



How Trade Policies Affect Agricultural Research?

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The scientific community has a vague and partial understanding of the implications of trade liberalization. We generally interpret it as increasing production and improving quality of commodities which are exported or are likely to be exported, and increasing domestic production of commodities (output or input) which are imported. We design our research programmes accordingly and perceive this as our response to trade liberalization.

Trade and economic liberalization has more pervasive effects. This note attempts a simple explanation of the underlying principles; the purpose is to sensitize scientists so that they have a better understanding of the implications of a free trade regime on the agricultural research agenda. As we adjust our research portfolio in response to the 'demand-driven' paradigm, this appreciation is essential.

EFFICIENCY

The first point to note is that the objective shifts from more production to more 'efficient' production. This implies a focus on lowering cost of production *per unit of output*. Agricultural scientists generally think in terms of *output per hectare*. The latter is a partial measure of efficiency which was useful when increasing production from limited land resources was the primary objective of research. Now the focus is on competitive production and cost of production is the appropriate efficiency indicator. Table 1 below illustrates this with the help of a hypothetical example of four technological options.

Table 1 : Cost of production for different production techniques

Technology	Yield (q/ha)	Value (Rs/ha)	Cost (Rs/ha)	Net Return (Rs/ha)	Cost/ql (Rs/ql)
(a) Traditional package	10	1000	800	200	80
(b) New variety	15	1500	1100	400	73
(c) Weedicide use	10	1000	700	300	70
(d) New package	20	2000	1750	250	87

The table shows that yield increase is not a necessary condition for efficiency gain. For example, the highest yield option 'd' is not efficient. It has higher production cost as compared to 'a', even though yields and net

returns are higher. On the other hand, option 'c' with no yield advantage is more efficient because it reduces unit costs of production. The issue is more complex, but here we just wanted to make the point that thinking in terms of yields or any partial indicator is no longer relevant.

It is possible to achieve efficiency gains through several routes—improved yields, higher input use efficiency, input substitution, cheaper inputs, etc. In context of a farming system, a new output mix also is an important source of efficiency gain. All these are important research themes.

COMMODITY COVERAGE

Both exports and imports are relevant for research. In exports, product and quality dimensions are important. We need to identify commodities (traditional as well as new) which need to be targeted for efficiency-oriented research. The form of the product (raw or processed) is also important. Two aspects need to be considered here. First, the demand pattern of the prospective importing countries in terms of quantity and quality in relation to the existing profile of domestic production; second, identification of the area or region which has greater comparative advantage from export point of view. These products and areas will have to be identified and targeted in a different way as compared to those where costs are high. In other words, a differentiated agenda would have to be followed. Commodity based research programmes would need to be adjusted accordingly.

The import-substitution perspective is equally important because the traditionally used instrument of developing and protecting domestic production through trade barriers is no longer tenable. We have to open our markets. The only course of action is to develop technologies which will make domestic production more efficient. Areas of research which reduce the imported component like cheaper sources of plant nutrients and chemicals, energy, for example, are important from the input side.

On the output side, there are more contentious issues. Studies indicate that with the technology now in vogue, we are not efficient producers of several important commodities. Sugar and edible oils are cases in point where imports seem inevitable. If we place high value on self-sufficiency, the only option is to reduce our

production costs through technological change. Our research on such commodities must have this orientation. In the long run, it is only sustained growth in total factor productivity which will make Indian agriculture competitive, otherwise we shall continue to loose ground. The point made earlier on efficiency holds the key

QUALITY AND STANDARDS

Research on phyto-sanitary standards relating to life forms and residues also assume great importance. The research system has so far played a peripheral role in this area though some new initiatives have been taken recently on developing quarantine facilities to regulate import of life forms. Regulatory framework involving various genetic resources bureaus is being firmed up. Similar programmes for export of agricultural products are also needed. The research system must have state of the art capability in this area to counter non-tariff restrictions imposed by importing countries. While the research system will not play the implementing role in this, it has to provide the methodology for certification and standards. Trade, particularly with developed countries will be critically dependent on this capacity. This also will be necessary to build safeguards.

CAPACITY BUILDING

The crucial point is that we have not taken note of the rules of the new game seriously enough and there is an unwarranted sense of complacency about our capabilities. Not even developed countries are as sanguine about their R&D strength as we are and this must change. Other actors are aggressively pursuing R&D strategies and IPR instruments to negate our comparative advantage with more powerful science. This can only be combated with similar capabilities. Human resource development, particularly in frontier areas, must continue to receive very high priority. We are also way behind others with regard to IPR-related issues. The ICAR is addressing these issues on priority and even as this is being done, we need to sensitize the scientific community.

OPERATIONALIZATION

Until now we have vague and aggregative notion of efficiency in this context. We believe that we are efficient

producers of rice, fruits and vegetables, but not so for edible oils or sugar. This is not very useful for agricultural research. We need to know the efficiency profile by commodity and regions. Only this will tell us how and where to target research efforts. It will require cost estimates by regions and zones. Agricultural economists in the national research system must develop this matrix. Table 2 illustrates this point on the basis of hypothetical cost of cultivation data for cotton in major producing states.

Table 2 : Yield levels and cost of production of cotton

State	Average yield (qtl/ha)	Cost of production (Rs./quintal)
Punjab	11	1500
Haryana	13	1050
Maharashtra	7	1400
Tamilnadu	12	1450

Two points need to be noted. First, high yield does not ensure more efficient production (Table 1). Second, as cotton trade is liberalized, cotton production in high cost areas like Punjab will be threatened by cheaper imports even as Haryana may continue to be competitive. Eventually, production will tend to be concentrated in efficient areas. The challenge for cotton researchers in Punjab will be to identify why costs are high and how it can be reduced to make production competitive. Agricultural economists will have to provide cost/price information to agricultural science managers so that the efficiency dimension is always kept in view while designing research programmes.

SUMMING UP

The most important signal emerging from the new trade regime is the centrality of 'efficiency'. Then there are product-specific, quality-related characteristics which need research attention. It is imperative that the national research system develops close relationship with the private sector so that these signals are quickly transmitted. The ICAR has taken the initiative to develop this interface but all research entities must take proactive role in this.

[For a concise but comprehensive account of export-driven research agenda, see *ICAR Reporter, From the DG's Desk, Jan-March 1999*]

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