MUTUAL ARMS REDUCTION SCENARIO (MARS) FOR THE FAP'S STUDY: "HUNGER, GROWTH AND EQUITY"

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FOREWORD

Even with globally adequate food availability, large numbers of people remain chronically undernourished today. Evaluation of alternative national and international policies that can help reduce rapidly hunger in the world has been a major theme of the FAP since its inception.

Though national redistributive policies may be essential to reduce hunger at a satisfactory rate, the resources available with the developing countries are limited. International capital transfers are thus needed.

Among the sources for such funds can be reduction in arms expenditure.

With the help of FAP's Basic Linked System (BLS) of national agricultural policy models we have explored consequences for economic development and reduction in hunger of mutual arms reduction and redistribution of parts of the resources thus saved.

In this paper, Vladimir Iakimets elaborates on the considerations that should go into designing arms reduction scenarios.

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ABSTRACT

In this paper the classification and general description of possible scenarios for the FAP's book "Hunger, Growth and Equity" is given. The main aim of the paper is to consider guidelines for the construction of the MARS (Mutual Arms Reduction Scenarios), including its objectives, assumptions made and problems to be solved. The outline of the structure of MARS is given.

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Mutual Arms Reduction Scenarios (MARS) for the FAP's study "Hunger, Growth and Equity"

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1. Introduction

The system of interacting national agricultural models created by the Food and Agriculture Program of IIASA is the unique instrument providing an opportunity for the analysis of the behaviour of economies of individual countries and world market under various influences and constraints. The description of the Basic Linked System (BLS), its structure, information flows, equations and the associated estimation problems have been discussed in a number of papers (see, for example, K. Parikh and F. Rabar, 1981, G. Fischer and K. Frohberg, 1980, M. Keyzer, 1980, G. Fischer and K. Frohberg, 1983). Therefore a repetition is avoided here.

Though each national model in this system (BLS) simulates the behaviour of a complete economy of a country including agricultural and non-agricultural sectors, the focus of the study of directions for development of food and agricultural sector is central. The current status of the BLS allows the use of this tool for an analysis of different ways for improving the global food situation in dynamics that could not be done by any other model. It became possible because the BLS is the simulation system of national agricultural policy models with sectoral breakdown interacting through world market.

There were two "applied" problems chosen for investigation with the help of this tool: trade liberalization and the hunger problem. In some sense both these investigations are oriented to illustrate the consequences of various economically sound approaches to the improvement of the world food situation

and to search for internationally and nationally accepted measures to do it.

Within the framework of the first study attention was mainly paid to the investigation of the impact of changes in trade relations between countries based mainly on elimination of various protectionist measures (for regions, groups of countries or for separate commodities) on the world and national food situation. The results of these calculations are promising from the point of view of the operationality of the BLS and their interpretation in comparison with results of reference runs (when the existing protectionism remains) will be given in the monograph on free trade which is now under preparation at FAP.

The second study is now in progress and it's aims are to investigate the possible ways of analysing and alleviating the hunger problem. One of the important components of this study is (as in the previous one) the development of reasonable set of scenarios.

This paper contains some ideas for classification of scenarios for the second study. The main purpose of the paper is to describe one of the scenarios (the so-called Mutual Arms Reduction Scenario - MARS). The importance of this scenario, the main assumptions for it's formulation, problems to be solved, description of it's structure and questions of this scenario implementation with the framework of the BLS are given in this paper.

2. On the classification of scenarios for the FAP's study "Hunger, Growth and Equity"

When one begins to think on the hunger phenomenon in our time immediately a number of general questions arise.

(1) What are the reasons for the existence of hunger?

(2) In what regions or countries is the hunger problem most critical?

(3) What is the potential of each country to feed it's population now and in the future?

(4) What alternative paths are available to reach the required levels of food consumption in different countries?

(5) Are available resources (land, labour, capital, etc.) all over the world enough to increase food production and to feed the world's population?

(6) Are these resources rationally allocated within countries and among countries?

(7) Is food currently produced in the world enough to feed the world's population?

(8) Is food produced within the countries distributed in the best way?

(9) What measures undertaken now to help the poorest countries are fruitful?

(10) What kind of policy implications at the national and international levels have to be made to improve the situation?

The problem of hunger, starvation and malnutrition is a grievous paradoxical problem of our time. Mankind has made colossal achievements in terrestrial science and technology, nuclear research, computers, etc., explored outer space and at the same time has not managed to solve the global problem of providing basic vital requirements for food to all the people of the world.

Reflections on the questions raised above, analysis of the world food statistics as well as discussions at the FAP's seminars gave rise to the persuasion that significant alleviation of the hunger problem is possible (at least from a theoretical point of view).

Let us raise the question whether there are feasible ways to solve this problem now and in the future. And we can give positive answers. There are at least three visible directions to be analysed with the help of the BLS:

(1) redistribution of food produced in the world

(2) redistribution of input resources available for agricultural production

(3) searching for and distribution of additional input resources.

2.1. Food redistribution scenarios

In order to outline this set of scenarios let us consider a very oversimplified picture of the hunger situation in the world and in different countries. For this purpose we will use general indicators estimating food supply such as daily supply of calorie and protein per caput. Let us note that various other indicators like vitamins supply per caput can be used also. If one compares the values of these indicators for various countries, then one sees that there are countries where these values are lower than the required ones. At least in these countries hunger must exist. Even among those countries where the average availability exceeds the requirement, there may be hunger due to uneven distribution of calories across people.

There are estimates showing that existing level of food production in the world is already quite enough to provide for the required level of food on a per capita basis if the available food is distributed properly. See for example, FAO, 1983 and Table 1. What does it mean? It means that in average the problem of required volume of food production has been solved in the world. However, we can say that we solved this problem only at the average, because large disproportions of food supply per capita between different parts of the world exist now (see Table 1). For example developing countries have more than 70% of world population (excluding socialist countries) and produce only 30% of main staple foods. According to some experts' (Y.I. Charzov, et al 1982) estimations in the developing countries 400 million people suffer from malnutrition, 100 million children are threatened with death because of undernourishment and lack of

vitamins.

Based on data from Table 1 one can conclude that redistribution of food produced in the world would be sufficient to solve the hunger problem. However, it will be an oversimplified understanding of the problem which can be called statistical speculation. The problem is that such a food redistribution is unrealistic one due mainly to the poor financial situation of a number of developing countries and they cannot use the world market as a source for improvement of the food supply in the country. It should be noted also that the existing approach to directing food aid is not geared primarily to solving the hunger problem. An example which illustrates this is the following. According to UNITAR (1980) the food aid for developing countries with GDP per capita equal and lower than 250 US dollars was estimated to be 1.8 US dollars per capita At the same time for countries where GDP per capita is more than 250 US dollars, food aid per capita is equal to approximately 3.2 US dollars. In other words the least developed countries receive less food aid. It is a paradox but such a fact shows the shortcomings of the existing patterns for food aid.

Table 1 DAILY PER CAPUT CALORIE SUPPLY AS PERCENT OF REQUIREMENTS

	1969-71	1974-76	1978-80	1977	1978	1979	1980
	..... %						
Developing market economies	95.5	95.5	99.2	96.3	99.2	99.8	98.6
Africa	93.5	93.1	93.7	94.3	93.9	93.3	94.0
Far East	92.8	90.8	95.7	91.1	96.0	96.9	94.1
Latin America	105.8	106.7	108.9	107.5	108.4	108.7	109.4
Near East	97.2	106.2	111.0	108.5	109.7	111.3	112.1
Other dev'ing market economies	100.0	101.5	105.7	102.8	105.7	106.3	105.3
Asian centrally planned economies	90.7	97.7	104.3	99.1	101.3	105.0	106.6
Total developing countries	93.9	96.3	100.9	97.2	99.9	101.5	101.2
Least Developed Countries	88.3	84.1	84.1	82.9	84.3	83.1	85.0
Total developed countries	128.4	130.8	133.1	131.2	132.2	133.7	133.4
World	104.8	106.5	109.8	107.0	109.1	110.4	110.0

Source: FAO, 1983, p.5

Taking into account all these arguments, it would be interesting to design a scenario for the BLS to analyse the impact of food redistribution on the hunger problem in the world. However, one needs to define appropriate rules for distributing international food aid and for bearing the costs of such aid. This class of scenarios for FAP's study on hunger could be called "*Food Redistribution Scenarios*" (FRS). An objective of these scenarios is to analyze what kind of changes in the world market mechanism, in food aid activity and in corresponding exchange behavior of separate countries will be favorable ones for the improving the food consumption by those who are currently hungry in the world population.

2.2. Resources Redistribution Scenarios (RRS)

It would not be an exaggeration to say that the most urgent, goal-oriented and promising approach to the solution of the food problem would be aid from the developed countries in establishing a steady and reliable basis for effective agricultural production in developing countries. In order to provide for such a basis the implementation of cardinal socio-economic transformations and agrarian reforms in these countries is a necessary condition.

In order to implement such transformations developing countries need appropriate resources. Let us turn once more to statistical data (see Table 2). One can see from this table that developed countries with 30% of the world's population produce 60% of the food, have 70% of the world income and purchase 80% of the total agricultural inputs. This means that developing countries have only 20 percent of the total purchased agricultural inputs to provide the food needs of 70% of the world's population. If the situation remains as it is then we can say that no transformations will help to create a national basis for effective agricultural production and to improve the food supply. So one can conclude that by redistribution of *available* input resources the creation of a national

basis for effective agricultural production and hence for increasing the food supply in developing countries can be achieved. It is reasonable from the whole list of input resources (land, bio-climatic potential, energy, machinery, chemicals, technology, labor and capital) take into account only those which are related to purchased inputs (energy, machinery, chemicals and technology) and of course capital investments*.

Table 2. Statistics for developed and developing countries, 1980

	DEVELOPED	DEVELOPING
POPULATION	30%	70%
FOOD PRODUCTION	60%	40%
INCOME	70%	30%
INPUTS	80%	20%

Source: Woods, R.G. 1981

* In some sense redistribution of labor (consumers) considered as a migration process, can also be analyzed.

An objective of scenarios of the RRS group is to analyze what kind of international and national admissible and acceptable policies for redistribution of the above mentioned resources will be the most preferable from the point of view of their impact on the development of agricultural sectors in the developing countries and what kind of changes will occur in those in the developed countries. It would be interesting also to learn what reasonable marginal volume of each of these resources *available* for agricultural production will be the most useful to be redistributed. It can be foreseen that all of these resources now *available* for world agricultural production will turn out to be scarce ones to solve the hunger problem for a reasonable time period.

2.3. Distribution of Additional Resources (DAR)

If the prediction made in the last sentence of the previous section is very similar then the following question arises; namely, whether there are any additional resources which could be used for the solution of the problem under consideration. Necessity of searching for such additional resources is confirmed by the results of a recent study entitled "Land resources for the populations of the future" carried out by the FAO in collaboration with the FAP of IIASA and financially supported by the United Nations Fund for Population Activities (FAO/IIASA/UNFPA, 1983) (FAO, 1984) and Shah et al (1985).

The most important result from this study is that for the year 2000 a number of countries in Southwest Asia and Africa will be critical from the point of view of domestically providing required food supply to their population, even if the volumes of inputs for agricultural production is raised to at least the intermediate level.* The situation would improve when the high level of inputs is used. However, even in that case a number of critical countries would

*The intermediate level according to the authors' definition means limited use of improved varieties and chemicals, reduced fallow, animal traction as well as manual labor' simple conservation measures; optimum crop mixes on half of the land.

remain. In other words results of this study show that without distribution of *additional* resources the hunger problem remains. It would be difficult to undertake any efforts if such *additional* resources did not exist. Fortunately they do exist now, however, these resources are not used for the solution of urgent problems to mankind. These resources are those used now for the arms race.

3. Mutual Arms Reduction Scenarios

It would not be an exaggeration to say that major and fundamental preconditions for the solution of current and future global problems, such as energy, food and so on, is the elimination of the threat of war. Stopping the arms race, switching all production forces from military to peaceful aims could not only lead to eliminating of the threat of human civilization, but could provide favorable conditions for overcoming the whole set of global problems such as ecological, energy, non-renewable resources, food and social ones. We will not discuss here the possible advantages from the reduction of the arms race for the solution of all of these global problems, and focus our attention only on the food problem.

3.1. Objective of the MARS

Development of the abovementioned scenario is aimed to show once more that all countries all over the world will be the gainers in a social and economic sense when the resources used for military purposes will be transferred to civil production. This is self-evident and the rationality of such transference of resources is practically beyond any doubt.

There are a lot of established facts and results of scientific research illustrating that reduction of the arms race would lead not only to physical saving our civilization but would be favorable to the improvement of social and

economic situation in countries at different levels of development. See for example, Y.I. Chazov, et al.,1982; Responsibility for ..., 1983; P.R. Ehrlich, et al., 1983; WHO, 1984; UN 1971.

This scenario is devoted to the analysis of possible alternatives for the utilization of the resources released from the arms race for the solution of the social and economic problems in different countries (mainly in LDC) and basically those with relatively large agricultural sectors.

The scenario MARS suggested here has as its objective the search for alternatives of utilization of resources released and to find the more preferable uses from the point of view of:

- eradication of hunger;
- improvement of individual country economy;
- smoothing (equalizing) the levels of development of different countries;

3.2. Importance of the scenario

The importance of the scenario MARS, one can realize from the following citation.

"We believe that the task of delivering mankind from the burden of armaments is a realistic objective. We are confident that an end to the senseless waste of efforts and resources, and the conversion of the vast industrial, scientific and technological potential to peaceful uses will open up broad opportunities for the creation of material benefits and improvement of the quality of life. We clearly visualize the beneficial effect disarmament would have for clearing the international atmosphere of fear and suspicion, for the development of fruitful international cooperation and the joint efforts to solve **the global problems of our time such as eradicating hunger and disease, satisfying man's needs for food, energy and raw materials, protecting the environment**

and harnessing the resources of the World Ocean and Outer Space (it is accentuated by us)." From: Appeal of the Conference of Soviet scientists for ridding humanity of the nuclear war threat and for disarmament and peace. Moscow May 17-19, 1983.

3.3. Reduction of military expenditure as a reserve resource for food problem solution.

In December, 1981 the booklet on the results of studies conducted by UN experts was published. The destructive power of the nuclear weapons accumulated in the world surpasses a million times that of the atomic bomb dropped on Hiroshima in 1945 (see also Y.I. Chazov et al, 1982). Let us remember that the consequences of this explosion were terrible.

The arms race since 1945 has consumed up 6,000,000 million dollars At the present time nearly 1 million dollars per minute are spent in the world on arms. In other words, annual military spending equals to 600,000 million dollars.

This represents a huge reserve of financial, human and physical resources which could be used for the solution of the world social and economic ills.

Contemporary militarism is the greatest threat to mankind, even when only limited military operations are carried out. Why? Because it has become one of the main obstacles to solving global, social, economic and cultural problems. Vast manpower (skilled manpower!!) and raw material resources (mainly non-renewable!!) are being used for military purposes. The same could be said in relation to land used for these purposes.

In other words, arms race distracts production capacities, scientific knowledge, intellectual power of mankind from the solution of important civil problems such as hunger, unemployment, exhaustion of natural resources, pollution of the environment, and overcoming differences in development of

developed and developing countries.

The implementation and extension of military programs gave rise to the problem of "lost opportunities" which becomes more and more pressing.

Mankind "loses" time, non-renewable resources, new inventions which could improve our life because of the failure to implement the urgent alternative civilian programs. It should be stressed that these lost economic and social opportunities make our current existence worse and will make themselves felt in the future.

For example, since the end of the Second World War, the cost of aircraft carriers increased by 10 - 20 times, bombers by 30 - 40 times, submarines by 40 - 50 times, and fighters by 100 - 150 times.

According to Y.I. Chazov et al, 1982, 60% of annual funds which are expended for arms could be enough for construction of 50 million flats (for 300 million people), or for construction of 0.6 million schools (for 400 million children).

It would be simple to continue such examples and comparisons, see for example, UN, 1971. However, all the abovementioned seems to be already quite convincing to say that within the framework of the FAP's "Hunger, Growth and Equity" a scenario of the world arms expenditure reduction ought to be included.

3.4. Problems of the scenario elaboration.

In order to implement the scenario MARS within the framework of the BLS a number of problems have to be solved.

1. Estimation of volumes and rates of military expenditures reduction in developed and developing countries. Calculation of volume of potential resources released.

2. Identification of criteria and constraints for allocation of these funds within DC and LDC for the solution of their internal economic problems. Determination of the priority of such criteria for countries with different levels of development.
3. Determination of shares of utilization of funds thus created in between domestic use and both in DC and LDC.
4. Elaboration of versions for allocation of resources in LDC from own release fund and fund created by DC.
5. Elaboration of versions for utilization of own release resources in DC.
6. Working out the list of indicators for comparisons of base and scenario runs.
7. Generating the versions of scenario for implementation with for the BLS.
8. Description of possible adjustments of the BLS (if necessary).

3.5. Arms race and developing countries

One of the fundamental problems of our time is overcoming the gap between the economic development levels of different countries, developed and developing ones.

The burden of the arms race affects the developing countries even more than the developed ones. For the period of the last 20 years for example, GNP of developing countries has tripled but their military spending has increased seven times. (See Responsibility for .... 1983)

It seems to us that the rate of reducing these expenditures in developing countries must be taken the same as for developed countries (10%) or may be even more?

The following proposal is worth to test in the BLS. In order to attain self-sufficiency of developing countries in food it would be enough to provide for

them external aid for 5 milliards dollars per year. It is equal to less than 1% of current expenditure of developed countries for arms (approximately the costs for the construction of 3 modern nuclear submarines). So this share (1%) can be taken as a part of funds released from developed countries for aid to developing ones.

It is expedient to determine ways of these money investments in developing countries. First of all let us try to outline the main reasons of critical food situation in many developing countries,

- backwardness of social and economic structures,
- weakness of technical and technological capabilities;
- low agricultural productivity;
- burden of external debt;

Hence the main directions for food problems solution in developing countries are:

- progressive social transformations;
- technological progress; and
- investments.

4. Main assumptions for elaborating the MARS

It is expedient to accept the following assumptions:

1. Information on military expenditures of each country have to be based on official national statistics.
2. Admissible levels of reduction of military expenditures in all countries have to be coordinated with available estimations of corresponding international organizations.

3. The way of utilization of resources released in LDC and DC have to be such to meet the opportunities of the BLS or to lead to only minimal adjustment.

4. Initial data on released funds in LDC and DC are given exogenously and will be endogenized during runs.

5. Utilization of resources in each country has to be smooth for the period under consideration and has to meet the rules of decision making in the national policy module of the FAP's models.

6. Volumes of transferred resources have to remain within absorptive capacities of national economy of LDCs and DCs and have to be calculated exogenously.

7. List of indicators for comparison of base and scenarios runs has to coincide with those available from the BLS where they are calculated endogenously.

5. Some guidance for structure of scenario

The most interesting information from the point of view of possible scenarios for the FAP hunger book is estimation that 8 - 10% of recent annual expenditures for arms would be enough for solution of hunger problem in the world for the period of several years.

The Soviet proposal on the reduction of the military budgets of states permanent members of the UN Security Council by 10 percent and utilization of part of these saved funds to provide aid to developing countries was submitted by the USSR in 1973 for consideration of the 27th UN General Assembly Session. Unfortunately this initiative has not been put into practice.

An idea is to use such estimations as guidelines for elaborating the scenario MARS.

Because each of the problems mentioned in the section 3.4 has several versions of solutions then in fact a number of the scenario MARS can be

constructed. Figure 1 contains the description of some such versions. For example, scenario (a1, b1, c1, d2, e1, f3, g2) means that for all countries we fix the value of military expenditures at the end of the period under study, all of them began the reduction of these expenditures without any delay, all developed countries agreed to fix constant share of own released resources for creation of joint aid fund which has to be distributed among LDC according to the comparative data on their national income and absorptive capacity, own released fund in DC is used for increasing investments in different sectors of the economy proportionally to their contribution to total national income, additional resources from aid fund are used in LDC for purchasing agricultural inputs and from own released fund for development of national agricultural production.

6. Conclusions

This paper contains some general ideas for the construction of scenarios for the FAP's study "Hunger, Growth and Equity". The classification of possible scenarios is suggested here. The main aim of the paper is to describe the scenario MARS considering current military expenditures as a source for additional resources now available in the world for the solution of the hunger problem. The importance of this scenario, main assumptions for its construction, problems to be solved as well as the outline of scenario structure have been described here. The next paper will be devoted to the formalized description of separate stages for the MARS scenario.

Figure 1. Structure of the Scenario MARS

A. Value of military expenditures at the end of period under study	a_1: fixed value as percentage of initial data		a_2: unfixed value
B. Dynamics of annually reduced military expenditures	b_1: optimistic	b_2: constant	b_3: gradual progressive
	b_4: cautious		
C. Share of funds released in DC for utilization in LDC	c_1: constant	c_2: non-increasing function of time	
D. Distribution of total fund created in DC among LDC	d_1: as function of LDC national income	d_2: as function of LDC national income, their absorptive capacity	
	d_3: as d_2 taking into account goal for smoothing the discrepancies among LDC		
E. Utilization of fund released in DC	e_1: increase of investments in different sectors of economy proportionally to their contribution to national income.	e_2: utilization of total fund as investment to development of agricultural production	
F. Utilization of additional resources in LDC from funds created by DC	f_1: for debt service	f_2: for food import	f_3: for input resource import
G. Utilization of additional resources in LDC from own fund released	g_1: for improvement of trade balance	g_2: for development of agricultural production	
	g_3: for improvement of income distribution.		

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