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ECONOMIC VALUE OF INDUSTRIAL PROPERTY RIGHTS

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INTRODUCTION

Technology and Economic Growth

1. The last decade has witnessed sweeping economic changes all over the world. The developing countries, in particular, have undergone a major paradigm shift. 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.
2. This period has also seen the successful conclusion of the GATT negotiations of the Uruguay round which extended from 1986 to 1994 and which, for the first time, included also an Agreement on Trade Related Aspects of Intellectual Property Rights (known as the TRIPS Agreement). The signing of the Final Act by 116 nations at Marrakech in Morocco on April 15, 1994, acclaimed as the most comprehensive trade deal in the history of mankind, has led to the formation of the World Trade Organization (WTO).
3. As new opportunities open up, the critical role of technology as a driver of economic progress has been widely acknowledged. Neo-classical economic theory attributed growth in output to increase in the factors of production, namely, labor and capital. Recent studies and experience show that contribution of raw materials, and in many cases of labor, has steadily declined in providing competitive edge to the products: their percentage in overall costs has reduced.
4. This is perhaps best reflected in micro-processor technology where raw material content has steadily fallen to an insignificant proportion of its price but the intellectual component has increased. Also the value addition in most new products comes basically through intangible components, including technology.
5. 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, for example, oil producing countries, are not necessarily the great economic powers.
6. Economic progress requires a constant stream of new ideas and products to improve quality of life, regardless of whether the innovation is a simple gadget or a sophisticated invention. Today it has become evident that innovation and creativity bring competitive advantage to companies and nations. *Per capita* economic growth of countries is driven increasingly by innovation, not by aggregate capital investment per se.

Growing Role of Intellectual Property Rights (IPR)

7. 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.

8. Intellectual capital is the foundation for market dominance and continuing profitability of many leading corporations.

9. As nations and companies elaborate their 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.

10. Intellectual capital is often the key objective in mergers and acquisitions and knowledgeable companies are increasingly using licensing routes to transfer these assets to low tax jurisdictions. The role of Intellectual Property Rights (IPR) is therefore significantly increased in the new economic and commercial forces. In economic growth and competition, intellectual capital is increasingly being recognized as been among the most important asset of many of the world's largest and most powerful companies.

11. Licensing agreements and joint ventures are based on IPR assets. They are a powerful tool to face the competitive market forces in addition to the traditional techniques of inventory management, human resource development and total quality management. The new financing techniques, leveraged buy-outs, and mergers too have led to emphasizing the role of intellectual property portfolios in companies. IPR are being pledged as security for loans and assessment of the real worth of businesses increasingly require valuation of their intellectual property portfolio.

12. 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. The focus is on innovation and invention based design. Analysis of product life cycle reveals their falling contribution as they mature. The upgrading of these products and the introduction of new ones demands well-planned innovative technology inputs.

13. The neo-classical economic theory assumed the technology progress essentially as an exogenous phenomenon. 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 a result of entrepreneurial activities in anticipation of profits from innovations. A sound patent system contributes to the transfer of technology and research results by providing a legal environment which is conducive to encouragement of technology transfer and application.

14. Intellectual property represents the creations of the human intellect. Intellectual property relates to information which can be incorporated in tangible objects and reproduced in different locations and can be used by several persons at the same time, unlike immovable or movable tangible property. Similar to the movable and immovable property, intellectual property is characterized by limitations of law, for example, limited duration in the case of copyrights and patents in order to safeguard the common interest of the society.

THE PATENT SYSTEM AND COMMERCIALIZATION OF INVENTIONS

15. In the highly competitive environment of international trade, increasing importance is being placed on planning and forecasting, and the development of appropriate commercial and industrial strategies on the part of individual enterprises, industrial groupings, and even countries. Such strategic planning is an increasingly important part of the successful implementation of the product and marketing policy of individual companies, and of the establishment and development of a technological base which is appropriate to the capacities and opportunities of the relevant country.

16. Recently, increasing attention and importance has been given to the role of the industrial property system as an analytical instrument for such industrial planning and decision-making. Two main uses may be of interest in this regard.

17. First, the information aspect of the patent system: awareness of the state-of-the-art in a particular technical field can avoid duplication in research work by indications that the desired technology already exists. Also it can provide ideas for further improvements and can give an 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. A state-of-the-art search will identify newly developing areas of technology in which future R&D activity should be monitored.

A state-of-the-art search can identify newly developing areas of technology

18. And second, as a tool for industrial planning and strategic decision making, the industrial property system may be very useful through analyses of the statistical aggregation of patenting activity as revealed through published patent documents. Since the degree of patenting activity provides an index of the degree of technological activity in a given technical field, the statistical analysis of patent documentation can indicate which countries or companies are active in various fields, in which industries technology is moving at a rapid pace and in which the technology is stable, and which are the enterprises active in particular technical fields. Registered trademarks witness a clear 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 forecasting future industrial developments, identifying areas in which market demand is increasing, monitoring general technological progress, and testing the soundness of policy and investment decisions.

19. Technology, and inventions, as a fundamental part of it, are, by nature, both private goods in creation and public goods in productive use or consumption. They are private goods in so far as their creation consumes both mental and physical resources which are thereby diverted from other production or consumption activities. Once technology or inventions become available in the form of information, however, they lose their characteristics as private goods. Unlike a tangible object, they can be used by many without loss to any person, and without further investment in re-creating it for new users.

20. These characteristics of technology and invention create a dilemma. If all are free to use technology and inventions which have been created, who will be willing to bear the cost associated with their creation? One of the basic rationales of the patent system is to provide such an incentive for the creation of new technology and inventions. It does this by offering to inventors exclusive rights to commercially exploit patented inventions for a limited time in return for the disclosure of the inventions to the public.

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.

21. The exclusive rights to exploit the invention commercially permit 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 the competitive advantage which the exclusive rights to exploit the invention confer. 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 and not on the basis of commercial or market criteria. The exclusive rights which are conferred by the patent relate to the commercial exploitation of the invention, and do not preclude another person from experimental work using the technological information contained in the patent specification. In other words, while the patent owner can prevent others from using, for commercial purposes, the same technology as is revealed in the disclosure of his invention, he is not protected against those who derive from his disclosed invention a perception of a market need which may be satisfied by the legitimate adaptation or improvement of his technology, or through the discovery of a different technical solution to satisfy the same market need.

23. The patent system contributes to economic growth and development by creating the conditions for the marketing and commercialization of inventions in several ways:

(a) it gives an incentive to the creation of new technology which will result in, *inter alia*, new products, inventions and commercial opportunities;

(b) 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;

(c) it acts as a catalyst for the commercialization of inventions and their transfer to productive use;

(d) it is an instrument of commercial and industrial planning and strategy.

24. 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.

25. 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 risk the supplier would calculate it into a higher price of his technology.

26. The patent system must be understood as a policy instrument which encourages developing indigenous technological capabilities by providing an incentive to local inventors, research and development organizations and industry, rather than a policy instrument which, if adopted, will immediately effect a transformation in the level of technological sophistication in the relevant country. In fact, it represents a strong shield for the development of innovative domestic industry however small it may be at the moment.

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

VALUATING INTELLECTUAL PROPERTY RIGHTS

28. Valuation of inventions and R&D results is necessary to estimate the value of the company's intellectual property portfolio. Furthermore, it is essential to working out the cost of technology for transfer purpose. Risk affects valuation analysis, corporate valuation must reflect risk and, most importantly, risk should reflect value.

29. Valuation is not easy. There is no agreed formula, or a common approach, to the valuation of technology, R&D results, know-how or intellectual property rights in general. It is easy to predict a person's contribution to a society when he or she is grown up and we can evaluate the usefulness of that person's contribution by ascertaining age, education, work experience and accomplishments but valuation of inventions is like predicting the future contribution of a child, if not that of a new born baby. Indeed, many inventions need not have immediate economic benefits to be valuable. Embryonic technology often needs further development before its actual value is realized.

30. This has led some people to believe that valuation of inventions is not amenable to scientific treatment and could be based more on "gut feeling" and intuition than on precise calculations.

31. One of the key factors affecting a company's success or failure is the degree to which it effectively exploits intellectual capital and values risk associated with chemicals and substances.
32. In order to value intangible assets or intellectual property, it is absolutely necessary to address the question of economic life. The two concepts are inextricable.
33. Management needs to know the value of the company's brands, other intangibles at risk for the same reasons as they need to know the underlying value of their tangible assets. To make sure that such values are maintained.
34. Some questions that have to be answered when assessing IPR.
- What IPR are used in the business?
 - How are IPR protected?
 - What is the value of IPR (as a whole and separately)?
 - What is the level of risk related to IPR (infringement third party's rights, infringement by others)?
 - Who owns IPR?
 - Could somebody sue me or could I sue somebody?
 - How can IPR be transferred or exploited?
 - What is the net present value of damages claims (corporate, environmental, personal)?

Valuation for Commercialization of Technology or Inventions

35. When valuating intellectual property rights it is essential that the assessment of all aspects of the transfer is seen in the whole context of the venture. Some of the considerations in respect of technology valuations are:

Size: Is there a market for the product of the technology?

Scale: Is the scale of operation of the technology appropriate to that market?

Maturity: Is the technology market proven or is it new which will require further development?

Obsolescence: On the other hand, is the technology stale which is about to be supplemented by new developments?

Environment: Can the technology be operated satisfactorily in the licensee's environments, both climatic and cultural?

Suitability: Is the technology appropriate for the infrastructure which is available e.g., power supply, telecommunication, transport, waste disposal, etc.?

**COMMERCIALIZATION OF INVENTIONS:
THE FINAL STAGE OF THE INNOVATION PROCESS**

36. Technology and inventions are important parts of the innovation process, which transforms inventions into marketable products. This process is most complex and as such requires much specialized professional expertise and expert knowledge. The marketing and commercialization phase of the innovation process is crucial for the success of any invention and innovation. The returns in terms of profit upon its commercialization are the ultimate proof of the success of any invention or new product.
37. 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.
38. The crucial point in the innovation process is the production, marketing and commercialization stage, when the invention or the new product or process based on it will meet the test of the market. It is only when it is accepted on the market by the consumers and users, that the invention or new product will begin to generate income which will compensate inventors and manufacturers for the investment made and eventually generate also some profit.
39. As it was already mentioned, the returns in terms of profit upon its commercialization are the ultimate (and eventually the most important) proof of the success of any invention or new product.
40. The innovation process is not a linear process and its different components overlap and interact in a considerable degree. Thus the commercialization and marketing of an invention could be initiated at a very early stage of its development, e.g., already during the idea generation and conception phase. However, for the inventor or his company it is not advisable to begin commercialization at such an early stage and at least 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 a lot more of development work will have to be done, before the invention may be used in practice and could generate any income.
41. An illustration of this is the invention of xerography, which is the technical basis of the copying machines. It took the Battelle Northwest Laboratories in the USA more than 10 years of R&D work and several hundred thousand dollars of investment to develop a marketable copier after the invention was made and its feasibility proven. And only then began the marketing based on the vast distribution network and experience of the Rank organization.
42. 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, e.g., to file a patent application and to produce a working prototype before trying to commercialize it.

43. One should always remember that from the point of view of commercialization inventions have many properties in common with any other commodity or product, the main difference being that unlike material goods, inventions can be used simultaneously by several persons and hence they can be sold or licensed several times, to different persons.
44. Inventors and all those involved in marketing inventions and innovations should not forget that only a very small percentage (five to seven percent) of all inventions for which patents have been granted reach the commercialization phase of the innovation process. The great percentage of failure is usually not due to the quality of the invention, but rather the result of the influence of other factors, such as, for example, the high investment cost for a relatively small effect, need of additional R&D work, the manufacturing and technological environment are not yet ripe for such invention, no real market need, etc. But the history teaches us that that will not stop creative people from inventing and trying to commercialize their inventions. Inventors are usually very optimistic persons who are always confident that their inventions will sell, and will generate an important income for them.
45. Commercial and marketing strategies will largely depend on the kind of invention and the field of technology, to which it is related. They will be different for a mass product and 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 will to a large extent define the methods and approaches.
46. Commercialization and marketing of inventions is a most complex process and in a highly competitive market it needs a professional approach and a lot professional expertise in order to have chances of success. Inventors are advised to seek as much as possible professional expert assistance when they are involved in that process.
47. There exist many publications that teach strategies and techniques on how to sell and commercialize products, and all of them always underline that there can be no fixed rule on how to commercialize or market a product, although certain guidelines are common and basic and are important to remember. The same applies even more to inventions, which by definition are not standard products.
48. 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.
49. From the viewpoint of the inventor or invention owner there exist a few possible ways for commercializing inventions:
- to start own manufacturing and marketing the product based on the invention,
 - to license the rights in the invention,
 - to sell the patent rights, or
 - any combination of the above.
50. The decision which way to choose will depend on a variety of factors, among which the cost and benefits analysis will often be decisive.

51. 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 require also 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 development of his invention.

52. Each individual case should be analyzed and evaluated accordingly, taking into account the nature and properties of the invention, the needs, conditions and potential of the market, the resources available, and last, but not least, the willingness of the inventor to cooperate in further development of the invention.

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

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

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

56. The possible license partners or buyers for an invention may be approached in different manners, such as, *inter alia*, direct contacts with companies, contacts through Chambers of commerce and industry or similar organizations, contacts through professional or industrial associations, by participating in specialized exhibitions or by using the services of an invention broker. It is advisable that all contacts should be carefully coordinated and monitored by establishing a public relations plan. The commercial success of an invention will depend largely on a reliable and dynamic partnership.

57. Today, besides the creators of technology (inventors, R&D centers, universities) and the user 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.

58. In some cases, in particular in developing countries, governmental agencies could also act as brokers or promoters of inventions, however, such institutions should not be a part of the governmental or administrative system, but should rather have an independent status with respect to business decisions.

59. 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 in 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.

60. Practice has shown that in order to be successful in the commercialization or marketing of inventions, the inventor of 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 preparation of public relation campaigns,
- advice and assistance in prototype manufacturing, etc.

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

FORMS OF COMPENSATION

62. The relation between licensing fees or royalties and the technology cost 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.

63. Usually royalty payments are not based on carefully worked out technology costs. They are more an outcome of what the licensor can extract to the maximum. *“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.”*

64. The other area of concern is the ways in which monetary compensation is decided. A license usually includes 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.

65. Royalties, on the other hand, may reduce if the licensee can offer some rights which are of interest to the licensor. In this case, a cross-license may be entered either free of royalty or with royalty at reduced rates. Other arrangements which influence valuation of invention for purpose of commercialization may include a “most favored licensee” clause, or some technology rights in favor of the licensor and a right of the licensee to grant sub-licenses.

66. The calculation of value of inventions in the context of currency exchange fluctuations also needs to be appraised. The currencies need to be specified and compensation received preferably at quarterly intervals.

67. Costs related to commercialization of invention would include also costs of the so called "show-how," that is, demonstrating to the future user the working of the invention (or technology, research result) and successfully transferring the product and know-how for successful commercialization.

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. 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.

CONCLUSION

70. We are witnessing an increased inter-dependence in global trade and technology as 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 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 IPR for competitive performance within and across borders makes this an important issue.

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