Some socio-economic consequences of the green revolution

Pisani, Elena

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SOME SOCIO-ECONOMIC CONSEQUENCES OF THE GREEN REVOLUTION

By Elena Pisani*

Abstract

The green revolution has, since the '60s, been the subject of lively debate among the international scientific community not only with regards to its technical aspects but, and above all, for socio-economic impacts it caused.

The article starts with the analysis of the development theories for the rural sector in the '50s and '60s in order to determine the theoretical path that started the green revolution in the Developing Countries, i.e. the high pay-off input model.

The article then describes the critical socio-economic elements that the literature analysis highlights within Asia, where 60% of the population lives on less than two dollars per day. The role of the agricultural sector has to be reconsidered not just in terms of changed economical structure, but also with an adequate evaluation of other components such as the social, political and institutional capital and the environment, so as to initiate sustainable development processes.

1. *Economics theories on the role played by Agriculture in the '50s and '60s*

In the beginning the development economics payed limited attention to the role of the primary sector as the start of economic growth. According to the modernist view, development was understood as the process of transformation of the economy structure, and ascribed to the reduction of the contribution of the primary sector to the Gross Domestic Product as well as the reduction of population actually employed in agricultural activities.

The role of agriculture, in development economics, was undervalued for such considerations as those presented below.

- Engel's law highlights how the demand for basic consumer goods increases less than proportionally to the increase in income (inelastic demand). As a consequence, as times goes by, the value of the primary sector production increases less than the increase of the Gross Domestic Product, and thus the primary sector cannot in theory determine, in the short term, a rapid growth of the economy.

- The agricultural transformation has been considered uniform and constant in all economies. As widely documented by Clark (1940), Kuznets (1966), Chenery e Syrquin (1975) from the analysis of the time series both in the capitalistic and in the socialist countries, the percentage of the primary sector relative to the active population and to the domestic product tends to diminish progressively. This vision has supported those development economists who refused the hypothesis of investing in the primary sector in order to jump-start a rapid economic development, given the inevitable decline of agriculture compared to other productive sectors.

* Fellow at the Department of Land and Agro-Forestry Systems - Padua University. The author wishes to thank prof. G. Franceschetti for his precious help and M.F. Pisani for the English translation.

- In 1949, two important economists, Raul Prebisch and Hans Singer, pronounced their thesis that in those countries that export primary goods and import manufactured articles the tendency is of worsening terms of trade.
It follows that the hypothesis of starting up a growth process through the development of agriculture for export is a vision of economic policy open to criticism.

- In 1958, Albert Hirshmann introduced the concept of the "linkages" effects to explain how the investment in determined compartments of the economy determines further developments in other sectors (through related production lines, and input-output connections). Hirshmann suggested that, in order to obtain an efficient economic planning, it is necessary to stimulate public investment in those sectors where the linkages effects might be stronger; this would amplify even more the effect of endogenous investments. Hirshmann judged that agriculture has little capacity to create new activities through linkages investments, whereas industry is certainly more suited for it. It follows that investments in industrial activities would certainly create more economic growth than those in agriculture activities.

The development economics therefore had to find ways to accelerate the progressive marginalization of the primary sector, by transferring resources (especially manpower) from the traditional sector to the industrial one, as the latter guaranteed labour productivity and was considered the real engine of the development.

This “reallocation” vision was sustained in the article published in 1954 by Sir Arthur Lewis, "*Economic Development with Unlimited Supplies of Labour*". This essay presents a model of economic expansion with two sectors: a modern capitalistic one opposed to a traditional one that was lagging behind. The main characteristics of the capitalistic sector are the use of the capital with the aim of investing it, the employment of people through salary, and the sale of the production in order to obtain a profit. Such aspects are missing in the traditional sector where the priority is self-sufficiency and also because the primary sector lacked the perception of profit as a magnet for economy, and therefore that of investment. Lewis reallocation of manpower from the traditional sector, where marginal productivity of labourers reaches almost zero, to the modern sector, generated capital development thanks to the profits produced by the greater productivity of the labourers. The expansion of the model is concluded when the salaries in the two sectors are equivalent and therefore the two-sector model becomes a neo-classical one-sector one.

The success of Lewis’ theory, with regards to the development of the industrial sector, stimulated a whole series of innovative studies on the role of the industrial sector in the development processes. In one study by Jorgenson (1961), comparing Lewis’ model with a neo-classical model, the economist arrived to the conclusion that the development of the capitalistic and modern sector depends on the growth rate of the agricultural surplus. Other researchers in the ‘60s arrived to the selfsame conclusion (Ranis e Fei, Enke) stating that in order to avoid the trap of a low level equilibrium in the initial development phases it was essential to realise some investment in the agricultural sector in order to accelerate its growth and the consequent surplus augmentation.

This research vein was also elaborated on by other authors: Johnston and Mellor (1961) highlighted that agriculture held an essential role in order to activate the growth processes of an economy through five main contributions:

a) Procuring manpower
b) Creating capital to invest in different economy sectors
c) Acquiring foreign currency through the sale of export products
d) Producing consumer goods for the active population employed in different economy sectors
e) Proving an outlet market for the local industrial products.

The role of the primary sector was anything but passive for jump-starting a process of economy growth. This consideration, together with H. Nicholls' assertions (1964), started empirical researches on the transfer of resources between different economy sectors in the various development phases.

The new theoretical issues relating the role of agriculture in jump-starting the development processes heavily criticised the assumptions underlying the diffusion model of innovative techniques for the agricultural development as applied in the '50s and '60s, implementing at the same time the principle of "agricultural extension" that had been successfully developed in North America. Such model assumed as its principle that the distribution of resources in the Developing Countries would not happen in a efficient economic way, assuming that poor farmers would not have the capability of taking decisions and that it would be necessary for them to obtain external help in order to overcome such *empasse*, a thoroughly negative judgement.

On this matter Theodore Schultz in his book *"Transforming Traditional Agriculture"* (1964) heavily criticised this assumption, declaring that such vision was rather the expression of the economists' and development planners' limited analytical ability in evaluating the farmers from the Third World as efficient economic agents: *"The Third World farmers and herders far from being irrational and fatalistic, were calculating economic agents who carefully weighted the marginal costs and benefits associated with different agricultural techniques"*[1].

Schultz therefore considered traditional agriculture as an efficient system of allocating the available production factors. His analysis sustained that the low levels of productions, and thus of income, were due to production factors that were inherently low-yielding because of their low technological level. The provision of new technological input, combined with the information on their use, was therefore the solution to the widespread agricultural poverty in the Third World; the governments of the Developing Countries had then to invest in the scientific research, as applied to the agricultural sector, and in training the human assets.

The assumption of the Chicago economist reinforced the role of scientific research, already thriving at an international level, of the *International Rice Research Institute* (IRRI) in the Philippines and of the *Centre for Maize and Wheat Improvement*

[1] Staatz, J., Eicher, C., (1984) *Agricultural Development in the Third World*. The Johns Hopkins University Press. Baltimore and London.

(CIMMYT), for the adoption of dwarf high-yielding varieties of rice and grain in Poor Countries.

The strategic concept of the Green Revolution economy (*high pay-off input economic model*) for this reason has been unanimously attributed to T. Schultz. He was convinced that the traditional agricultural societies could not create, in the short term, a radical change in their organisation, because he considered the levels of saving and investing of these societies insufficient to start a growth process. The only way that would probably increase the production was the adoption of external productive factors (hybrid seeds, fertilisers and pesticides) that would develop farming production, in order to satisfy the increasing food demand and thus augmenting the capital necessary to the development of the whole economy. The Green revolution would therefore determine the transformation of the rural pre-capitalistic society (given that most exchanges were based on bartering this was characterised by a low coinage level) into a capitalistic society where the agricultural sector was the very propeller of the economic development.

2. The Green Revolution in the '60s and '70s

The *Green Revolution* is a critical juncture in the traditional methods of farming. In 1966 the Rockefeller's foundation and the Mexican Government established, at the CIMMYT in El Batan, Mexico, a research activity to select a high-yielding hybrid of wheat. The new plant had to have particular physiological characteristics, in other words a shorter stem that could benefit from fertilisers and an increased resistance to typical wheat diseases. After extensive experimentation a hybrid was selected, Norin-10 for wheat. Likewise in the Philippines at the IRRI the IR-8-288-3 variety was selected, this was the product of crossing Indonesian and Taiwanese seeds, now called IR-8, and guaranteed far higher production to that of the traditional varieties.

It is nevertheless common opinion that the Green Revolution doesn't simply consist of a process of replacing traditional seeds with high-yielding ones. The traditional farming system underwent a complete transformation, with modern agricultural techniques such as hoeing, corrective fertilisation, transplant and correct spacing between seedlings. All these new methods somehow had to be combined to the pedological and climatic conditions of the location where they were introduced and this required in-depth studies of the different rural environment by the research institutes in joint-venture with the local Agriculture Universities.

Tables 1, 2, 3 reports on cereals, show the increase of the farmed area, of the production and the yields per hectare of different geographical areas and in different years (source FAO updated to January 2006).

Table 1: Area harvested by Cereals (ha) in different geographical areas per different years

Years	Latin America and Caribbean	Developing Asia	Developing Africa	Developing Countries	Developed Countries	World
2005	50,737,259	298,487,576	95,188,555	444,427,201	237,270,942	681,698,143
2000	48,355,463	301,477,620	84,298,239	434,143,541	240,043,549	674,187,090
1990	47,414,545	308,019,648	73,236,467	428,687,511	279,772,111	708,459,622
1980	49,128,982	301,922,554	57,820,349	408,890,152	308,603,517	717,493,669
1970	46,549,063	289,475,428	60,007,067	396,046,788	279,644,323	675,691,111
1961	37,265,137	266,827,243	51,166,106	396,046,788	292,855,436	648,129,670

Table 2: Cereals Production (Mt) in different geographical areas per different years

Years	Latin America and Caribbean	Developing Asia	Developing Africa	Developing Countries	Developed Countries	World
2005	158,610,805	1,016,785,390	113,377,871	1,288,811,140	930,546,367	2,219,357,500
2000	138,034,466	961,742,360	97,518,416	1,197,331,040	862,425,580	2,059,756,620
1990	99,083,566	857,771,742	81,342,397	1,038,232,410	913,365,140	1,951,597,550
1980	88,443,342	618,506,118	59,230,017	766,220,291	783,952,607	1,550,172,900
1970	71,364,892	463,159,814	52,372,797	586,925,797	605,740,344	1,192,666,140
1961	47,399,044	309,050,290	39,589,144	586,925,797	480,961,311	877,026,930

Table 3: Cereals Yields (Kg/Ha) in different geographical areas per different years

Years	Latin America and Caribbean	Developing Asia	Developing Africa	Developing Countries	Developed Countries	World
2005	3,126.1	3,406,5	1,191.1	2,809.9	3,921.9	3,255.6
2000	2,854.6	3,190.1	1,156.8	2,757.9	3,592.8	3,055.2
1990	2,089.7	2,784.8	1,110.7	2,421.9	3,264.7	2,754.7
1980	1,800.2	2,048.6	1,024.4	1,873.9	2,540.3	2,160.5
1970	1,533.1	1,600.0	872.8	1,482.0	2,166.1	1,765.1
1961	1,271.9	1,158.2	773.7	1,114.8	1,642.3	1,353.2

Source: Data processed from FAOSTAT http://faostat.fao.org updated to January 2006.

The trend regarding world population, in different geographical areas, has been reported in the table 4, in which it emerges the world population doubled in the time frame considered. This is essentially due to an increase of the population in Developing Countries as the population of Developed countries remains substantially stable.

Table 4: Population (thousand) in different geographical areas per different years

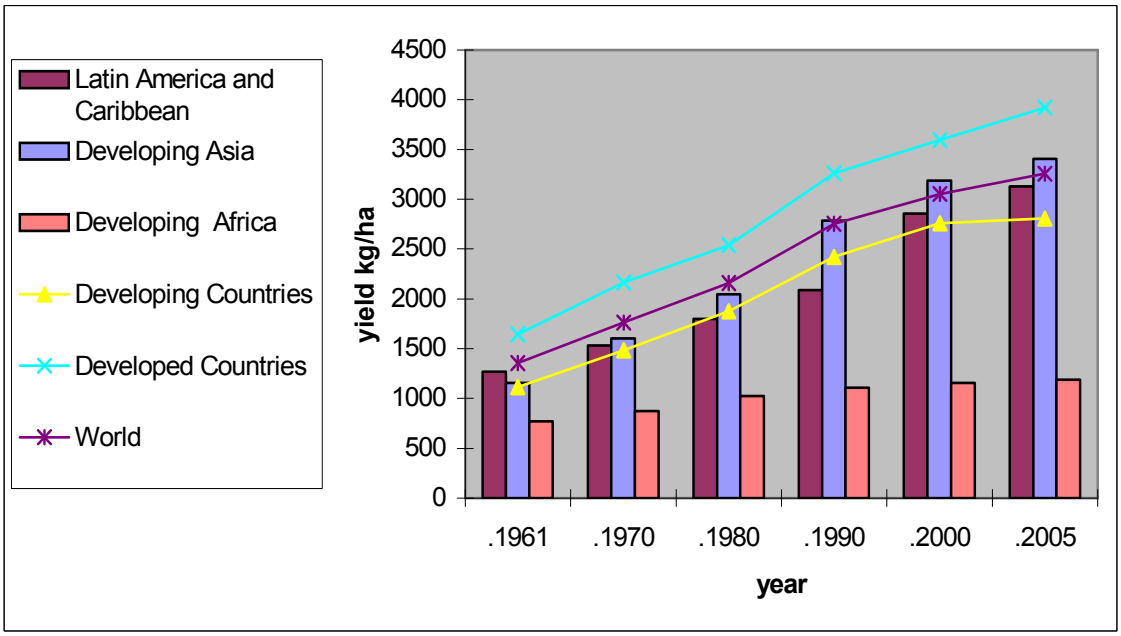
Years	Latin America and Caribbean	Developing Asia	Developing Africa	Developing Countries	Developed Countries	World
2005	558,280	3,707,430	842,642	5,117,471	1,336,155	6,453,626
2000	520,231	3,473,926	751,672	4,754,077	1,316,509	6,070,586
1990	441,526	2,972,866	585,592	4,006,557	1,257,029	5,263,586
1980	361,401	2,456,120	440,476	3,263,267	1,171,408	4,434,675
1970	284,858	1,990,315	334,627	2,613,995	1,078,504	3,692,499
1961	224,405	1,604,635	266,324	2,098,764	981,366	3,080,130

Source: Data processed from FAOSTAT http://faostat.fao.org updated to January 2006.

The demographic growth was accompanied, in the Developing Countries, by a noticeable increased production of cereals to which the Green Revolution has, partially,

contributed. Even though there are various records of cases, depending on whether Asia or Africa or Latin America are considered (graph 1).

Graph 1: Productivity of cereals in different geographical areas



Source: Data processed from FAOSTAT http://faostat.fao.org updated to January 2006.

From the analysis of the cereals yield (between 1961 and 2005) it appears that this:

a) almost tripled between 1961 and 2005 for the Developing Countries in Asia
b) more than doubled in Latin America, taken as a whole
c) only slowly increased in the Developing African countries. This highlights the difficulties African countries face in feeding their population.

These aspects are furthermore underlined in table 5 where the cereals productivity is compared with the population increase for different geographical areas during 1961-2005. The results of table 5 are quoted in graph 2 where it emerges the extremely insecure situation of the African context, where the population in 2005 more the tripled while the cereals production increased by only 1 time and a half compared to the 1961's value. These results are supported also by the literature that presents the substantial failure of the Green Revolution in the African context (Reardon 1998).

Table 5: Cereals yields compared with population increase in different geografical areas (1961-2005)

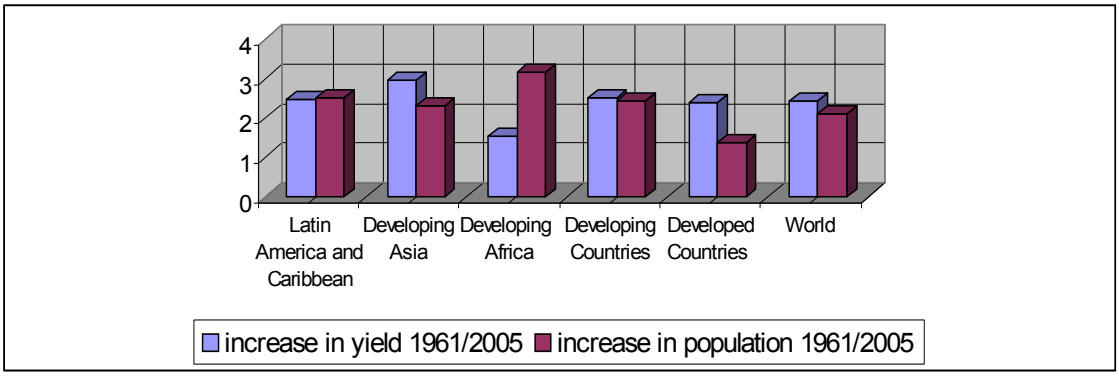
		Latin America and Caribbean	Developing Asia	Developing Africa	Developing Countries	Developed Countries	World
Cereals yields (kg/ha)	2005 (a)	3,126	3,406	1,191	2,809	3,921	3,255
	1961 (b)	1,271	1,158	773	1,114	1,642	1,353
	(a)/(b)	**2,46**	**2,94**	**1,54**	**2,52**	**2,39**	**2,41**
Population (thousand)	2005 (c)	558,280	3,707,430	842,642	5,117,471	1,336,155	6,453,626
	1961(d)	224,405	1,604,635	266,324	2,098,764	981,366	3,080,130
	(c)/(d)	**2,49**	**2,31**	**3,16**	**2,44**	**1,36**	**2,10**

Source: Data processed from FAOSTAT http://faostat.fao.org updated to January 2006.

Asia, where the Green Revolution has been most successful, maintains a rate of growth of cereals production that is higher compared to the demographic increase. Latin America's situation is of substantial equilibrium in this respect.

Finally the Developed Countries testify the best situation with a cereal production that more then doubled when compared with 1961 and with a population that is only 1.4 times that of the base year.

Graph 2: Comparison between the increase in cereals yield and the population growth for geographical areas between 1961 and 2005



Source: Data processed from FAOSTAT http://faostat.fao.org updated to January 2006.

These data, even if meaningful, don't give us any indications concerning the cereal production distribution between the populations that should be the subject of other researches.

3. Some critical aspects of the Green Revolution in the Asian context

In relation to the impact of the Green Revolution on the rural poverty in Asia, there are clashing opinions in literature. It is appropriate to point out how there is a limited availability in literature of quantitative studies on the hypothetical correlation between the green revolution and rural poverty, considering that this last variable could be influenced by economic and non economic components, which cannot be necessarily attributed to the introduction of the green revolution.
Hoping to clarify a complex theme, the following critical aspects are considered:

1) the technological package
2) the scale dimensions of farms and the productivity
3) the effect on occupation.

The technological package

The spreading of the Green Revolution in the rural areas of the Third World, and also in the Asian context, happened through the adoption of the technological package that provided a series of materials, instruments and contained practical information on the use of the hybrid seeds.
Implementing the package caused many problems for a considerable section of the rural society:

- for those farmers that were illiterate it was impossible to actually read the instructions and the dosages of fertilisers and pesticides;

- farmers had difficulties in activating the contacts with the public and private institutions that were necessary to obtain the materials and to develop or to reinforce the marketing channels for the increased production realised.

In order to solve these problems in the mid '70s the Training and Visiting System (T&V s) was founded. Basically technical staff would establish itself in situ or in experimental farms and would teach the application of the Green Technology by diffusing the use of fertilisers, pesticides. The new method accelerated the spread of the technical knowledge, improving not only the agricultural practices but also allowing a considerable increase in productivity.

Anyway the T&V system and the use of the experimental farms did not fully considered many issues related subsistance agriculture. In the table 6 the disparity of situations in the two different hypothesis mentioned above is represented.

Table 6: The main differences concerning Experimental Farm and Subsistence Agriculture in Developing Countries

Main Features of Experimental Farms	Mail Features of Subsistence Agriculture
• Fertile land • Operative infrastructure • High quality irrigation systems • Detailed and informative documentation • Poor Agronomists' attention to the economic consequences of new technology	• Remote and imporished land • Antiquated or inefficient structures • Lack of irrigation systems • Family-based labour • Low education

Source: Hogendorn (1995)

The results of T&Vs did not achieve their potential optimum, especially because they didn't carefully consider economic aspect. The adoption of the technological package furthermore underlined the important problem of selling the product. The new technology could only be adopted if selling the product would generate enough money to justify the increased expenditure of the technological package. Furthermore the remuneration of the farmer was strictly linked with a deep knowledge of the pricing and of the market systems, and this kind of information wasn't immediately available.

The Green Revolution was not only a study in optimising the agronomy (so as to obtain the maximum production) but also a study in optimising the economy (so as to obtain the maximum profit).

The scale dimensions of farms and their productivity

The topic invested particular emphasis for the scale dimension of farms. For the middle and big land-owners implementing the new technology did not cause undue problems, but for the poor farmer who operated on the fringes of the market the choice between the old and the new could be particularly difficult given the initial adverse economy conditions.

Contrasting opinions emerge from the economic research focussing on whether the Green revolution was efficient considering the scale dimensions of single farms, some believe it was a success, others believe it failed. It is evident that focussing on this means:

a) tackling the issue of the distribution of wealth between small, medium and big agricultural producers;
b) highlighting if the economic theory imbued in the Green Revolution was actually able to solve poverty in many Developing Countries.

The result of this analysis can therefore lead us to refuse or accept the development theory that aims at transforming pre-capitalistic economies, typical of the tradition agricultural structure, into modern market-driven economies, through the adoption of external inputs for the high-productivity.

In other terms it is often questioned whether the increased income, and the replacement of subsistence economy with the modern market economy, is actually a suitable instrument for reducing poverty in many Developing Countries. The international research shows that different situations arise depending on different socio-political contexts.

Considering the scale dimensions of the farm, it is possible to analyse the elements that directly influence the hectare productivity, following the hybrid introduction. Those have been classified by A. Pearce (1980) in two categories:

a) whether water utilisation is adequate and immediate, i.e. whether the irrigation system is adequate and effective
b) the use of fertilisers.

On the first element Pearce states that the advantages that could be had from an adequate irrigation system were on the whole more favourable to the big-sized farms, as these could well afford the cost of installing tubewells for lifting up water from underground or for capturing water from the surface. Such possibility was on the other hand very unlikely for the small and micro farm-owners, unless there existed a sufficient public investment to provide irrigation to the smaller farms.

Where irrigation was successfully realised, however, farms became more and more concentrated. With the spreading of irrigation systems the price of the land began increasing, and big land owner started accumulating more and more land, whereas smaller owners, even though they had obtained an impressive increase in production, could not readily invest the profit in the purchase of new land, or in ameliorating the land they already owned. This phenomenon is remarked on in studies realised in the north-east of India (Punjab, Haryana, and Uttar Pradesh) and Pakistan.

The research on the use of fertilisers leads to different results. In Asia it was observed that small farms favoured the increase of hectare or acre production, as this was in part due to the intensive use of family helpers, and this balanced the otherwise high cost of production.

This is in contrast with the data captured for the big farms, some owners were conspicuously not attending the farm and totally depended on salaried help, and the increased productivity was inferior to that of smaller owners. Other big land owners who decided to invest big capitals and assumed the direct management of their farms obtained increased productivity far higher than those of the smaller farmers.

Table 7 taken from Dasgupta, B. (1977) highlights in three villages of the Indian Punjab, the gross income, cost of production, and net income for different sized farms in the first years of their adoption of the Green revolution, when empirical studies were conducted in order to ascertain the validity, also from an economic point of view, of the new technology.

The gross income per production acre is strictly connected with the productivity, so the table highlights the U-shaped curve that relates hectare production with the dimension of the farm. This tendency also emerges from other Indian areas, which supports the hypothesis of increased production, for hybrid seeds, for small or big sized farms.

Table 7: Gross Income and Farm Business Income per acre for various Farm Size Groups, 1967/68 and 1971/72 in three villages in the Indian Punjab (values in rupees)

	Small	Medium	Large
Medium Gross income			
1967/68	2320.75	1762.46	1911.93
1971/72	2574.79	2419.87	3925.40
Medium Cost per acre			
1967/68	1481.09	1010.55	922.17
1971/72	1439.33	1342.33	1637.39
Medium Farm business			
1967/68	839.66	751.91	989.76
1971/72	1135.17	1077.54	1658.01

Source: Dasgupta (1977)

From these observations the following is evinced:

a) An initial availability of capital to invest in irrigation, without recurring to credit, greatly favours the adoption of a new technology which guarantees conspicuous production increase.
b) Public intervention is essential for the small producers in order to obtain services in irrigation and information on the technology use that otherwise would not be accessible. Where this has been realised (Japan and Taiwan), small producers can acquire an economic advantage that enables them to stay in the market;
c) Small farms can only be supported against the concentration of land, by a public market body; on the other hand they do obtain a high hectare productivity.

In lack of a rigid control on the part of the government on these variables, the adoption of an external technology (high pay-off inputs) risks, in a pre-capitalistic society where the social structure is not equal, to exacerbate the impoverishment of the population whose subsistence is within small or micro farms.

The effect on occupation

Another aspect considered by the researchers has been the effect on occupation, and consequently on the level of income of a large part of the rural population that survives through seasonal work. The literature distinguishes optimistic and pessimistic views.

For some (Ladejinsky, Falcon, Wharton, Frankel, Byres and Shiva) the Green Revolution increased the social tensions, risking turning into a "red revolution" for the following reasons:

a) It denied the small farmers (peasants) and the landless labours the gains realised through the Green Revolution
b) It diminished their real income by mechanising part of the rural activities.

For others the Green Revolution has benefited more some subjects than others but in general everybody enjoyed some profit (Sen, Harrison, Bhalla and Chadha), as attested by a better per capita income, better levels of education and of health, reduction in prices for agriculture products that reduced the basic food expense for both the urban and the rural population.

Harbans Singh Sidhu (1991) reminds us that the Green Revolution consists of two aspects:

a) bio-chemical aspect, i.e. the innovations adopted for irrigation systems, seeds and fertilisers;
b) mechanical aspect, i.e. the ground-preparation work, sowing, reaping, transport of agricultural products, by using tractors.

For Singh Sidhu the bio-chemical aspect, on its own, creates work as the introduction of permanent irrigation systems extends the agriculture season, and thus entails a higher use of manpower. Besides, the multiple-cropping system and the precocious ripening of the hybrid plants favoured a bigger harvest, and therefore required more labour.
The mechanical aspect instead obviously tends to reduce the use of manpower.
The effect of the new technology on occupation and consequently on the levels of income of the poorest layer of population that lives in rural areas depends on relative combination of the two aspects. There can be then various scenarios:

a) increased occupation if the bio-chemical aspect prevails on the mechanical one (this can be seen at the initial stages of the Green Revolution).
b) Reduction of occupation if the mechanical aspect prevails on the bio-chemical one (in the study conducted by the economist in the Haryana and Punjub States the female occupation has been reduced whereas the male occupation seems to have stayed roughly the same).

4. Conclusions

The view on poverty and on the methods that should be adopted in order to progressively reduce it has always been the centre of the international debate.
During second half of the 20th century various schools of thought formed, according to the prevailing economy theories: from the view of economy growth as the necessary instrument to better the livelihood, ('50s and '60s), to the new view of poverty as a "process", for which the economic growth is not sufficient.
In the 70s, after the adoption of the green revolution, the development economists moved their attention towards questions regarding occupation and income distribution. Setting aside macroeconomics theories, they preferred to concentrate on micro studies at village or single farmer level. The target was the "Growth with Equity" instead of Economic "Growth and Modernisation", as the latter when considered on its own didn't guarantee the authomatic poverty reduction.
Growth is therefore indispensable but not sufficient factor for reducing poverty in the various geo-political contexts. Equally other aspects have to be taken into account: the social, political and institutional processes that are realised in poor economies and that strongly determine the success of the failure of the policies designed to reduce poverty ('70s and '80s).
The '80s and '90s also witness the dawning of awareness of the environmental resources and of the necessity to safeguard them adequately in order to ensure that the development processes are sustainable. Their dissipation could exacerbate the dichotomy of wealth distribution, ill-favouring the indigent at the borders of the social hierarchy. On the basis of this historical route one *should* read the theoretical and practical experience of the Green Revolution, originally based on the assumption that the economic growth, started with the development of the primary sector, would on its own better the livelihood of most of the poor population in the Developing Countries.

The increases of cereals production realised in Asia during the '60s and '70s, have deeply affected the order of rural structures. Nevertheless the Asian context, where the growth of productivity has been more marked, witnesses even now how a relevant percentage of the population still living in poor conditions. The international estimates taken from the United Nations Population Division state that 21,5% of the population in Asia survives on less than a dollar a day, and 59,9% with less than two dollars a day (see table 8).

Table 8: Incidence of poverty in Asia (%) 1990 and 2002.

Years	East Asia	South Asia	Southeast Asia	Central Asia	Total
$1-a-day poverty Index					
1990	33.0%	41.3%	23.9%	1.9%	34.3%
2002	15.9%	31.6%	9.6%	7.4%	21.5%
$2-a-day-poverty index					
1990	72.2%	85.5%	65.0%	13.9%	75.3%
2002	45.6%	78.3%	48.3%	39.9%	59.9%

Source: Processed data taken from United Nations, Population Division. World Population Prospects: The 2002 Revision, medium variant projections.

It is necessary to adopt a vision of the development processes where the components "economic growth", "social, political and institutional" and "natural resources" are adequately weighed and valued in their reciprocal interaction.
Within this conceptual structure, fighting poverty should start first by rethinking the growth processes. The followings are only some indications to consider.

1) Investments in human capital, achieved through health programmes, training, better nourishment that would widen the spectrum of opportunities for the poorest population.

2) Renewed research on farming focussed on the issues faced by the poor population, and paying particular attention to the local production and to the methods needed to increment their increase.

3) A more equal access to land ownership.

4) Micro-credit and micro-finance to aid the poor farmer at the stage of purchasing the production inputs.

5) Spurring the function of the Rural Non Farm Activities in order to start an integrated rural system.

6) Monitoring prices both at a national and at an international level in order to capture the right information at the most opportune time.

7) The adoption of efficient participation schemes so as to ensure that the benefits are more equally distributed in all the social layers.

The sustainable development approach aims exactly at this and tries to convert into practice the lessons learned during the previous decades.

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