

---

## 1. How Important were Strong Private Intellectual Property Rights in the Development of Developed Countries?

### Evolution of National Intellectual Property Rights Regime

In modern debate on intellectual property rights, we are frequently told that without patents and other private intellectual property rights, developed countries would not have been able to generate the technologies that made them prosperous. For example, the US-based National Law Center for Inter-American Free Trade claims that “the historical record in the industrialized countries, which began as developing countries, demonstrates that intellectual property protection has been one of the most powerful instruments for economic development, export growth, and the diffusion of new technologies, art and culture”(1997. (*Strong Intellectual Property Protection Benefits the Developing Countries*—<http://www.natlaw.com>)

However, this kind of statement cannot be further from the truth, as the intellectual property regimes in the developed countries were highly deficient by “modern” standards that are now asked of the developing countries.

The first patent system was used in Venice in 1474. British patent law came into being in 1623, while France adopted its patent law in 1791, the USA in 1793, and Austria in 1794. Most other developed countries established their patent laws between 1790 and 1850 and established other elements of their intellectual property rights (henceforth IPR) regimes, such as copyright laws (first introduced in Britain in 1709) and trademark laws (first introduced in Britain in 1862), in the second half of the 19th century.

However, all of these IPR regimes were highly “deficient” by modern standards.<sup>1</sup> Patent systems in many countries lacked disclosure requirements, incurred very high costs in filing and processing applications, and afforded inadequate protection to the patentees. Few of them allowed patents on chemical and pharmaceutical substances (as opposed to the processes) – a practice that has continued well into the last decades of the 20th century in many countries (and was a major bone of contention in the TRIPS agreement).<sup>2</sup> Especially, these laws accorded only very inadequate protection of the IPR of foreign citizens. In most countries, Britain included (before

the 1852 reform), the Netherlands, Austria, and France, patenting of imported inventions by their nationals was often explicitly allowed. In the USA, before the 1836 overhaul of the patent law, patents were granted without any proof of originality, thus enabling the patenting of imported technologies.

Also important to note is that there were countries that became well developed without patents. The Netherlands, although it introduced a patent law in 1817, abolished it in 1869 and did not introduce one until 1912. Switzerland did not have a patent system until 1907. The 1907 Swiss patent law still had many exclusions, especially the refusal to grant patents on chemical substances (as opposed to patents on chemical processes). It was only in 1954 that the Swiss patent law became comparable to those of other advanced countries, although chemical substances remained unpatentable until 1978.

Despite the absence of patent law, the Dutch economy performed quite respectably in terms of innovation. During their “patentless” period, the Swiss were one of the leading innovators in the world, coming up with world-famous inventions in areas like textile machinery, the steam engine, and food processing (e.g, milk chocolate, instant soup, stock [bouillon] cubes and baby foods). Also, there is no evidence that the absence of a patent system worked as a deterrent to FDI (as it is often claimed to be these days). There were even some important cases, especially in food processing industry, where the absence of a patent law was definitely a major reason behind FDI.

## Evolution of International Intellectual Property Rights Regime – The Road to the Paris Convention

With the introduction of IPR laws in an increasing number of countries,

---

<sup>1</sup>Obviously, exactly what aspect is considered “deficient” will depend on one's view. For example, there are good arguments for and against the products patent in chemical and pharmaceutical industries.

<sup>2</sup>Chemical substances remained unpatentable until 1967 in West Germany, 1968 in the Nordic countries, 1976 in Japan, 1978 in Switzerland, and 1992 in Spain. Pharmaceutical products remained unpatentable until 1967 in West Germany and France, 1979 in Italy, and 1992 in Spain. Pharmaceutical products were also unpatentable in Canada into the 1990s. For details, see Patel (1989 p. 980).

the pressures for an international IPR regime naturally started growing from the late 19th century. Starting with the 1873 Vienna Congress, there was a series of meetings to create an international IPR regime. These finally resulted in the ratification by 11 countries of the Paris Convention of the International Union for the Protection of Industrial Property (the original signatories were Belgium, Portugal, France, Guatemala, Italy, the Netherlands, San Salvador, Serbia, Spain and Switzerland). It covered not just patents but also trademark laws (which enabled patentless Switzerland and Netherlands to sign the Convention). In 1886, the Berne Convention on copyrights was signed. What is notable is that, despite the emergence of an international IPR regime, even the most advanced countries were still routinely violating the IPR of other countries' citizens well into the 20th century.

As mentioned earlier, Switzerland and the Netherlands did not have a patent law until 1907 and 1912, respectively. The USA, a strong advocate of patentee rights even then, did not acknowledge copyrights of foreigners until 1891. The US did not fully conform to the Berne Convention on international copyright (1886) until 1988, when the country finally abolished the requirement that copyrighted books had to be printed in the US or typeset on US plates. And as late as the late 19th century, there was great concern in Britain over the widespread German violation of its trademarks. It is interesting to note that at the time the British were criticising Germany not only for using industrial espionage and the violation of its trademark law but also for exporting goods made on convict labour (recall the recent US dispute with China on this account). On the other hand, exactly at the same time, the Germans were complaining about the absence of a patent law in Switzerland and the consequent "theft" of German intellectual property by Swiss firms, especially in the chemical industry.

The international intellectual property rights regime established by the Paris Convention, and subsequently embodied in the WIPO (World Intellectual Property Organisation) went through two major turns of events after the Second World War.

**Evolution of International Intellectual Property Rights Regime –  
From NIEO to TRIPS**

During the 1970s and the early 1980s, as a part of their push for the New International Economic Order (NIEO), the G77 developing countries sought to generate greater transfer of technology from the advanced countries through the reform of the international IPR regime. Especially controversial was their push for: (i) exclusive compulsory licensing (where the number of licensees is restricted by the government); (ii) reduced licensing fees for developing countries; (iii) lengthening of the period of “right of priority” for the developing country inventors; (iv) and even allowing developing countries to revoke license before the granting of compulsory licensing and relaxing the condition for revocation (Shell, 1998, pp. 120-3).

Contrary to the expectation by the G77 countries, however, these demands for the loosening of the international intellectual property rights regime galvanised patentees in the developed countries into a counter-offensive. Especially important was the changing attitude of the US, whose relative industrial decline over the 1960s and the 1970s prompted a wave of resentment against foreign “theft” of US intellectual properties. Reflecting this mood, from the early 1980s, the US courts started favouring patentees as never before. Particularly significant was the US realisation that trade threats can be used as a way to enforce the IPR of the US corporations on its trading partners. In the late 1970s and the early 1980s, the US Trade Representative (USTR) started putting pressure through bilateral trade talks on countries like Hungary, Korea, Mexico, Singapore, and Taiwan, to “improve” their IPR regimes. Trade law amendments (especially to the so-called “Super 301” Section) in 1984 and 1988 made IPR issue a key element in the functioning of the USTR.

In the meantime, the US realised that the use of trade threats as a means to force changes on its trading partners’ IPR regimes needed not be confined to bilateral trade talks. Consequently, in April 1986 the US government put forward TRIPS as an item on the agenda for the Uruguay Round of the GATT talks. Although until 1988, when the US started pushing for it strongly TRIPS was not seen by most as an important item in the Uruguay Round agenda (Siebeck, 1990a; Shell, 1998), it now occupies an important place in the newly-emerging global governance regime.

## **2. Is Patent Necessary for Innovation?**

In the recent debate surrounding the pharmaceutical industry, especially but not exclusively in relation to the AIDS/HIV drugs, many people criticized the “artificially” high profit rate in the industry made possible by the monopoly established by patents. Against such criticisms, the defenders of the pharmaceutical industry have argued that, without such high profit rates, there will be little investment in research and development, and thus little innovation. Is this true?

Contrary to what the defenders of strong private intellectual property rights (PIPR) believe, people often pursue knowledge for its own sake or for the “public good”, so they do not always need monetary incentives conferred by PIPR in order to generate new knowledge. This is indeed a view put forward by the 13 eminent scientists (all fellows of the Royal Society of Britain) in an open letter to the *Financial Times* arguing against TRIPS. They argue: “Patents are only one means for promoting discovery and invention. Scientific curiosity, coupled with the desire to benefit humanity, has been of far greater importance throughout history” (“Strong global patent rules increase the cost of medicines”, p. 20, *The Financial Times*, 14 February, 2001). UNDP, in its 1999 *Human Development Report* also cites some examples where “open access” (that is, the opposite of private property right) has encouraged, rather than prevented, the generation of new knowledge in certain areas. It cites the example of internet-based computer software, where people are allowed to improve the shared software available on the net if they can, but are asked to make the improved version available freely (pp. 72-3).

More importantly, even without patents, the innovator can enjoy many “natural” protective mechanisms and therefore will be able to reap substantial financial gains from his/her innovation. These natural protective mechanisms include the following.

- The “imitation lag”, which refers to the lag between the introduction of an innovation and the emergence of “imitations” of such innovation. This occurs because it is time-consuming to absorb new knowledge, especially when parts of it are “tacit” in the sense that they cannot be easily communicated across persons or organizations. Therefore,

## TECHNOPOLICY BRIEF No. 1

the larger the component of tacit knowledge in a new technology, the more difficult it becomes to imitate it quickly.

- The “reputational advantage”, which refers to the phenomenon that simply because he/she was the first person to come up with a new product, consumers know his/her product better and tend to associate it with superior quality. Needless to say, this advantage cannot last indefinitely unless the innovator maintains quality and/or price advantage over the imitators.
- The head start in racing down “learning curves”. Unit production costs tend to come down, as production experience accumulates, and therefore the firm that started production earlier, at a given point of time, tends to have lower unit costs.

That innovators enjoy the above-mentioned natural protective mechanisms was in fact a popular argument used by the anti-patent movement in Europe during the 19th century and the idea behind the famous early 20th-century Austrian-American economist, Joseph Schumpeter's vision of capitalist development through “creative destruction” of innovation. Indeed, a number of studies confirm that in most industries such natural protection mechanism is more important than patents in motivating innovation. The relatively insignificant effect of the patent system on innovative activities in general is also confirmed by the historical experiences of Switzerland and the Netherlands that we mentioned in item 1 in this brief.

### **3. TRIPS, Technology Transfer, and the Development of Technological Capabilities in Africa**

#### *What is TRIPS?*

The TRIPS (Trade-Related Intellectual Property Rights) agreement of the WTO (World Trade Organization) covers a number of areas concerning intellectual property rights. These include patents, copyright, trademark, geographical indications (e.g. only sparkling wine produced in the Champagne region of France can be called Champagne), industrial designs, lay-out designs of integrated circuits, and what is technically known as “undisclosed information” (such as trade secret or information lodged with governments

for, say, new drug approval). It allows WTO member countries to impose trade sanctions in retaliation for the infringement by its trading partners of intellectual property rights of its citizens.

Of these, the agreements on patents are the most controversial, given that they are economically most important and most complex in their legalities. The agreements on patents (which add significantly to the existing Paris Convention on patents - see item 1 of this brief) have been in the direction of significantly increasing the scope for patentability and for patentee rights. Note that all these specify the “minimum” requirements, so member countries are allowed to grant stronger protection to patentees. Member countries are now compelled to provide most-favoured nation treatment to other member countries (i.e. no discrimination between member countries), and also national treatment to foreign citizens (i.e. no discrimination between nationals and foreigners).

Diagnostic, therapeutic, and surgical methods, plants and animals and essentially biological processes for the production of plants and animals still remain unpatentable, but micro-organisms and non-biological and microbiological processes are now patentable. Both products and processes are now patentable. Many countries at the time of the agreement did not have product patents in chemical and pharmaceutical industries (as it was the case with most developed countries until as late as the 1970s - see item 1 of this brief). Moreover, in the case of process patent, the burden of proof of infringement has been shifted from the patentee to the alleged infringer. The minimum term of the patent has been extended, although not by very much. The minimum term is now 20 years from the date of filing, whereas in the past this was somewhat shorter in some countries (e.g. some countries gave 17 years’ protection).

Patentee rights can still be over-ruled, especially through compulsory licensing (national governments granting the license without the consent of the patent holder) and parallel imports, under certain circumstances (e.g. public interest, national security), but the conditions under which these can be over-ruled have been tightened. Developing countries were granted a five-year transition period to bring their patent laws and other IPR laws to international standards, which expired at the end of 2000. The least developed countries were given a 10-year transition period, but this will run out by the end of 2005. However, many experts regard these transition periods to have been far too short, given the enormous gaps in

the conditions between the developing and the developed countries.

## Will TRIPS Promote Innovation and Technological Capabilities in Africa?

TRIPS affects technological (and thus industrial) development in developing countries in two ways — directly by affecting local innovation or international technology transfer and indirectly by affecting the development of technological capabilities, which in turn affect the course of a country's ability to generate and absorb new technologies.

The strengthening of PIPR through TRIPS will inevitably mean greater formalization of the technology transfer process. Formalized technology transfer through licensing may, other things being equal, increase the incentive of the seller of the technology to more actively “teach” the recipient in the process of technology transfer. In this process, the recipient does not just get taught how to use the technology being transferred, but is likely to increase his/her technological capability – or in other words, will enable him/her to “learn to learn” (the phrase originates from Joseph Stiglitz).

However, such beneficial effect will happen only when the recipient of technology already possesses significant amount of capability to engage in such learning process — that is, when he/she already possesses some *technological capability*. Many developing country producers, especially those in Africa, do not have such capabilities, and this means that TRIPS is unlikely to bring about positive effects.

Against this argument, it may be said that countries without such minimum technological capabilities, being so far from the frontiers of technological development, would not typically be in a position to be involved in the transfer of patent-protected technologies that are affected by TRIPS. For example, many firms in developing countries use second-hand or even third-hand machines, the patents for the technologies embodied in them, if there ever were any, would have long expired. In this respect, most African countries are less likely to be adversely affected by the TRIPS agreement than the more advanced developing countries, which may have the capabilities to exploit the patented technologies but are barred from doing so by TRIPS. However, even in the less advanced developing countries, patented technologies may be relevant as far as



---

licensing by TNC subsidiaries is concerned, as they tend to use technologies which are more advanced and therefore more likely to require licensing than the ones used by the local firms.

Moreover, the higher prices of technology acquisition that result from TRIPS are likely to have negative effects on the accumulation of technological capabilities. Strengthening of PIPR through TRIPS means higher average price for technology acquisition, which in turn means a reduction in the overall inflow of technology into developing countries, other things being equal. This means fewer opportunities for learning and consequently less addition to the stock of technological capabilities. In the words of the former Chief Economist of the World Bank and highly respected academic Joseph Stiglitz, “knowledge is a key input into the production of knowledge; an increase in the ‘price’ of knowledge (as a result of stricter intellectual property standards) may thereby reduce the production of knowledge”.<sup>3</sup>

Another cause for concern is that the new international IPR regime that has come into existence with TRIPS puts even less emphasis on technological capability building in the poorest developing countries than its predecessor, which operated under the shadow of the so-called NIEO (New International Economic Order) demanded by the developing countries in the 1970s. This makes the prospect of the African countries amending this deficiency gloomier than ever.

#### **4. Policy Options for Africa under the WTO Regime**

##### **Africa as the Consumer of Technologies—The AIDS/HIV Case**

The greatest cause for concern for the African policy-makers resulting from the changes in the international intellectual property rights regime following the TRIPS agreement has been that of the AIDS/HIV drugs case. Many pharmaceutical companies in developed countries have tried to prevent some developing country pharmaceutical companies (mainly from Thailand, Brazil, India, and Argentina) from exporting cheap AIDS/HIV drugs to other developing countries, especially those in Africa,

---

<sup>3</sup> Joseph Stiglitz, "More Instruments and Broader Goals: Moving Toward the Post-Washington Consensus", originally delivered as the 1998 WIDER Annual Lecture, reprinted in H.-J. Chang (ed.) *The Rebel Within: Joseph Stiglitz at the World Bank*, 2001, Anthem Press, p. 52, n. 33.

invoking TRIPS.

Many people, both inside and outside Africa, have been outraged by the fact that developed country drug companies were charging 10-20 times more for these drugs to extremely poor countries whose basic social fabric is being torn apart by the high incidence of AIDS/HIV. Following these criticisms, a few pharmaceutical companies have finally relented and recently offered discounts on these drugs for very poor countries. However, they have insisted that this is merely an act of charity and therefore should not be interpreted as a signal that they are going to relax their claims on their intellectual property. This is proven by the fact that these were among the 41 pharmaceutical companies that took the South African government to court in March 2001 (but then eventually backed down in the face of public criticisms) on the ground that its patent law provides too much power for the government to control patentee rights through compulsory licensing and parallel imports and that therefore it is “unconstitutional”.

The defenders of the pharmaceutical companies sometimes ask why only they should be asked to serve public interest by providing cheap AIDS/HIV drugs to the poor countries, when, say, food companies are not asked to solve the food crisis in poor countries (see for example, the remarks made by some representatives of the pharmaceutical industry quoted in the article by David Pilling, “Patents and Patients” —*The Financial Times*, (17/18 February 2001).

However, this is at best a misinformed and at worst a self-serving argument. The pharmaceutical industry relies a lot more heavily on patent protection for their profits than most industries, which means that its profits are a lot more “artificially” manufactured by public intervention (in this case, patent law) than those of other industries. This means that the industry has a greater duty to serve the public interest than other industries. Given this, the public has all the right to weaken patentee rights, if it decides that the public interest lies in re-distributing income from the pharmaceutical companies to the consumers.

The defenders of the pharmaceutical industry argue that without strong patent protection their profits will dry up and they will, therefore, not be able to invest in research and development that are necessary for the

invention of new drugs.

This argument, once again, is misleading. For one thing, much of pharmaceutical research is actually not done by the pharmaceutical companies. For example, in the US, about half of pharmaceutical research is conducted with public sector funding or private charity funding. More importantly, given the “artificially” created nature of profits in the industry, it is not clear whether the pharmaceutical companies really need the rates of profit that they enjoy now to come up with new drugs (see item 2 in this brief for further discussion).

Thus seen, the African policy-makers need to air a collective demand, using the AIDS/HIV case as its launching pad, that the TRIPS agreement be reformed. The basis for this reform should be the recognition that patentee rights are not “natural” things but exist only because of the public decision to protect them, and therefore can be over-ridden when they clash with broader the public interest.

## Africa as the User of Technologies

The AIDS/HIV case mainly concerns the role of Africa as a consumer of some final products of technologies. But Africa also needs to advance its position as a user of technologies and as a generator of them (albeit on a modest scale, realistically speaking).

As the user of technologies, Africa needs to assert its position as a continent that is in serious need of large-scale technology transfer. Given that the lack of technological capabilities in the continent is a serious obstacle to such transfer (see item 3 of this brief), African countries need to demand greater international provision for technological capability building.

This demand should include not only greater international assistance to education and training; it should also include the revision of the WTO agreement in a way that makes infant industry protection easier (at the moment, it is allowed but frowned upon) and export subsidies more

---

<sup>4</sup> Some countries reduced such ceilings substantially - for example, India cut its trade-weighted average tariff from 71% to 32%. However, many countries, including India, have fixed them at relatively high levels - for example, Brazil cut its trade-weighted average tariff from 41% to 27%, Chile from 35% to 25%, Turkey from 25% to 22% (see Amsden, 2000, Table1.)

widely allowable (at the moment, it is allowed only for the least developed countries). Both these will allow greater opportunities for “learning” in more technologically-advanced industries, and thus for a faster build-up of technological capabilities.

Of course, our emphasis on the need for reform the WTO agreement should not be interpreted as suggesting that the African countries should wait for the external conditions to change before they do anything. Such reform is going to be made only in the future, if it ever is. Therefore, African countries need to learn to exploit the legitimate provisions and the “loopholes” in the WTO agreement in a way that maximizes their opportunities to build up technological capabilities.

First of all, it should not be forgotten that, even on paper, the WTO agreement by no means obliges countries to abolish all tariffs and protections, and many developing countries have decided on tariff ceilings that are still considerable.<sup>4</sup> Moreover, the least developed countries, many of them in Africa, have until 2006 to reduce tariffs and the product patent protection that has the deadline of 2005. These provisions need to be exploited to the maximum.

Second, it should be remembered that infant industry protection, which is important in providing the “learning” opportunities to the domestic producers, is still allowed (up to eight years). However, it must be pointed out that infant industry protection was not the clause invoked by countries like Korea when using protection under the old GATT regime - they usually used the balance of payments (BOP) clause that we discuss below.

Third, there are still provisions for “emergency” tariff increase (“import surcharge”). This can be done on two grounds. The first is a sudden surge in sectoral imports, which a number of countries have already used (e.g. Argentinean tariff on Brazilian cars). The second is the overall BOP problem, for which almost all developing countries qualify and which a number of countries have also used. Since countries have discretion on how much emergency tariffs can be imposed on which commodities, as far as these are on the whole commensurate with the scale of the BOP problem, there is still a lot of room for deliberately creating rents in areas where learning opportunity may be maximised.

Fourth, not all subsidies are “illegal” for everyone. Most importantly for Africa, the least developed countries is allowed to use export subsidies,

which can be quite important in providing “learning” opportunities to developing country producers. Subsidies for agriculture, regional development, basic R&D, environment-related technology upgrading are still allowed. Moreover, the subsidy restrictions only cover “trade-related” policies, which means that there are many “domestic” policies that can be used for the creation of learning rent and other technology policy purposes - examples will include subsidies on equipment investments, support for start-up enterprises, subsidies for investment in particular skills, etc..

Fifth, for the purpose of this Brief, it is very important to note that many standard tools of technology policy are *not* banned by the WTO. Key policy tools include: investments in education and training (including on-the-job training); strengthening of public R&D institutions for farming or small-scale industries (Taiwan has been especially successful in providing R&D support for small firms); support of private-sector R&D activities; establishment of public-private joint R&D ventures; and establishment of science parks.

Lastly, as for the TRIMS (trade-related investment measures), it should be noted that it is not as stringent as it is sometimes thought to be. Developing countries can maintain or even strengthen local contents requirement, which is an important tool for technology upgrading. They are still allowed to use export promotion measures, such as “trade balancing stipulations” (where TNCs are required to exports final products whose value equal the imports of parts and components) or export requirement for TNCs in export processing zones. Many countries (e.g., Brazil, Argentina, Chile, India, Indonesia, Mexico, Malaysia, Thailand) have in fact been using these provisions in a number of industries (e.g., automobile, pharmaceutical and in various consumer goods industries).

## **5. Conclusion**

The supporters of the new international intellectual property rights regime, which has enormously strengthened the protection for the patentees, have staked their arguments on two major grounds. First of all, they argue that strong patent protection is absolutely necessary if we want technological progress. Secondly, they argue that protection of intellectual property was the key to the development of the currently developed countries. In

this brief, we have shown that neither of these claims are true. In most industries, patents are not necessary to generate innovation, and the developed countries had developed on the basis of intellectual property rights regimes whose quality fell short even of the “low” standards that the developing countries had before the TRIPS agreement.

Above all, it is important to note that intellectual property rights are a publicly-granted monopoly, that are justifiable when their social benefits outweigh their costs. Thus, there is nothing wrong in people making collective decisions (both at national and international levels) to weaken the patentee rights, should they think the current bundle of such rights is socially unacceptable.

The new international intellectual property rights regime can bring some benefits to developing countries, but it is likely to be negative for them on the whole. African countries are going to suffer particularly as the consumers of technologies, although, as the users of technologies, they are not likely to suffer as much as the more technologically advanced developing countries in the new regime.

Demands need to be made to reform the TRIPS agreement in a way that benefits developing countries. And as these changes are gradually made, if they are made at all, developing countries should find ways of exploiting to the maximum the legitimate provisions and “loopholes” in the new regime, in order to absorb advanced technologies, and more importantly, develop their technological capabilities more quickly and effectively.

## References

- Amsden, A. 2000. *Industrialisation Under New WTO Law*, a paper for the UNCTAD X meeting, 12-19 February, 2000, Bangkok
- Patel, S. 1989. "Intellectual Property Rights in the Uruguay Round - A Disaster for the South?" *Economic and Political Weekly*, 6 May 1989.
- Shell, S. 1998. *Power and Ideas*. Albany, State University of New York Press.
- Siebeck, W. 1990a. "Introduction" in W. Siebeck (ed.), *Strengthening of Intellectual Property Rights in Developing Countries*, Discussion Paper No. 112, Washington, D.C., World Bank.
- UNDP. 1999. *Human Development Report 1999*, New York, Oxford University Press.

---

**Who Benefits from the New  
International Intellectual  
Property Rights Regime? And  
What Should Africa Do?**

Ha-Joon Chang

## **The Technopolicy Brief Series**

The African Technology Policy Studies network (ATPS) is a medium for brokerage of knowledge on technology and technology policy issues for Africa. In the realization of this function, the network has launched the *Technopolicy Briefs Series*, to provide critical knowledge and advice on fundamental policy issues in the realm of technology. The series is easy-to-read and targeted to a wider audience, particularly government leaders, policy-makers, legislators and all those who can play a catalytic role in Africa's development.

For more information on ATPS, please contact Dr. Osita Ogbu, Executive Director, African Technology Policy Studies Network (ATPS), 3rd Floor, The Chancery , P.O. Box 10081, 00100 General Post Office, Nairobi, Kenya.

Email: [oogbu@atpsnet.org](mailto:oogbu@atpsnet.org)

Telephones: 254-2-723800/ 714168/ 714498 Fax: 254-2-714028



Professor Ha-Joon Chang works at the Faculty of  
Economics and Politics, University of Cambridge

















