrating on activities enjoying comparative advantage. It facilitates the development of economies of scale⁵ and provides access to new technologies and management methods.

23. The broad concept of competitiveness implies that openness is a necessary but not sufficient condition to sustain economic growth and rising living standards. Appropriate policies and suitable institutions in a wide range of areas need to be in place. Wage cost advantages are not enough and can be quickly eroded by technological change. As discussed below, the ability to innovate, i.e. to create new products or adapt existing ones, increasing their technological content, is a critical dimension of competitiveness.

⁴ The concept of “responsible competitiveness” has been proposed to denote a situation in which the business sector is provided with the appropriate incentives to make economic development compatible with social development and environmental sustainability.

⁵ Economic integration contributes to enhancing competitiveness. Overcoming the size limitations of the national market allows producers to increase production volumes resulting in the reduction of unit costs.

B. Competitiveness as productivity

24. Productivity occupies a central position in the understanding of competitiveness. Some experts will go as far as equating, at the national level, productivity with competitiveness. The increase of labour productivity is a major influence on the dynamics of living standards.

25. The analysis of competitiveness in the broad sense (i.e. the sustained ability to increase living standards, which ultimately relies on the growth performance of the economy), quickly moves into the identification of the factors that determine this ability (See Addendum. I.B. The determinants of productivity).⁶

26. The focus on productivity allows another formulation of the concept of competitiveness: countries strive to create the policy and institutional environment that nurtures the growth of enterprises and facilitates increases in productivity.

27. This is precisely the approach that various institutions follow in compiling competitiveness indices. They define competitiveness in terms of enabling conditions and existing resources rather than on the basis of outcomes. The publication of these composite indices has underpinned the popularity of the concept in the media and policy debate, as they provide information on many dimensions of the economic environment. A fuller description of these indicators can be found in the Section II of the Addendum to this document.

28. These ranking exercises, particularly the most ambitious ones, have been criticized on several grounds. Weightings and aggregation methods can be arbitrary. Information collected through surveys is subjective and sometimes replaces existing hard data. There is frequently confusion between the outcome of competitiveness (a positive economic performance) and determining factors.

29. Nevertheless, these attempts to assess national competitiveness contain useful information and provide further insights into the concept. While overall comparisons may be of limited use, benchmarking on specific issues may serve to determine strengths and weaknesses and identify areas where progress could yield higher benefits.

30. As many of the factors that influence the competitiveness of individual enterprises are determined at the national level, the use of this concept is justified when referring to national economies. Competitiveness, as a broad and multifaceted concept, provides an integrated framework to consider policies, as discussed in the next section.

C. Competitiveness as a policy framework

31. The concept of competitiveness has its roots at the firm level. The meaningful translation of this notion at the national level implies a focus on policies. An assessment of national competitiveness requires a discussion of the role of government policies in nurturing and

⁶ A broader consideration of the determinants of living standards and economic growth would also require taking into account factors influencing labour utilisation.

enhancing the competitiveness of firms. The ability of firms to compete depends on their own resources, their skills in developing successful business strategies and their success in innovating. However, the existing institutional environment, which is largely the result of policy decisions, has a critical influence in shaping this ability. Some experts see institutional differences as the most significant factor setting apart individual countries and the quality of institutions as the ultimate driver of competitiveness.

32. A large number of policy interventions in different fields can therefore support competitiveness. However, this broad concept provides a framework for integrating individual interventions and for facilitating a debate between public and private actors on the best ways to achieve and sustain economic growth. Thus, national competitiveness strategies are commonly based on the use of several related policies.

Box 1. Millennium Development Goals and competitiveness

Progress in achieving the Millennium Development Goals (MDGs) has a direct influence on enhancing national competitiveness. The reduction of poverty, the increase in education and the improvement in health (Goal 1, 2, 5 and 6) have an obvious impact on the quality of the labour force. The promotion of gender equality (Goal 3) allows society to tap into an underexploited reservoir of talent that would foster the capacity of the economy to embark on a path of high and sustained growth. Ensuring environmental sustainability (Goal 7) encourages better resource management and reduces health problems. The global partnership for development (Goal 8) includes as an explicit target to be pursued, in cooperation with the private sector, the increased availability of the benefits of new technologies, especially information and communication technologies. National strategies to increase competitiveness and existing plans to attain the MDGs can be mutually reinforcing.

33. A classification of policies may distinguish between those that:

- (a) Create the basic legal and institutional framework for a well-functioning market economy;
- (b) Define and enforce the regulatory mechanisms to ensure fair market competition;
- (c) Remove distortions created by government policies that discourage private activity and compromise efficiency;
- (d) Correct market failures preventing companies from developing competitive advantages; and
- (e) Actively support those factors that have been identified as underpinning the competitiveness of modern economies through appropriate financing and institutional arrangements.

34. Rather than being mutually exclusive, different policies are highly complementary and their effectiveness is reinforced when they are pursued simultaneously.

35. Benchmarking is a basic tool to identify strengths and weaknesses in the analysis of national competitiveness. However, there is no a “one-size-fits-all” model for enhancing competitiveness, a multifaceted concept with many dimensions and complex interactions

between different factors, ranging from the general macroeconomic situation to the degree of financial development or the characteristics of the education system. Thus, individual policies or situations can be benchmarked but concrete recommendations depend on the national situation, which would suggest a specific policy mix. For instance, in countries with few policy-induced distortions, such as an inefficient tax system or excessive inflation, the emphasis would fall almost exclusively on structural factors such as education or the upgrading of the physical infrastructure. In others, where the situation of public finances and macroeconomic stability is precarious, due consideration must be paid to these problematic areas as well.

36. Overall, there has been a shift towards policy measures that do not seek to encourage specific sectors or industries but to create favourable conditions for development across a range of sectors. A traditional industrial policy of “picking the winners” has been discredited as unable to face the competitive pressures unleashed by globalization. To take advantage of the opportunities created by the increased openness to trade and the circulation of information in the global economy, countries need a more flexible setting that can respond to dynamic changes.

37. Strategies for developing competitiveness sometimes focus on exploiting existing advantages but they may also encompass the development of new ones through more active policies, which use as instruments the upgrading of skills, the creation of appropriate infrastructure, the provision of financing or the formation of supporting institutions. As discussed below, these are factors that influence innovation - a major factor driving the competitiveness of modern economies.

38. The collaboration between the public and private sectors in developing competitive advantages is a key element of the debates on how to foster competitiveness. The private sector can provide important services for competitiveness, such as infrastructure, within the framework of public-private partnerships. Critically, the public sector can help the private sector to overcome the coordination problems that would otherwise prevent the formulation of strategic plans to enhance competitiveness. Private companies can provide important inputs to shape public interventions seeking to increase competitiveness.

39. As firms are the ultimate targets of competitiveness policies, the private sector should obviously be involved in policy-making. Competitiveness councils have been formed in a number of countries, becoming a focal point for the articulation of the views of the private sector and the dialogue with the public authorities (See Addendum. I.C. Competitiveness councils).

40. Engaging a variety of actors to form a national partnership for competitiveness, grounded on complementary actions between the public and private sectors, is usually a basic strategic policy component.⁷ With the actions of the private and public sectors being strongly

⁷ B. Herzberg and A. Wright, *Competitiveness Partnerships – Building and Maintaining Public-Private Dialogue to Improve the Investment Climate* (Washington D.C.), World Bank, 2005.

complementary, the design of policies needs to pay attention to issues of sequencing, i.e. establishing the most suitable order of actions for maximum effect.

41. In many countries, promotion of clusters, both at the national/sectoral and regional levels, has been an important tool for fostering economic development and increasing competitiveness. Clusters are geographically close groups of interconnected companies, suppliers, service providers and associated institutions in a particular sphere. Sustainable clusters are likely to emerge spontaneously but can be nurtured through policy efforts, providing a good example of successful collaboration between the public and private sectors (See Addendum I.D. Clusters and competitiveness).

42. Fair competition has an obvious positive influence on productivity and therefore competitiveness. However, there is also scope for cooperative activities; the recently mentioned clusters are a good example. This operates at many levels. Companies can take collective action to improve the business environment. Collaborative institutions, such as chambers of commerce as well as universities, may play an important role. International cooperation can also serve to enhance competitiveness, as a result of strengthening mutual linkages and pooling of resources to undertake common tasks.

Box 2. UNECE activities and competitiveness

UNECE works in many areas that have a direct impact on competitiveness, resulting in the reduction of the costs faced by enterprises and providing impetus for economic dynamism.

Energy efficiency programmes contribute to environmental sustainability, but also increase the ability of companies to compete in the market place. Environmental regulation may not need to be perceived only as a source of costs; it also represents an incentive for innovation that identifies resource inefficiencies and encourages business to adopt forward-looking strategic behaviour. Improved transport links may directly reduce business costs. In addition, these links increase the scope for competition, thus fostering productivity increases. They also make possible the creation of more complex efficiency-enhancing networks of companies. Trade facilitation efforts ensure that the potential benefits of trade liberalisation are effectively realised.

Work in these fields is an expression of the contribution that international cooperation can make to enhance national competitiveness.

II. INNOVATION

A. Innovation: concepts and indicators

43. One of the major ways to retain or gain competitiveness is to undertake innovation activities that create new products or processes (of production, management, marketing, etc.) and improve existing ones. As a consequence of these inventions and improvements, firms switch to producing with a superior technology, usually resulting in the production of better quality output or output incorporating higher value added. Higher value added products or

those of superior quality usually command higher prices as compared with those produced with the previous technology.

44. It is useful to distinguish between core or basic research, applied research and development (R&D), the commercialization of its results into new products or processes (i.e. innovation), and the imitation of existing products and processes by firms other than the original innovators. Distinguishing between these different stages of the innovation process is important because the appropriate role of government policy, and the interplay between public and private actors, differs at each stage, and because the various stages are of different importance according to countries' levels of economic development.⁸

45. Moreover, an important issue is the extent to which innovation is associated with spillovers, i.e. the extent to which innovation begets additional innovation by others. An example would be innovations in information and telecommunication technology (ICT), which has allowed non-ICT businesses to create new business models using ICTs, such as new sales channels or new ways to organize their supply chains. So-called general-purpose technologies are particularly important in this regard (See Addendum I.E. General-purpose technologies).

46. From a policy perspective, the issue here is how on the one hand to protect the property rights of the original inventor in order to provide sufficient incentives for innovation, and on the other hand to allow rapid diffusion of the innovation in order to maximize spillovers.

47. While at first the innovation process was perceived as running from core research to R&D to commercialization, it is now recognized that the process is more complex.⁹ In addition to core and applied research, innovative firms rely on their clients, their suppliers, and their sales and marketing departments as sources of innovative ideas. Moreover, clients, suppliers, and non-research departments also typically provide important feedback during the research and development process. Government policies, such as regulations, can also drive innovation, even if they are introduced for other purposes (e.g. to promote sustainable environment). Finally, it is not rare historically for an innovation and commercial application to actually precede the scientific explanation of how and why it works.

48. The concept of national innovation system (NIS) is often used to analyse the complex web of actors involved in innovation and their mutual relations. NIS is the network of institutions, firms and human resources (and their interactions) that generates innovation in a given country (See Addendum. I.F. National Innovation Systems).¹⁰ The focus on NIS emphasizes the linkages between its various components and the set of rules and incentives that define the framework for innovation activities. This holistic analytical tool can usefully inform public policy, identifying weak links that undermine the efficiency of the system in generating and disseminating innovation.

⁸ C. Freeman and L. Soete, *The Economics of Industrial Innovation* (Cambridge (MA)), MIT Press, 1997.

⁹ OECD, *Governance of Innovation Systems, vol. 1 Synthesis Report* (Paris), 2005.

¹⁰ OECD, *Dynamising National Innovation Systems* (Paris), 2002.

49. Innovation is typically measured either through indicators that are input-based, such as spending on R&D or education, or output-based, such as patents granted (see also Addendum. III). Both types of indicators have drawbacks. The main drawback of input-based indicators is that the return on spending can vary substantially over time, across countries, and across agents within a country. It may therefore be difficult to arrive at meaningful comparisons of innovative activities over time or across sectors or countries on the basis of input-based indicators alone.

50. Output-based measures also have their shortcomings. For instance, relatively few patents account for the bulk of economic value of all patents. Therefore, in order to get a meaningful measure of innovation, citation-weighted patent counts may be required. Another drawback of patent counts is that by far not all valuable innovations are patented. The Internet is one highly conspicuous example. The decision whether or not to patent is endogenous. It depends on the costs of obtaining a patent relative to the size of the market for which the patent would be valid and on the projected life-span of the innovation before it would be superseded by newer innovations. Moreover, by definition, patents cannot capture the tacit, non-codifiable part of knowledge.

51. Using productivity changes as measures of innovative activity sometimes entails difficulties in distinguishing between true innovation-induced productivity gains and increases in profits induced by changes in market power. Also, productivity measures are derived from measures of outputs and inputs and therefore any measurement errors in the underlying data will show up cumulatively in the productivity measures.

52. As a matter of policy, both input and output-based measures have a useful role to play. Output-based measures are perhaps more helpful to assess whether there is a problem (e.g. a lack of innovation). Input-based measures can then provide clues as to the causes. For instance, if a country ranks high on indicators focusing more on inputs into the innovation process, but ranks relatively low on indicators emphasizing results, resources would need to be used more efficiently in the innovation process. Conversely, if a country ranks equally low on input- and output-based indicators, this points to the need to devote more resources to innovation.

53. In addition to measures of innovative activity per se, there are also attempts at measuring international technology diffusion and spillovers. As far as it occurs through market transactions, technology diffusion can be measured in a relatively straightforward way through international royalty payments for the use of licences, patents and copyrights. However, most of this diffusion probably does not take place via market transactions, not least because a significant component is likely to consist of tacit, non-codified knowledge.

B. Determinants of innovation: generation and diffusion of knowledge

54. Science, technology and innovation (STI) have become key factors contributing to economic growth in all countries, independently of their degree of development. The creation of original knowledge and technology continues to be heavily concentrated in a few highly developed economies. However, globalization, understood as growing economic integration due to the removal of barriers to trade and capital mobility and the quicker circulation of

information across boundaries thanks to the advance of ICT, has increased the scope for the international diffusion of knowledge and technology.

55. Knowledge and technology circulate at the international level through trade in goods and services, foreign direct investment (FDI), technology flows and the movement of people. Multinational firms are using ICTs to organize transnational production and research networks in response to international competition and the increased need for strategic interaction. The international networks organized around transnational enterprises play a key role in the transfer of technology.

56. Fewer than two dozen countries worldwide have significant expenditures on R&D.¹¹ Results – as measured by scientific articles or patent applications– are also heavily concentrated. Despite the heavy concentration of research spending and output in a few highly developed economies, knowledge and technology have been spreading across borders through a variety of channels. For most countries, foreign sources of technology and knowledge account for a very significant part of their productivity growth.¹² However, there is as yet no readily accessible global pool of technology.

57. The localized character of technology suggests that an important component of it is tacit in nature. International diffusion of technology, therefore, does not automatically lead to successful innovation in the recipient country. Rather, innovation is an outcome that depends both on the access to knowledge and technology and the national ability to make the best use of the possibilities opened by this access. For a country to be able to use foreign technology and knowledge and to successfully turn them into innovations therefore requires investments in absorptive capacity. These include most notably investments in human capital, but also in infrastructure and in applied R&D.

58. The distinction between innovation in the narrow sense and imitation is somewhat blurred in practice. Imitation typically will require adapting imported knowledge and technologies to local conditions, a process which can be considered innovative in its own right. Many of the UNECE region's emerging markets economies are well placed in this regard, as they have high levels of human capital relative to their per capita incomes.

59. International cooperation in R&D activities is increasing.¹³ In many developing and emerging market economies, most industrial R&D is done by affiliates of foreign firms. Similarly, high shares of the patents originating from non-OECD member countries are owned or co-owned by foreigners.

¹¹ According to the OECD's definition of gross domestic expenditure on R&D, there are 16 countries which individually contribute at least one per cent to the global total. The top ten countries account for over 85 per cent of this total. See OECD, *Science Technology and Industry Scoreboard* (Paris), 2005.

¹² Apart from the level of development, size is another important factor determining to what extent a country relies on foreign sources of technology.

¹³ UNCTAD, *World Investment Report 2005* (Geneva), 2005.

60. Trade in high-technology goods can be a source of technology for importing countries. At the same time, firms might also acquire knowledge through exporting. That is, the need to compete in international markets may force exporting firms to adopt best practices and to search for innovative solutions both at the production and managerial levels. Their contacts with international clients may provide exporting firms with sources of information, best practices, access to production networks, and benchmarks against which to assess their own performance.

61. The movement of people is another possible channel of technology transfer. Countries can benefit from the knowledge acquired by workers and students returning from abroad. However, there is a significant brain drain of highly-skilled people emigrating to a few rich countries, many of whom will probably never return to their native countries.

62. In terms of the importance of the various possible channels for international technology diffusion and spillovers, the available evidence shows that imports are an important channel, while it is less clear on learning-by-exporting effects.¹⁴ FDI is associated with technology diffusion and spillovers; however, it is not clear whether these are large enough to always justify the pervasive and large subsidies with which governments are trying to lure multinational firms.

63. Local conditions determine the way in which the participation of the national companies in these international networks can take place. A more appropriate type of policy intervention seems to be that directed to shaping these local conditions in a way that is conducive to technological development and increased prosperity.

C. Innovative enterprises: the role of policy

64. For advanced economies, which are at or close to the technological frontier, the main challenge is to constantly generate a sufficiently large stream of new ideas and to successfully commercialize their innovations. A prerequisite for this is a high rate of investment in knowledge. But a key challenge is to make sure that inventions and advances in knowledge do lead to commercially successful innovations in processes and products.

65. Competition, entrepreneurship, and start-up enterprises are important in this regard for a variety of reasons.¹⁵ First, actual or potential competition from new entrants can be a powerful incentive for incumbent firms to invest in R&D and to innovate so as to stay at the forefront. Second, incumbent firms may have incentives to delay introducing new technologies or new product vintages because doing so would reduce the value of their existing product vintages and cut into their profit margins (“cannibalization”). New start-ups do not have such disincentives to innovate.

¹⁴ W. Keller, “International Technology Diffusion”, *Journal of Economic Literature* 42(3), 2004.

¹⁵ OECD, *The Sources of Economic Growth in OECD Countries* (Paris), 2003.

66. Third, large, well-established firms may not be particularly good at quickly weeding out the failures among their internally generated innovations. A small start-up firm, by contrast, which is founded and focused on a single innovative idea, will be quickly forced to wind down a new venture by its creditors and financiers if the idea does not turn out to be commercially viable, thereby freeing up resources for other innovative ventures. Fourth, advances in knowledge and inventions often originate outside the enterprise sector, e.g. in universities. Starting their own firm can be a highly effective way for researchers to commercialize their own inventions. This can be better than selling the invention to, and entering into contractual relations with, existing firms, a procedure which can create difficult issues in terms of sharing the risks and rewards of an innovation of uncertain commercial value and spelling out and monitoring the related obligations by the parties.

67. Policy has a key role to play in creating an enabling environment for a high rate of technology start-ups. It aims to maximize the opportunities for innovations to be brought to market, making sure that failed innovations are quickly aborted whereas successful ones are being nurtured. This favourable environment has multiple dimensions:

- (a) At a general level, it is important to reduce barriers to entry and exit, such as excessive requirements and bureaucratic hurdles when registering a business or when undergoing a bankruptcy or foreclosure procedure;
- (b) Effective anti-trust policies need to be established and enforced; and
- (c) Efficient regulation and supervision of financial markets, banks and other financial intermediaries is important in order to secure an adequate supply of financial funds for innovative activities (See Addendum. I.G. Financing of innovation).

68. A strong case exists for public support for commercial innovation.¹⁶ The benefits of an innovation can only be appropriated partially by the company that introduces it, while a positive externality is associated with it. Without policy intervention, the expected private return may not be a sufficient incentive for the firm to initiate the innovation. Under these conditions, companies would not invest enough in activities fostering innovation. Policy interventions may be needed to correct for this market failure.

69. Policy intervention can also help to overcome coordination problems. A certain innovation may only be possible if a number of different components are in place, implying that the various participants need to be sure that the necessary complementary actions will be carried out.

¹⁶ A recent review of the rationale and mechanisms of public support can be found at F. Jaumotte and N. Pain, "An Overview of Public Policies to Support Innovation", *OECD Economics Department Working Papers* No. 456, 2005.

70. Policy choices to support commercial innovation depend on the different national institutional settings. As pointed out in a recent World Bank study¹⁷, national assessments are necessary to underpin the design of a programme of support. This concerns not only the choice of instruments but also, for the less advanced countries, the need for measures of more general significance in other areas to increase the ability of these countries to acquire and absorb knowledge.

71. Public support can include both financial and non-financial instruments, such as the provision of various business services. One such service, which is very useful is, business incubator programmes. These provide would-be and actual start-up entrepreneurs with “one-stop shopping” for dealing with all administrative matters regarding setting up a business plus privileged access to basic facilities.

72. A major concern is securing the “complementarity” of the public financing provided, i.e. that it does not replace private financing that would have been forthcoming in any case. The type of enterprises being targeted (SME or larger enterprises) is important here.

73. Programmes that encourage cooperation between universities and the business sector and programmes that facilitate the transition between academic and business careers can be valuable. Public-private partnerships (PPPs) may be used as instruments to foster links between public research organizations and the private sector, ensuring that university research is more responsive to the innovation-driven demands of the industry. The use of PPPs to encourage the interaction between public research and the industry requires appropriate university funding arrangements and possibilities for competitive funding, i.e. obtained through a bidding process, as opposed to guaranteed financial support. The manner in which research bodies are financed largely determines their interaction with local industry. Guaranteed public funding may reduce the intensity of their links with industry.

74. However, direct public financing may be used to support partnerships between public research institutions and industry. The formation of these PPPs needs to pay necessary attention to governance and cost-sharing arrangements among the various partners and IPR issues in relation to the results. Such arrangements can also have an international dimension.

75. Less advanced countries need to exploit the potential advantages of being at a distance from the technological frontier by imitating and diffusing foreign technologies. This dimension should be an important component of the design of programmes of support. Successful catching-up will depend on the country’s absorptive capacity, in particular factors such as economic openness, governance and an effective financial system. Competitive advantages based on low labour costs and price competition are always vulnerable to the emergence of other potential production locations, where costs are even lower. It is therefore important not to get trapped in a rigid specialization in labour or resource-intensive activities but to gradually move up the value-added chain, shifting to more knowledge-intensive industries.

¹⁷ World Bank, *Public Financial Support for Commercial Innovation. Europe and Central Asian Knowledge Economy Study Part I* (Washington, D.C.), 2006.

E. Innovation and structural change

76. Investment in innovation and in technology by firms contributes to the technological upgrading in the sector of which they are part and, more generally, to the shift towards a higher technological content of the country's industry. Apart from investment by existing firms, a country's industry also becomes more technologically advanced through the entry of new firms (domestic or foreign) in higher-technology sectors (e.g. mechanical and electrical engineering, transport equipment) or the exit of firms from sectors or subsegments that incorporate lower technological content or result in lower value added (e.g. textiles and clothing, food products).

77. Innovative activity of existing companies and the entry and exit of firms in sectors of different levels of technological content imply changes in the country's industrial structure. Structural change towards more modern patterns occurs when the output of products with higher value added and technological content grows relatively faster than that in more traditional sectors and activities (using less advanced technology and supplying lower value added products). These developments imply a change in the specialization pattern of the country towards higher technology industries and sectors.

78. Existing specialization patterns are not only the result of narrowly defined current cost advantages but also the outcome of a longer-term and cumulative process shaped by the evolution of the development process and the accompanying government policies. The shift to a production and trade structure with higher technological content requires supportive policies that address the structural and lock-in factors that underpin the existing specialization. From this point of view, the notion is particularly relevant for countries where economic diversification, away from an excessive concentration in a narrow range of commodities, is identified as a policy target. Thus, competitive advantages need to be nurtured, being the result of specific strategic decisions and the development of favourable local conditions, rather than being purely the result of passive integration in international markets.

E. Innovation: drivers and supportive conditions

79. Successful innovation depends also on a number of more general conditions, which are largely coincident with those that are considered as driving national competitiveness.

80. In order to promote innovation, a supportive investment climate must be created. This is dependent on a number of factors that can be grouped into five broad clusters:

- (a) Macroeconomic conditions
- (b) Institutions
- (c) Competition
- (d) Human capital
- (e) Physical infrastructure.

81. Prudent macroeconomic policies keep inflation low, avoid excessive government and external debt, promote full employment, and maintain a competitive tax structure. In contrast,

overly loose and unpredictable macroeconomic policies clearly raise business costs by increasing uncertainty and risks.

82. An institutional framework conducive to productive investment centres on a legal and regulatory system that promotes the rule of law, intellectual property rights (see Addendum. I.H. Intellectual Property Rights), good governance and improves access to financial services. Flexible labour and product markets and a strong competitive environment both enhance the positive impact of technological innovation and stimulate innovation.

83. There is an increasing recognition of the complementarities between human capital formation and the accumulation of other types of productive assets. Human capital is of particular importance in generating technological and organizational innovations, which in turn foster long-term economic growth.

84. Public policies to support the accumulation of human capital include not only the subsidization of basic education (and to a certain extent tertiary education) but also the provision of fiscal incentives (such as educational credits, tax incentives, etc.) to encourage individuals and private businesses to invest in human capital development. The formation of human capital encompasses, however, more than simply the formal education and training systems, it also depends on “social capital” acquired through the health and social welfare systems, families and communities, informal networks, business and other non-governmental entities.

85. Finally, the quality and availability of the physical infrastructure such as energy supply, transport network and telecommunication links play an important role and can have a significant impact on the ability and incentives to invest in innovation.

86. As discussed earlier, the importance of these factors for the innovation process will depend on the specific conditions on each country. An integrated analysis, which focuses on the interactions between the various elements and underlines complementarities and synergies can provide a useful guide for the application of the insights gained from the international comparison of experiences and policies. (See Addendum. I.F National Innovation Systems).

III. CONCLUDING REMARKS: ADDRESSING THE CHALLENGES OF COMPETITIVENESS

87. The main task confronting policymakers is to create favourable conditions for sustainable economic growth, thus providing the basis for improved living standards. This corresponds to a broad understanding of the concept of competitiveness. Strengthening competitiveness, which is the basic aim of the new Economic Cooperation and Integration Division of the UNECE, provides a holistic framework for the integrated consideration of public policies in a wide range of fields. A central premise in this paper is that the various factors of competitiveness and growth in the modern economy are closely interrelated and present strong synergies.

88. In modern knowledge-based economies, competitiveness is largely being driven by innovation. Structural change, resulting in a shift towards production and trade patterns with higher technological content and value added is, as rule, associated with increased

competitiveness, being the result of the innovative activities of existing companies and the emergence of new enterprises. In turn, facilitating the development of entrepreneurship nurtures the main forces of innovation and change.

89. The public authorities need to create the appropriate framework conditions for innovative activities to flourish. The major issues to be addressed include facilitating the generation, diffusion and commercialization of innovation, along with the commercialization and adequate protection of IPRs.

90. But the role of the public sector goes beyond establishing the basic rules of the game through legal and regulatory provisions. In close cooperation with the private sector, it can actively promote competitiveness and innovation. Creating public-private partnerships in various areas critical to competitiveness can be an effective way to structure this collaboration. The areas range from creating infrastructure to financing arrangements to support innovation. Public policy can contribute to overcoming the coordination problems that inhibit innovation in the private sector and to the institution-building required to underpin competitiveness and innovation.

91. International economic cooperation can provide a useful tool to enhance national competitiveness; for example, joint projects can be undertaken, business costs reduced and the scope for economic interaction increased.

92. Addressing the challenges of competitiveness defines a complex agenda of policy actions, with a need to consider prioritization and sequencing issues. Policy advice requires a solid understanding of existing economic dynamics in order to correctly identify relevant issues and assess the impact of any measures proposed. There is a widely shared view of what constitutes a business environment conducive to increased competitiveness and innovation. However, identifying the necessary conditions for the development of innovative activities does not provide a sufficient indication of how supportive institutions and policy packages should be designed in practice. The exchange of experiences and good practices in a multilateral environment provides a well-grounded departure point for the formulation of policies that take into account specific national features.

Glossary

Business angel: Private investor who invests in a new business at a very early stage of its development in exchange for an equity stake. Besides financing, business angels usually contribute their knowledge and expertise on that particular activity. Investment sums are relatively small.

Cluster: System of close links between firms and their suppliers and clients, and knowledge institutions, resulting in the generation of innovation. The group of firms includes also companies that compete among themselves.

Core research: Also known as basic research. Experimental or theoretical work to acquire new knowledge without any particular commercial application or use in view.

Incubator: A company or facility that provides physical space and a number of services (legal, secretarial, advisory) to new businesses, helping them through the earlier stages of their development.

Imitation: Adoption (by a firm) of the results of innovation undertaken by another firm or organization.

Innovation: In an economic context, any new way of creating economic value added, for instance, through a new production or distribution process, a new business model, a new way of organizing work, or by creating new markets or finding new sources of supply/inputs.

Invention: An idea, a sketch or model for a new or improved device, product, process or system.

Intellectual Property Rights: The rights given to persons over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a limited period of time. They encompass copyrights and rights related to copyrights; trademarks and distinctive geographical indications; and patents, industrial designs and trade secrets.

National Innovation System: The network of agents whose activities and interactions initiate, import, modify and diffuse new technology in a given country, as well as government policies, the institutional set-up and financial resources devoted to innovation and knowledge. These agents are mainly knowledge institutions (universities, research institutes, technology-providing firms), enterprises and government departments.

Technological innovation: The introduction of a technologically new product or process or a significant technological improvement of an existing product or process.

Non-technological innovation: Innovations not based on the use of new technologies. Examples include business model innovations (e.g. the hub-and-spokes model of airline operations), marketing innovations (e.g. a new pricing scheme), and financial innovations (e.g. the introduction of a new derivative which allows the more efficient pricing and allocation of financial risks).

Process innovation: Generation of new or more efficient processes of production, organization, management, distribution and marketing.

Product innovation: Generation of new or improved goods (e.g. consumer goods, equipment, materials) and services.

Public-private partnerships: Innovative forms of financing resulting from the collaboration between the public and private sectors. Many different arrangements are possible. The public sector can be either a source or a beneficiary of the financing provided.

R&D (research and development): Activity undertaken for the purpose of searching for, discovering, inventing, experimenting, imitating or developing new products (including improved versions or qualities of existing products), or new or more efficient processes.

Real exchange rate: The nominal exchange rate is the price of one country's currency in relation to another, while the real rate takes into account the differences in the price level between those countries.

Science: A set of methods to describe and interpret observed and inferred phenomena, past of present, and aimed at building a testable body of knowledge open to rejection or confirmation.

Start-up: A recently-formed business venture in its earliest stage of development (i.e. before an initial public offering or acquisition), typically in a high-technology line of business.

Spin-off: There are corporate and university spin-offs. A corporate spin-off is a divestiture by a corporation of a division or a subsidiary by issuing to stockholders stock in a new company set up to continue the activities of the division or subsidiary. A university spin-off is the creation of a company by members of a university research group to commercialize some of the research results of the group.

Technology: Relatively formal and systematic body of knowledge of techniques used for producing, distributing and transporting products, and the embodiment of this knowledge in an operating system using physical production equipment. Nowadays this knowledge has very strong scientific content.

Technology park: Territorially defined area containing a group of (mostly start-up) companies that devote the bulk of their activities to R&D and share common facilities and infrastructure. These parks usually result from a policy decision by the government, which provides some of the facilities at below-market prices.

Technology transfer: Exchange or sharing of knowledge, skills, processes, or technologies across different organizations.

Unit labour cost: Wages and salaries, including employer contributions to social security, per unit of output.

Venture capital: Also known as private equity finance. Venture capitalists can invest large sums of money in a business in return for an equity stake. They require detailed business plans, financial projections and even a track record before investing.