Open Access, involves expenditure. Therefore, publication charges should be an integral part of the project budget, with an appropriate sub-head.

(vi) The activities of the granting agencies have expanded manifold during the last couple of decades. The staff strength and other facilities at the agencies have not correspondingly increased. Outsourcing to private parties is not a desirable option. It is the dedicated and mature personnel in the agencies that often facilitate the smooth operation of projects. Some of the old hands have retired or would retire soon. There should be adequate provision for fresh recruitment and training. Physical facilities at the offices also merit attention.

(vii) The granting process involves three components: the advisory, the administrative and the financial. It is necessary to clearly define, after due discussion, the precise role of each component. Eventually, the three should function harmoniously and in tandem.

(viii) Each government department involved in extramural funding can explore the possibility of setting up autonomous mechanisms for handling project grants. However, the temptation to merge the mechanisms associated with different departments should be resisted. Plurality of funding sources and multiplicity of mechanisms are essential for the healthy and balanced development of science in the country.

(ix) Science is of considerable strategic importance in the emerging global scenario. It is difficult to assert that one area of science and technology is more important than the other. Therefore, the financial and administrative autonomy enjoyed by the Department of Atomic Energy and the Department of Space should be extended to all science and technology departments and ministries.

I believe that seven of the above nine suggestions could be implemented substantially within the existing framework. All that is required is the will to do so. The last two perhaps require further efforts. There would certainly be other constructive suggestions pertaining to the specific issue addressed here. All of them need to be considered carefully and acted upon. However, the urgency of action should not be lost sight of. As mentioned at the beginning, to ensure forward movement, it is important that the discourse does not turn into a blame game. We have to take everybody along to the maximum extent possible, to improve the system.

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Subsidies for R&D need to be rationalized

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The World Trade Organization (WTO) has brought in many changes in the thought process of practically each member country, and the developing countries had to and have to revisit themselves and familiarize with new realties of global trade and competition. Research and development (R&D) likely to be one of the major drivers of the knowledge society, finds adequate space in the schemes of WTO. Most commonly, the chapter on Trade Related Aspects of Intellectual Property Rights (TRIPS) has been at the centre stage as far as the direct influence of WTO on R&D is concerned. The issue of patents has been so captivating that policy makers of science and technology systems have not paid adequate attention to other chapters of WTO which would directly impact the R&D systems in many countries. For example, the chapters on Subsidies and Countervailing Measures (SCM), Trade in Services and Technical Barriers to Trade, will have direct bearing on the policies of many countries related to R&D.

As long-term investments in R&D are expected to lead to competitive advantage, it is viewed that this sector may be equated with other forms of investments, in which the present scheme of things are governed by norms of subsidies and countervailing measures. The essential principle is that investments by government to promote R&D should not lead to a situation of unfair competition among member countries, both in domestic and international arenas. The chapter on SCM has stipulated many norms and placed restrictions on funds provided by governments for many activities, including R&D. A subsidy shall be deemed to exist if there is a financial contribution by a government or any public body within the territory of a member, or there is any form of income or price support and a benefit is thereby conferred. A financial contribution by government would mean direct transfer of funds (grants, loans and equity infusion), potential direct transfer of funds or liabilities (e.g. loan guarantee), government revenue which is otherwise due is foregone or not collected (e.g. fiscal incentives such as tax credits), goods and services provided by the government other than infrastructure and payments made by the government to funding mechanism to carry out one or more types of function mentioned above, which would normally be vested in the government. The basic principle of restricting subsidies is to avoid injury to the domestic industry of another member and impairment of benefits accruing directly or indirectly to other members. Any subsidy which promotes or helps use of domestic over imported goods, or is tied to actual exportation or export earning is considered a prohibited subsidy meaning and it is not allowed. As R&D services become more known, frequently occurring and globally needed, these will be exported like any other services. These will then become a subject of prohibited subsidies. Similarly, if a grant provided by the government is, for example, not properly added to the price of the service or product or process emanating from the R&D, it may become a candidate for prohibited subsidy. In the context of R&D, certain subsidies would not attract any retaliatory action by another member.

Any subsidy provided for fundamental research is non-actionable. Fundamental research for this purpose means an enlargement of general scientific and technical knowledge not linked to industrial or commercial objectives. Industrial research and pre-competitive develop-

ment activity would be non-actionable if the stipulated conditions of WTO are successfully met.

Industrial research means planned research or critical study aimed at the discovery of new knowledge, with the objective that such knowledge may be useful in developing new products, processes or services or in bringing about a significant improvement to existing products, processes or services. In such a case the assistance should not exceed 75% of the costs of research. A pre-competitive development activity is linked to industrial research and means the translation of industrial research into a plan, blueprint, or design for new, modified or improved products, processes or services, including the creation of a first prototype which would not be capable of commercial use. It would not include routine improvements and alterations to existing products, processes and services. The assistance for this activity should not be more than 50% of the costs of pre-competitive development activity. For both the situations, the assistance granted should be exclusively limited to: (i) costs of personnel, (ii) costs of instruments, equipment, land and buildings used exclusively and permanently, (iii) costs of consultancy and equivalent services, including bought in research, technical knowledge and patent, (iv) additional overhead costs incurred directly, and (v) other running costs such as those of materials, supplies, etc.

Such assistance programmes have to be notified to WTO from time to time. The notification should include the following information, viz. form of subsidy (grant, loan, tax concessions, etc.), total amount of assistance or assistance per year, policy objectives and/or purpose of assistance, duration of assistance and statistical data permitting an assessment of the trade-off effects of the assistance. The matter related to actionable subsidies can be taken to the Dispute Settlement Board (DSB) for resolution. If the decision of DSB is not implemented by the member awarding subsidies, the affected member can take suitable action like levying import duties or banning import of such products, processes and services.

What will it mean in real terms for the R&D sector funded by a government? It is now common that nations invest heavily in R&D and many of these investments may be indirect, such as tax incentives. Some of the countries providing tax incentives on R&D are Australia, Canada, China, France, India, Ireland, Japan, Korea, Singapore, United Kingdom and USA. The recent COMPETE Act promulgated in USA appears to be a step in that direction. The bottom line is that if the expenses incurred by the government in promoting R&D can be classified as actionable subsidy, the concerned country may face some trade barriers. What these barriers would be and how they will be enforced is not yet clear. The real risk is to be seen especially when R&D itself is becoming globally competitive. International research involving different countries may also face similar questions at some point. Clearly, one is not talking about small research grants, but large grants which may impact the trade in that area in medium or long term. The matter of subsidy related to research has not been widely discussed by the scientific community in as much detail as done in matters related to intellectual property rights (IPR).

The Indian R&D is largely supported by the government, almost 80% of the total R&D budget is provided by the government for R&D, and so is the case in many other developing countries. This ratio would undergo some change in due course of time. In a situation of this nature, it is probable and possible that some investments made by the government may be directed towards getting trade and strategic advantage, which may attract the provisions of SCM. These investments may be direct in terms of grants or incentives such as tax exemptions. Take, for example, our investments in many strategic sectors such as space and atomic energy, which may soon turn around and start making business sense as well and generate direct wealth. These sectors have been directly supported by the government to come to this level that we are now globally competitive. It is at this position that global competitors are going to point guns at India for providing direct subsidies to such programmes. How such accusations, howsoever invalid or unrealistic they may be or appear to be, will affect our R&D goals is a matter of urgent debate in the country. Countries like Korea and China have been addressing this issue for many years now. The developed countries have been at it for a long time and the tools devised to keep oneself at an arms length from getting entangled in such an issue have been designed by the developed countries. Therefore, it is imperative that attention should be paid to learning and application of such tools as quickly as possible, as we have been able to do in some other sectors such as IPR.

First, it is essential to realize that subsidy in R&D is a real issue and not semi-real or unreal that it can be put under the carpet. Secondly, it is necessary to evolve a system of categorizing R&D as defined by WTO, which may call for a detailed consultation among various stakeholders in the country. Thirdly, a close examination of the nature and content of assistance provided by us should be made. For example, we do not seem to be providing assistance for all the heads of expenditure in our R&D programmes as provided by WTO, such as costs of land and building. Thus there is a scope for enhancing assistance and still not be covered by actionable subsidies. Fourthly, an appropriate reporting system needs to be developed, which clearly brings out whether the investments are really going to impact trade directionally to give advantage to the country. One can always argue that the said investment is directed at long-term development and its trade effects cannot be measured and hence, it does not fall under the category of subsidies. While apportioning funds and putting them in various heads, smart and innovative accounting methods may prove to be useful and handy. Fifthly, it may be realized that this issue will soon become important separate sessions of WTO may be held on the topic. At that time we must be ready with enough data on the practices being followed by other member countries because, other countries also invest in R&D in a similar manner like we do. To stop our competitors to take the 'holier than thou' approach and put undue pressure, we must collect data on the practices followed by other countries and analyse them to determine if they are following similar practices or not. Sixthly, all developing countries engaged deeply in national development will adopt R&D more and more through government support and at times, the boundary between subsidy and non-subsidy may be thin. The benefit of doubt should be given to legitimate cases and our effort should be to fall in the category of legitimate cases, so that our development process is not decelerated. WTO may soon start discussing this matter which has been dormant for some time now.

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