

Socialismo del Siglo XXI: Efficient socialist planning

Allin Cottrell and Paul Cockshott

Department of Economics, Wake Forest University
Department of Computing Science, Glasgow University

http://www.ecn.wfu.edu/~cottrell/socialism_book

<http://www.gn.apc.org/Reality>

Sucre, October 2006

Introduction

“There is no alternative” (to the market). How often do we hear this?

- Historical arguments: “Planning failed in the Soviet Union”.
- Theoretical arguments: Hayek, Mises, the Austrian school.
 - “Too many equations”
 - “You can’t get the information”
 - “Incentives will be lacking”

We need a concept of socialist planning that answers these concerns.

Basic propositions

Central planning requires:

1. A method for building (and updating) a set of targets for final output.
2. A method for calculating the implications of the final-output targets for the gross output of each good.
3. A system of monitoring, rewards and sanctions to ensure that the plan is carried out.

These in turn require: a system for gathering and processing economic information, and a metric for the cost of production.

Alec Nove's point: Planning in detail

If central planning is to be effective, it must be done in full, disaggregated detail.

Even given good-will, there is no guarantee that economic decisions made in independent enterprises will lead to a coherent result.

OLEG YUN: In the 1980s, Gosplan was able to construct “material balances” for only about 2000 products in its annual plans.

Labour time: Social unit of account and measure of cost

- The distribution of resources across the sectors of the economy takes the form of a labour-time budget.
- The basic criterion for efficiency is minimization of the labour time required to produce things.
- Workers are rewarded in labour-tokens, according to the hours worked.
- Consumers can take from the social fund goods having a labour-content equal to their labour contribution (after deducting taxes to pay for communal uses of labour time).

Decisions on the main allocation questions

The broad distribution of labour time — between accumulation of means of production, collective consumption, and individual consumption — can be decided democratically.

- Direct voting on particular uses of labour time at appropriate intervals. For example: expand the health service?
- Voting on a number of variant plans. For example: how to respond to global warming?
- Electoral competition between parties having distinct views on the priorities for planning.

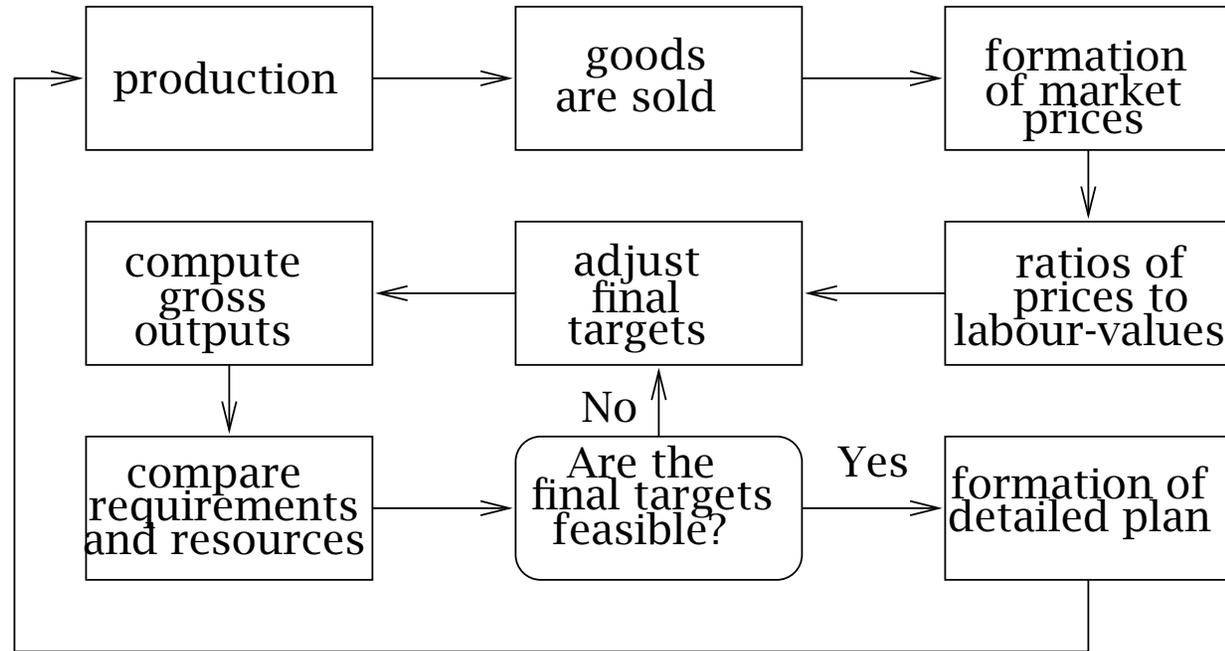
Consumer goods algorithm: basic ideas

- Oskar Lange: Market prices for consumer goods are used to guide the distribution of social labour across the production of the various consumer goods. You can have “market prices” (supply = demand) without a capitalist system.
- Strumilin: In a socialist equilibrium the useful effect produced in each branch of production should be in proportion to the labour-time expended.

Consumer goods algorithm: more detail

- Consumer goods are marked with the labour time needed to produce them (“labour-value”).
- If supply and demand are not equal, prices (expressed in labour tokens) are adjusted: they are raised for goods in short supply and lowered where there is a surplus of the goods.
- The plan for the next period calls for increased output for goods where the ratio price/labour-value is above average, reduced output for goods where price/labour-value is below average.
- In each period, the plan must be balanced, using input-output methods plus auxiliary algorithms.

Schematic view of planning



(Gives the basis for responses to Nove, Mises)

Practicality of the calculations?

Calculating labour-values: we have n unknown values and n input-output equations. This is straightforward in principle. The problem is one of scale.

Number of products	Multiplications	Time in seconds:	
		<i>Uniprocessor</i>	<i>Multiprocessor</i>
1000	10^9	1000	1.0
100000	10^{15}	10^9	1000000
10000000	10^{21}	10^{15}	10^{12}

Table 1: Solution by Gaussian elimination

10^{12} seconds is over 31 000 years. :- (

A better way!

Use an iterative method (Gauss–Seidel or Jacobi) and allow for the *sparsity* of the input–output matrix. Each of the n products requires not n distinct inputs, but only n^k , $0 < k < 1$. We assume below $k = 0.4$.

Number of products	Multiplications	Words of memory	Time in seconds:	
			<i>Uni.</i>	<i>Multi.</i>
1000	158489	31698	0.158	1.6×10^{-4}
100000	100000000	20000000	100	0.1
10000000	6.3×10^{10}	1.2×10^{10}	63096	63.10

Table 2: Iterative method, 10 iterations

Allocation of resources

Given targets for net or final outputs, and given the available technologies and resources, how to calculate a feasible plan?

1. Start from the final outputs and calculate the gross outputs (using the iterative method).
2. Find the requirements for labour and fixed means of production. If these cannot be met, scale down the final output targets and start again.
3. An algorithm which scans the space of feasible plans, seeking the best fit between target outputs and feasible outputs was developed by COCKSHOTT (1990). Uses the method of “simulated annealing” to re-allocate scarce means of production across industries. Paul has now tested this on a simulation of a 1-million product economy, on a modest (< \$10 000) computer.

Today's information technology

In the calculations above we assumed a multiprocessor capable of 10^9 multiplications per second.

This is very conservative.

The fastest computers used in research establishments today have speeds measured in “Teraflops”: 1 Teraflops = one trillion (10^{12}) floating-point instructions per second (TOP500 Report: www.top500.org).

The total *memory requirement* is also within range for current high-performance computers.

Conclusion

We claim to have a solution for problems that were not solved in the Soviet economy. How can this be?

The combination of two elements:

- Adherence to labour-time accounting and costing.
- Use of modern information technology.

Our calculations suggest that detailed central planning of a complex economy probably first became practical in the 1980s — just about the time that the Soviet Union was giving up on planning and moving towards the market!

Contents

- Introduction ❖
- Basic propositions ❖
- Alec Nove's point: Planning in detail ❖
- Labour time: Social unit of account and measure of cost ❖
- Decisions on the main allocation questions ❖
- Consumer goods algorithm: basic ideas ❖
- Consumer goods algorithm: more detail ❖
- Schematic view of planning ❖
- Practicality of the calculations? ❖
- A better way! ❖
- Allocation of resources ❖
- Today's information technology ❖
- Conclusion ❖