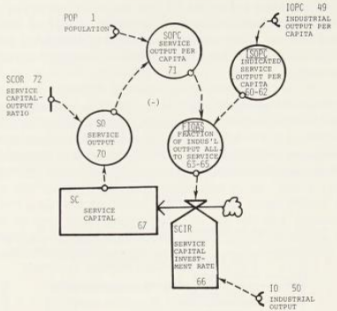

Figure 3-21 DYNAMO flow diagram of feedback loop governing investment in services

formulation of ISOPC are assumptions about the shift in values that accompanies industrialization. We tried to base the model relationship on the value shift that has been historically observed to occur with economic development. Because some new pattern may emerge in the future, however, we made it possible to change the definition of ISOPC during the course of any simulation run.

We employed a relationship between ISOPC and IOPC related to that observed between the magnitudes of service output per capita and industrial output per capita during the economic development of most nations (Chenery and Taylor 1968). Because our definitions of service, agriculture, and industry differ slightly from those employed by Chenery and Taylor we rederived the industry-service output relationship using the cross-sectional statistics on GNP provided in Figure 3-7. Figure 3-22 illustrates the relation of service output per capita (Figure 3-7, column 2 × column 7) to industrial output per capita (Figure 3-7, column 2 × column 6) for the 38 countries for which appropriate data are available.

The cross-sectional and longitudinal studies of Chenery and Taylor suggest that current relationships among the various constituents of GNP in different countries are similar to those observed in most countries over the course of their industrialization. We therefore employed our cross-sectional curve of service output per capita versus industrial output per capita (Figure 3-22) as indicative of the relationship that will prevail in the future, barring major value changes within the global population.

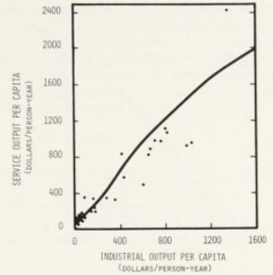

Figure 3-22 The relation of service output per capita to industrial output per capita

To permit a change in the assumed relationship between IOPC and ISOPC during a simulation run, ISOPC is specified with a CLIP function that shifts the value of ISOPC from ISOPC1 to ISOPC2 at TIME=PYEAR. Both ISOPC1 and ISOPC2 are defined as tabular relationships. The tables that indicate the two relationships, ISOPC1T and ISOPC2T, are normally identical to the line in Figure 3-22. Their form in most simulations is shown in Figure 3-23.

```
ISOPC.K=CLIP(ISOPC2.K,ISOPC1.K,TIME.K,PYEAR)                    60, A
   ISOPC  - INDICATED SERVICE OUTPUT PER CAPITA
            (DOLLARS/PERSON-YEAR)
     CLIP   - A FUNCTION SWITCHED DURING THE RUN
     ISOPC2 - ISOPC, VALUE AFTER TIME=PYEAR (DOLLARS/
              PERSON-YEAR)
     ISOPC1 - ISOPC, VALUE BEFORE TIME=PYEAR (DOLLARS/
              PERSON-YEAR)
     TIME   - CURRENT TIME IN THE SIMULATION RUN
     PYEAR  - YEAR NEW POLICY IS IMPLEMENTED (YEAR)

ISOPC1.K=TABHL(ISOPC1T,IOPC.K,0,1600,200)                       61, A
ISOPC1T=40/300/640/1000/1220/1450/1650/1800/2000                61.1, T
   ISOPC1 - ISOPC, VALUE BEFORE TIME=PYEAR (DOLLARS/
            PERSON-YEAR)
   TABHL  - A FUNCTION WITH VALUES SPECIFIED BY A TABLE
   ISOPC1T- ISOPC1 TABLE
   IOPC   - INDUSTRIAL OUTPUT PER CAPITA (DOLLARS/
            PERSON-YEAR)

ISOPC2.K=TABHL(ISOPC2T,IOPC.K,0,1600,200)                       62, A
ISOPC2T=40/300/640/1000/1220/1450/1650/1800/2000                62.1, T
   ISOPC2 - ISOPC, VALUE AFTER TIME=PYEAR (DOLLARS/
            PERSON-YEAR)
   TABHL  - A FUNCTION WITH VALUES SPECIFIED BY A TABLE
   ISOPC2T- ISOPC2 TABLE
   IOPC   - INDUSTRIAL OUTPUT PER CAPITA (DOLLARS/
            PERSON-YEAR)
```