THE ROLE OF INTELLECTUAL PROPERTY IN PROMOTING INVENTION, INNOVATION AND TECHNOLOGICAL DEVELOPMENT

by

the International Bureau of WIPO

INTRODUCTION

1. Today, nobody challenges the importance of creativity, inventions and innovation to economic and technological development. Ever since man appeared on planet Earth, one of his major weapons for survival was the ability to find innovative solutions to the problems he encountered. The development of civilization over the centuries has been marked by countless inventions and innovations facilitating the life of mankind and making it more comfortable and easier. Indeed, we cannot imagine today's world ever having evolved without all those inventions and innovations.

2. Over the past two hundred years with the acceleration of technological progress, the life of mankind has changed in a radical way, and innovation has become an important part of our everyday reality.

3. If, in the past, a son had to wait until his father's death to introduce an innovation in his trade, today as knowledge develops, accumulates and spreads so fast that as a result a person will see technology and production methods, communication tools and processes, behavior patterns, etc., change more than once during his life. Also, the knowledge and professional skills that an individual has acquired during his years at school and university will have to be updated several times during his or her lifetime.

4. Every day we see and use products, which five or ten years ago were not even imagined. Some forecasts show that, in five years time, half of the products we are using today and are seen on the shelves of the shops and all around us will have disappeared and been replaced by new ones, i.e., every year more than 25,000 new products are being introduced on the US market. All these developments are the result of inventive creativity and the innovation of mankind.

TECHNOLOGY AND ECONOMIC GROWTH

5. Long-term economic growth is the result of an increase and accumulation of scientific and technological knowledge, i.e., increased knowledge about useful goods and how to make them.

6. With new opportunities present, the critical role of technology as the driver of economic progress has been widely acknowledged. The value added to most new products comes basically through intangible components, including technology.

7. The last decade has witnessed sweeping economic changes all over the world, particularly in developing countries. Restrictive policies with respect to controls on trade and industry, foreign investment and technological collaborations have been discarded. As country after country has liberalized its economic regime, new competitive pressures have come into play.

8. Economic progress requires a constant stream of new ideas and products to improve the quality of life, regardless of whether the innovation is a simple gadget or a sophisticated invention. There is now overwhelming empirical evidence that innovation and creativity bring competitive advantages to nations and companies. *Per capita* economic growth of countries is driven increasingly by innovation, not by aggregate capital investment *per se*.

9. The recent economic achievements of many countries have not sprung from their natural resources. Prosperity is no longer based on tin, rubber or timber. Countries rich in natural resources, i.e., oil producing countries, are no longer necessarily the great economic powers of today.

GROWING ROLE OF INTELLECTUAL PROPERTY RIGHTS (IPRS)

10. Intellectual capital is often of considerable value because it is unique. It comprises, *inter alia*, patents for inventions, trademarks, industrial designs, utility models, appellations of origin, integrated circuits topographies, copyrights, but also know-how, trade secrets, proprietary technology, talents, skill and knowledge of the work force, training systems and methods, customer lists, distribution networks, quality management systems, etc.

11. As nations and companies elaborate on new strategies where technological superiority determines success, the question of assessment and valuation of intellectual property rights (including inventions, industrial designs, trademarks, know-how, trade secrets, etc.) assumes increasing importance.

12. The role of intellectual property rights (IPRs) is therefore significantly increased in international economic and trade relations. Today intellectual capital is recognized as being among the most important assets of many of the world's largest and most powerful companies.

13. The transfers of technology, licensing agreements and joint ventures are based on IPR assets. Novel-financing techniques and mergers have emphasized of the role of intellectual property portfolios in companies. IPRs are now pledged as security for loans and the assessment of the real worth of companies more often requires the valuation of their intellectual property portfolio.

14. At the corporate level there is an increasing awareness that active and full control over technology, new products and processes secures the way to competitive advantage. Companies focus on innovation and invention-based design. Since product competitiveness falls with time, the upgrading of these products and the introduction of new ones demand well-planned innovative technology inputs.

15. The neo-classical economic theory assumed technology progress essentially as an exogenous phenomenon. A current understanding of economic growth is at variance with this view which regards technology as a "free good." It is now widely acknowledged that, technological progress occurs precisely as the result of entrepreneurial activities in anticipation of profits from innovations. The intellectual property system contributes to the transfer of technology by providing a legal environment, which is conducive to such transfer and the application of technology.

16. As creations of the human intellect, intellectual property relates to the information, which can be incorporated into tangible objects, reproduced in different locations and used by several persons at the same time. Similar to the law on movable and immovable property, intellectual property law is characterized by limitations, i.e., limited duration of copyrights and patents.

THE ROLE OF INTELLECTUAL PROPERTY RIGHTS IN PROMOTING SOCIO-ECONOMIC DEVELOPMENT

17. In highly competitive international trade, increased importance is placed on planning and forecasting, and development of appropriate commercial and industrial strategies by enterprises, industrial groups, and countries. This strategic planning is an increasingly important part of the successful implementation of the product marketing policy of companies, and of the establishment and development of an appropriate technological base that is appropriate to the capacities and opportunities of each country.

18. Recently, increasing importance has been given to the role of the industrial property system as an analytical instrument for such strategic planning and decision-making. The two main reasons are:

(a) First, the information aspect of the patent system: an awareness of the state-of-the-art in a particular technical field can avoid duplicative research work if the desired technology already exists. Also it can stimulate further improvements and provide an insight into the technological activities of competitors or, by reference to the countries in which patents have been taken out, it can reveal the marketing strategies of competitors. A state-of-the-art search will identify newly-developing areas of technology in which future R&D activity should be monitored;

(b) Second, as a tool for industrial planning and strategic decision making, the industrial property system may be very useful through analysis of the statistical aggregation of patenting activity as revealed through published patent documents. The degree of patenting activity provides an index of countries or companies which are active in various fields, and of which industries technology is progressing and in which the technology is stable, and which are the enterprises active in particular technical fields. Registered trademarks bear witness of commercial interest in the market of a country or group of countries. Analyses of IPR and their presence in different countries provide a means of testing the soundness of many policy and investment decisions.

19. Inventions, as a fundamental part of technology, are by nature both private goods in creation, and public goods through productive use or consumption. They are private goods insofar as their creation consumes both mental and physical resources that are thereby diverted from other production or consumption activities. However, once technology or inventions become available in the form of information and public goods, they can be used without loss to any person, and without further investment in recreating it for new users.

20. A dilemma exists, if everyone is free to use the technology and inventions created, and who will bear the costs associated with their creation? One of the basic rationales of the patent system is to provide an incentive for the creation of new technology and inventions, by offering inventors exclusive rights to commercially exploit patented inventions for a limited time, in return for the disclosure of the inventions to the public.

21. The exclusive right to exploit the invention commercially permits its creator to work it without fear of interference from imitators who have not incurred the investment in research and development, which produced the invention. The inventor will thus have the opportunity to recover research and development costs through a competitive advantage. The patent grant in this respect acts as an instrument of economic policy to stimulate further risk taking in the investment of resources in the development of new products and technology.

22. Patents are granted on technical criteria. The exclusive rights which are conferred by the patent relates to the commercial exploitation of the invention, and the patent

holders are not protected against those who derive from the disclosed invention a perception of a market need which may be satisfied by the legitimate adaptation or improvement of this technology, or through the discovery of a different technical solution to satisfy the same market need.

23. It is generally acknowledged that society derives satisfactory compensation for the exclusive rights it temporarily confers on certain individuals, since this exclusivity generates benefits that, in the long run, offset any economic disadvantages or risks which "exclusive rights" might entail. In general, the industrial property system is a means to:

– encourage and safeguard intellectual creativity;
– promote investment, by giving a guarantee against unauthorized use of the patented inventions to those who accept the risk of advancing from the prototype stage to mass production;
– provide consumers with the fruits of inventive and innovative activity, by the large-scale production and distribution of higher performance and higher quality goods;
– disseminate quickly and widely new ideas and technologies, by creating a public "database" of new inventions and technologies.

24. Furthermore, the IP system provides the necessary framework for the transfer of technology by contributing to an increased confidence and transparence in transactions.

25. The patent system contributes to economic growth and development, by creating conditions for the economic and commercial use of inventions in several ways:

– it gives an incentive to the creation of new technology which will result in, *inter alia*, new products, inventions and commercial opportunities, or
– it contributes to the creation of an environment which facilitates the successful industrial application of inventions and new technology and the legal framework which encourages investment, including from foreign countries;
– it acts as a catalyst for the commercialization of inventions and their transfer to productive use;
– it is an instrument of commercial and industrial planning and strategy.

26. The patent system must be understood as a policy instrument that encourages developing indigenous technological capabilities by providing an incentive to local inventors, research and development organizations and industry. In fact, it represents a strong shield for the development of innovative domestic industry, however small it may be at that moment.

27. The patent system does not constitute an instant remedy, but rather a long-term infrastructure investment in the development of a national market. Without a patent

system, inventors, entrepreneurs and companies would have no effective protection against the imitation of their inventions, and less incentive to invest in the development and strengthening of their technological capacities. It might, therefore be expected that the number of inventions produced by local inventors would be even less, in the absence of a patent system.

28. The patent system must be seen as a long-term infrastructure investment to develop the national technology market.

FUNCTIONS OF THE INDUSTRIAL PROPERTY SYSTEM

29. The main functions of the industrial property system may be summarized as follows:

- to stimulate inventive and innovative activity;
- to encourage the development of new technology;
- to encourage the commercialization of inventions and innovations;
- to facilitate access to the latest technological information.

30. Some explanations of the above-mentioned functions of the industrial property system are given in following paragraphs.

Function to stimulate inventive and innovative activities

31. A patent right is granted to a person who has invented (created, developed) an invention and who is the first one to file an application for the grant of a patent. As already mentioned, the exclusive right granted for the invention makes it unique and thus the inventor can expect to commercialize it on favorable terms. All kinds of inventions, fundamental or improvement type benefit equally from the exclusive protection. While fundamental inventions are very important for new products and industries, the so-called improvement-type inventions are also important, especially actual appliance for industries, often resulting in cost reduction or an improvement in the quality of the products.

32. The patent system provides a protection to the inventor and an incentive to continue his work, because he can be sure that if his invention is patented he will be the only one who, for a limited period of time, could legally exploit the invention and has, at the same time, the right to exclude everybody else from using his invention. This means that there will be no free ride on his invention by others who would just like to copy and use the invention free.

Function to encourage development of new technology

33. Inventions are created in the process of the development of new technology or when solving technical difficulties. They are utilized by enterprises, which apply the above-mentioned technological policy.

34. The proper protection of inventions by an industrial property system guarantees inventors an exclusive right of working inventions on a commercial basis. It makes enterprises develop and utilize inventions for their own development. The period of exclusive rights of the invention is limited to a certain time period. Thereafter, the knowledge becomes part of the public domain. Therefore, enterprises make further efforts to develop advanced technology as follow-up activities in order to keep their products competitive and profitable.

Function to encourage commercialization of inventions and innovations

35. A mature industrial property system will support accelerated introduction of technology (domestic or foreign) through the proper protection of patent rights. New technologies can be transferred more easily to countries with established and well-functioning industrial property systems. The industrial property system is a guarantee for the inventor that, when transferring his invention to an industrial user, it has been done a legal basis.

36. The industrial property system provides security for investors. While a financial institution or an investor is interested in investing in R&D, and they would like to be sure that while they are investing in R&D related to the new invention or process, that nobody else would do the same and that they would be working "competition free" for a certain period during which they will not be suffering from similar developments by competitors and develop safely their products and offer it to a receptive (because unsaturated) market.

Function to facilitate access to latest technological information

37. One of the basic principles of the industrial property system is that protection may be granted only in return for full disclosure of inventions (which, otherwise, could have been kept secret, at least for a certain time). This could be called the information function of the industrial property system. Originally, this information function was hardly more than a collateral effect of the industrial property system since, by and large, patents are taken where and when inventions cannot be kept secret any more. But with time the information contained in patent applications amounts to a stock of technological

knowledge which, due to systematic and precise documentation and classification, constitutes a valuable national asset in its own right.

38. The patent system provides a unique and, by far, the most complete collection of technological information and data on what is going on in the different fields of technology. By studying patent documents, everybody working on the development of new products, or in R&D in specific fields of technology, can know what developments are taking place in any company or firm in the world. He can also identify the state-of-the-art of the research in specific technological fields and learn about the progress of competitors, what their most recent inventions are and where protection for such inventions is being sought.

39. Awareness of the state-of-the-art in a particular technical field can avoid the duplication in research work by indications that the desired technology already exists. Also, it can provide ideas for further improvements and can give insight into the technological activities of competitors and, by reference to the countries in which patents have been taken out, the marketing strategies of competitors.

40. A state-of-the-art search can identify newly developing areas of technology in which future R&D activity should be monitored.

THE INDUSTRIAL PROPERTY SYSTEM AND MARKET ECONOMY

41. The establishment of markets, where demand is competitive and innovation-minded, is a prerequisite to the proper functioning of the industrial property system and a stimulus to socially desirable inventions and innovations. In other words, as an instrument of infrastructure intended to support the inventive and innovative activities of enterprises, the industrial property system depends on a well-functioning, complementary infrastructure upstream from the inventor, i.e., a science basis and workable competition as well as downstream. But it is the industrial property system which, for the most part, serves as an effective catalyst between both sides.

42. As regards the economic and institutional framework within which the industrial property system can operate satisfactorily, two considerations have to be borne in mind.

43. The first is that the granting of a patent for an invention normally does not amount to the grant of a monopoly and, indeed, talking of patents as of monopoly rights is grossly misleading. For one thing, there are only very few, if any, inventions that may not be replaced by alternative technologies. In addition, the patent grant itself contains the seed for the development of substitute technologies in that the disclosure of the invention

facilitates the understanding of new technological knowledge, its circumvention or adaptation to specific needs. In this way, the patent is a self-destroying exclusivity.

44. This limited nature of the exclusive protection granted by the industrial property system leads to the second and more important consideration, which is that the industrial property system operates on competitive markets and, indeed, will yield its maximum benefits on competitive markets only. The granting of exclusivity permits that a portion - but only a portion - be excluded from an otherwise competitive market replete with rivals ready to imitate the invention. The limited term of the patent protection makes sense only in view of the prospect that upon lapse of the patent term competitors will in fact imitate the invention.

45. Companies that already dominate markets may not need patent protection for the introduction of innovations. IPRs may, however, allow fresh entry into oligopolistic or monopolistic markets for companies offering new products or processes, which due to their exclusivity, cannot be imitated at predatory prices by the firms dominating the market.

46. In other words, the efficient functioning of the industrial property system depends on the existence of a dynamic competition on the market. This, of course, does not necessarily mean that a system of exclusive patent protection will work in a market economy only, but it will produce the totality of its beneficial effects only under conditions of effective competition among enterprises.

47. This complementary function of the industrial property system, i.e., to spur competition, means that governments cannot introduce patent protection as a means to promote technological development, unless they also allow for at least some effective competition among enterprises, and unless they do not take care of the maintenance of competitive market structures by also controlling economic concentrations and restrictive business practices which sometimes may be based on the use of IPRs.

48. It is not only the reward structure of patent protection which depends on the establishment of competitive markets, but also its very function as a means of stimulating and selecting commercially successful inventions. Patents are granted purely on the basis of general technical considerations such as novelty and non-obviousness; they are not granted because of a particular economic or social value of the invention. This value is to be determined exclusively, by what the market yields for the exploitation of the invention, after due efforts by the inventor. Patents do not directly reward inventions. The success of inventions on the market place will generate the reward, and the function of a patent is no more than to offer a basket for the collection of such reward.

49. The industrial property system provides a relatively safe guarantee that the inventive and innovative potential of any given company or country will in fact be activated. By covering all fields of technology, patent protection as a tool of selecting opportunities for innovation operates on a basis as broad as possible using the interests and efforts of all people in a decentralized way. What is most important is that it leaves the difficult problem of how to determine the economic and social value of an invention to the market place, i.e., to the actual user or consumer of the new process or product.

50. Finally, as patents protect only the opportunities to invent and innovate that the market offers, there must be a demand, which, if met by the invention, will bring the expected reward. Markets, however, may be imperfect in at least two respects. Firstly, there may be insufficient competition on the demand side. Secondly, markets do not always support a demand for socially desirable inventions. Consumers do not pay for new processes or products if these yield an advantage to society at large rather than to the individual consumer himself. This phenomenon of inventions that produce larger social than individual benefits is well-known in the areas of environmental protection, safety and public health. The appropriate remedy is to regulate the market by establishing environmental and safety standards, to which any processes and products have to conform so that new processes and products, which correspond to these standards, will find a demand. Exhaust emission standards for automobiles are one of the best-known examples.

THE IMPACT OF THE INDUSTRIAL PROPERTY SYSTEM ON INVENTION AND INNOVATION

51. The preceding explanation of the economic rationale and function of the industrial property system as a necessary policy-planing instrument that will encourage invention and innovation may appear somewhat theoretical. It is not infrequent that in many countries disappointment is expressed as to the yield of their own industrial property system and their patent statistics indeed indicate that it may benefit foreign applicants much more than the domestic inventors.

52. However, dominance of national markets by foreign technology may not be attributed to the industrial property system alone. Such dominance cannot be successfully defeated by refusing patent protection since, in any event, patent protection is indispensable for the establishment of innovative domestic industry. In fact, availability of patent protection represents a strong shield for the development of domestic industry however small it may be at the moment. As already mentioned, the industrial property system does not constitute an instant remedy, but rather a long-term infrastructure investment in national industrialization.

53. All along the innovation process, right from the definition of a project to the conception of an invention and its transformation into a prototype and finally into a marketable product, patents play a role as a source of information and as the instrument to protect the investments necessary at any given stage. This role, however, varies somewhat according to whether inventions and innovations are developed and introduced by one and the same enterprise, or whether they are contracted out totally or in part to other institutions or enterprises.

54. It is difficult to identify socially desirable inventions, which may not reap sufficient rewards under patent protection, by a precise economic test. However, by political judgment, at least three kinds of support are commonly the subject of specific government intervention. Such interventionist measures are not, however, intended to replace the industrial property system, but rather an attempt to establish the conditions necessary for the proper functioning of the industrial property system or to give an adequate message to inventors or innovators that their efforts in specific directions will not be in vain.

55. In order to exploit the market opportunities for invention and innovation, the inventor must have the necessary scientific and technical skills, i.e., he must be able to find adequately trained personnel and he must have access to a broad scientific and technological basis. The advantages offered by patent protection are insufficient to support all these costs (as distinguished from the actual costs of labor and of laboratory equipment).

56. What is at stake, in fact, is the establishment of the basic infrastructure of industrialization and of the operation of the industrial property system, which governments must provide in the form of an efficient education system and the establishment of competent research institutions.

57. In addition to providing the educational and scientific infrastructure for industry, governments of many countries have been led to directly support the inventive and innovative activities of industry by granting all kinds of financial assistance to individual R&D or innovation projects. The measures differ in their form, by beneficiaries and by subject matter.

58. The reasons for such financial assistance are manifold. In part, they relate to inadequacies in the industrial property system; patents may be granted too slowly in areas of fast technological development or they may not afford sufficiently broad protection for technologies of large intersectoral applicability. More frequently, R&D projects are considered to be too risky or too expensive to be undertaken on the basis of patent protection alone. In this respect, it should be noted that patents provide for rewards only at a late stage of the innovation process so that inventors and enterprises have to make

advance outlays. Depending on the size of the enterprise and on the substance of the project, the necessary capital may be difficult to find.

59. Some experts argue that patent protection may be superseded rather than reinforced by other systems of incentives to invention and innovation. This risk is often related to cases where direct subsidies are granted for R&D investments and related costs without paying attention to the subsequent business and commercial implications. If not finely tuned to the operation of the industrial property system, such subsidies may impair the function of patents as an instrument for the demand-oriented selection of rewarding opportunities for invention and innovation.

60. Patentable inventions provide a perfect opportunity and a very good reason to reward the in-house inventor, i.e., the employee who was capable of concretizing technical knowledge into an invention. Indeed, rewarding employee inventors is not only a matter of justice, since they afford a means to the enterprise of excluding competitors from making or selling the same product or from using the same process, i.e., they provide the enterprise with a well-protected competitive advantage, but indeed remuneration for employee inventions calculated as an equitable share of the profits made on the basis of the patented invention (with, of course, due account taken of the respective contributions of the employee and the enterprise to the invention) will operate as a strong incentive to inventive and innovative activities within the enterprise itself. Inventions present clearly defined situations for remuneration and they may easily (and should) be calculated on the basis of the enhanced potential profit of the enterprise rather than on the basis of mere cost saving (as is done in many cases). A well-remunerated inventor becomes an active participant in the running of the enterprise since he has a stake in it.

INDUSTRIAL PROPERTY RIGHTS IN TRANSFER OF TECHNOLOGY

61. The framework of the patent system also provides a necessary element of certainty for a technology transfer transaction. If a potential technology recipient were located in a country which did not maintain a patent system, the supplier of the technology would need to rely on purely contractual arrangements seeking to guarantee non-disclosure and use of the invention by third parties. Such arrangements establish an element of commercial risk for technology suppliers, which is more pronounced than in circumstances where the transfer transaction can be linked to a patented invention or technology guaranteeing protection against illegal exploitation by third parties.

62. The existence of a patent also introduces another measure of certainty to the commercial transfer transaction by enabling the potential recipient of the technology to sight the essence of the technology, which he is wishing to acquire. In the absence of a

patent, such initial sightings of the technology, which it is proposed to transfer, must take place through disclosures under secrecy and confidentiality agreements, which can again introduce an element of commercial risk of the leakage of the technology to third parties, thus undermining both the value of the technology from the point of view of the supplier, and the value of the technology for which the recipient will be paying. Furthermore, to cover such high risks the supplier would calculate it into a higher priced technology.

63. Contrary to secret technological know-how, patents perform several simultaneous functions, which are critical for the efficiency of the network transferring and disseminating technology, namely:

- patents provide information on who possesses which technology;
- patents give evidence of the technological strength of the respective partners because they are easy to investigate and, by their very nature, represent R&D efforts resulting in an advance in the art;
- patent claims allow one to define precisely the technical and territorial scope of any technology transfer transaction, as well as the technology to be transferred and clearly distinguished, from any other technical knowledge of which a partner may learn during the transfer contacts. This is particularly important in contract research and in cooperative research projects where the background knowledge of each partner must be distinguished from the jointly developed new technology, and where the jointly developed technology must be duly attributed for exploitation to each partner;
- the exclusive nature of patents, which transforms ubiquitous technical information into an appropriable asset, makes it possible that inventions can actually be transferred from one owner to another for monetary consideration in respect of the contract performance, the cooperative efforts or the commercial value attributed to a particular technology.

64. Therefore, the transfer function of IPRs is as important as is their information and incentive function, and is by no means limited to the grant of licenses as an additional source of income or as an instrument to serve markets into which an enterprise is not able to enter itself.

Forms of compensation in Transfer of Technology

65. The relation between licensing fees or royalties and the technology costs embodied in inventions is often not simple. A license fee or royalty should always be expressed in relation to a stated base, for example the sale price or manufacturing cost.

66. Usually royalty payments are not based on carefully worked out technology costs. They are more an outcome of negotiations between the licensor and the licensee.

"*A reasonable royalty*—according to one US Federal Court judgment—*is the amount a person, desiring to manufacture, use, or sell a patented article as a business proposition, would be willing to pay as a royalty and yet be able to make a reasonable profit.*"

67. A license usually includes a royalty payment by the licensee. For exclusive licenses, the licensee acquires the sole rights within the specified territory. It may call for an initial payment followed by a minimum annual guaranteed amount of royalty. The minimum payments are included as an incentive for the licensee to promote the active use of the licensed technology, product, etc.

68. The ingenuity of financial specialists in setting up compensations in license or technology transfer agreements is vast and they finally determine the value assigned to inventions or technology. Some of the options are:

- an upfront payment;
- stage payments;
- payments pro-rated to licensee sales;
- guaranteed minimums;
- payment for services of licensor's staff;
- payments for training of licensee's staff;
- amount of expenses incurred in traveling and subsistence of licensor's staff;
- payment for the services of outside professional experts, such as patent agents and lawyers;
- payments for continued information exchange.

69. Some of these methods are just as creative as the inventions they attempt to value for commercialization.

COMMERCIALIZATION OF INVENTIONS: THE FINAL STAGE OF THE INNOVATION PROCESS

70. Technology and inventions are important parts of the innovation process, which transforms inventions into marketable products. This complex process requires specialized professional knowledge. The marketing and commercialization phase defines the success of any innovative invention. The returns in terms of profit upon its commercialization are the ultimate proof of its success.

71. If we look closer at the innovation process we will realize that it consists basically of four overlapping and interrelated main phases: the idea generation and conception phase; the development and design phase; the prototype and pre-production phase; and, the production, marketing and commercialization phase.

72. This is the critical point in the innovation process; the production, marketing and commercialization stage, when the invention, new product (or process based on it) meets the trial of the market. Only upon its acceptance on the market by consumers and users, will the invention or new product begin to generate income, which will compensate inventors and manufacturers for their investment, and hopefully generate some profit. The returns in terms of profit are the ultimate (and eventually the most important) proof of the success of any invention or new product or technology.

73. The innovation process is by no means a linear process; its different components overlap to a considerable degree. The commercialization and marketing of an invention could begin at a very early development stage, i.e., the idea generation and conception phase. However, for the inventor or his company to begin commercialization at such an early stage is not advisable; certainly not before having filed a patent application. The price someone could offer for such an inventive concept would be very low, if any, regardless of its ingenuity and market potential, since more of the development work will have to be done, before the invention may be used in practice and could generate any income.

74. The income an invention may generate will depend directly on the investment made for its development and marketing:

– the highest return (or benefit) for the inventor may be expected when he decides to start its own production based on the invention, but this approach will also require the largest investment;

– the benefit for the inventor will be much lower when he decides to license or even to sell his patent rights at an early stage of the development of his invention.

75. A common mistake of many inventors is that they try to sell their invention without taking the necessary steps to at least obtain legal protection and to develop the inventive concept into something more tangible, i.e., to file a patent application and to produce a working prototype before trying to commercialize it.

76. Commercial and marketing strategies depend on the relation between the invention and the field of technology. Strategies will be different for mass products than for an invention in a specialized field, applicable only in the production of a few manufacturers. The market environment, the customs and traditions, the purchasing capacity and power of people (consumers) in the area also defines the methods and approaches taken.

77. The successful marketing of inventions and technology means to marry a new invention to a real existing need. It demands an extensive and very close collaboration and cooperation between three groups of people: those who create inventions and technology, those who explore and create markets and those who use inventions and

technology. Inventors are advised to seek, as much as possible, professional expert assistance when they are involved in that process.

78. From the viewpoint of the inventor, or invention owner, there exists several ways in commercializing inventions:

- to start their own manufacturing and marketing of the product based on the invention;
- to license the rights of the invention;
- to sell the patent rights, or
- any combination of the above.

79. Deciding on which way to choose will depend on a variety of factors, among which the cost and benefits analysis will often be decisive.

80. Well-prepared business plans and convincing prototypes are indispensable for attracting investors, manufacturers and potential users.

81. Patent protection, if available and strong enough, can be a very powerful tool in the commercialization process, in particular on foreign markets.

82. Usually commercialization should begin on a local scale, close to the user and only upon success should one embark on large-scale commercialization and marketing (including also for export in foreign countries).

83. Today, besides the creators of technology (inventors, R&D centers, universities) and the users of technology (industry, the business community and the consumers), the entrepreneur (broker, finder/creator of markets) has an increasingly important role in the commercialization and transfer process.

84. Sometimes governmental agencies could also act as brokers or promoters of inventions; however, such institutions should have an independent status with respect to business decisions existing outside the governmental or administrative system.

85. Inventors often entrust the search for partners and the commercialization of their inventions to commercial brokers. Before entering such arrangements, however, inventors should obtain as much as possible information on the activities and experience of the commercial broker and ask also for references from other independent sources. It is advisable that inventors retain the rights of the invention (patent, industrial design or utility model registration, trademark registration) and agree with the broker on a commission to be paid to him upon accomplishment of the task.

86. Practice has shown that, in order to be successful in the commercialization or marketing of inventions, the inventor or his company will need to have access to several or all of the following services:

- technical and technological evaluation of inventions and innovative projects;
- economic evaluation and market studies (i.e., feasibility studies);
- legal advice and assistance;
- contacts with potential users;
- experience in business negotiations;
- contacts to mobilize and attract seed and start-up capital or venture capital;
- assistance in obtaining industrial property titles, including patenting of inventions or registering trademarks;
- assistance in publicity matters and the preparation of public relation campaigns;
- advice and assistance in prototype manufacturing, etc.

87. In several countries, associations of inventors provide expert assistance on the different aspects of commercialization of inventions such as written information on general and specific business practices and ethics, on economic, financial and other laws and regulations affecting commercialization, including lists and addresses of experts in the various fields, such as patent practitioners, patent lawyers and invention brokers.

CONCLUSION

88. Finally, it can be said that, today it is generally accepted that invention and innovation are crucial for the successful participation in our very competitive global market place. A well-functioning national intellectual property system will contribute substantially to encouraging invention and innovation. It will also serve public welfare by upgrading the technical and technological base of the country, and prepare the ground for the creation and exchange of technology, and the fostering of greater human resources development in technical fields. In short, the stimulus of expanding a country's stock of technical knowledge will be materially increased and the stimulus of investment in useful development of that knowledge will be likewise increased.

89. We are witnessing growing interdependence in global trade and technology as the costs and risks of developing new products and processes increase. Strategic alliances between companies such as licensing agreements, joint ventures, mergers, acquisitions and cooperative R&D agreements, are proliferating, cutting across national borders and cultures. Alliances seek to learn and acquire from each other technologies, products, skills, and knowledge that are not available to other competitors. New relationships between enterprises and countries are setting new standards in making it easier to do

business together. The increasing role of technology in economic growth and the growing transfer of IPRs for competitive performance within and across borders makes this an important issue.