

2003

System Dynamics Model Development for R&D Budget Allocation Strategy

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Abstract

A computer simulation model was developed for R&D budget allocation problems that usually contain very complex and non-linear social issues. The System Dynamics approach was employed, which is proper to complex and non-linear social problem modeling. An issue of budget allocation to each step in five research areas was analyzed for an application example. The base scenario, that assumes to allocate a large portion of budget to demonstration step, was found to have a weakness in long-term sense. To overcome this weakness, some other better alternatives were recommended through the analysis. In addition, this paper suggests the ways to

utilize the updated model in the future.

1.

(Research & Development)

delay effect)

(time

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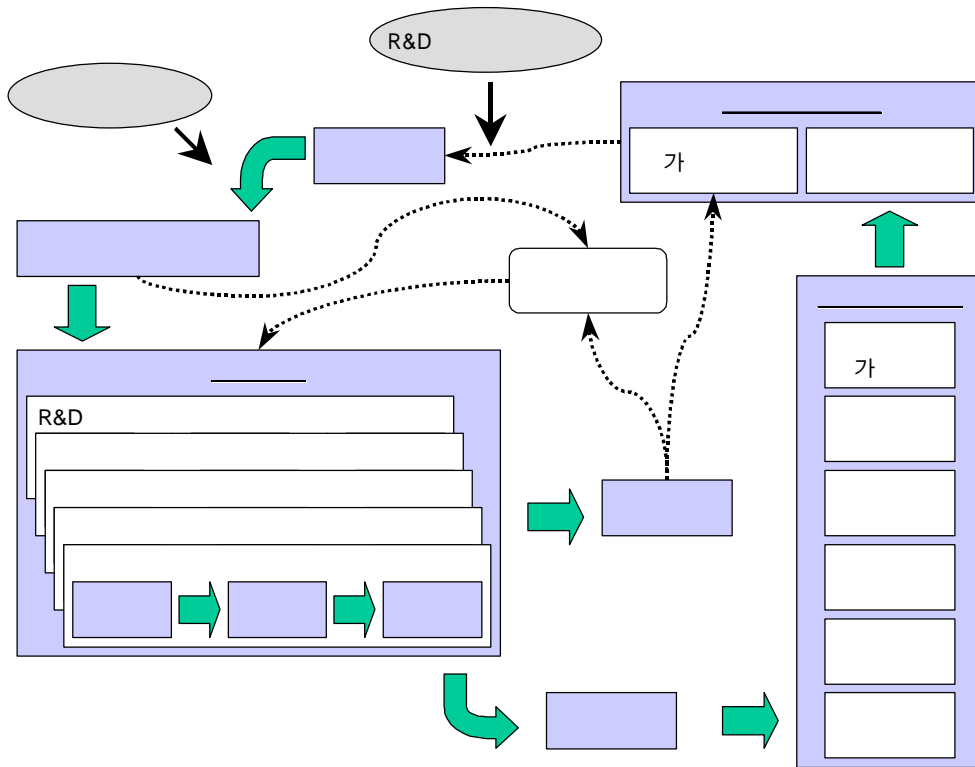
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2.



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3

[1,2]

< 1 >

	● R&D ● ● ● ● ●	
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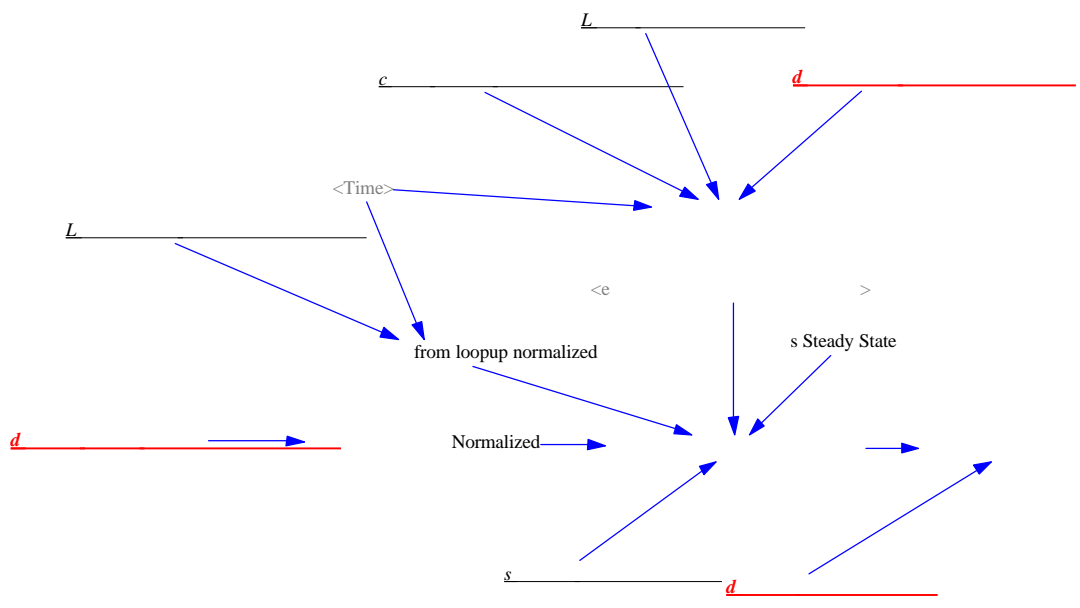
2.2

가 < 2 > (Endogenous Variables) <

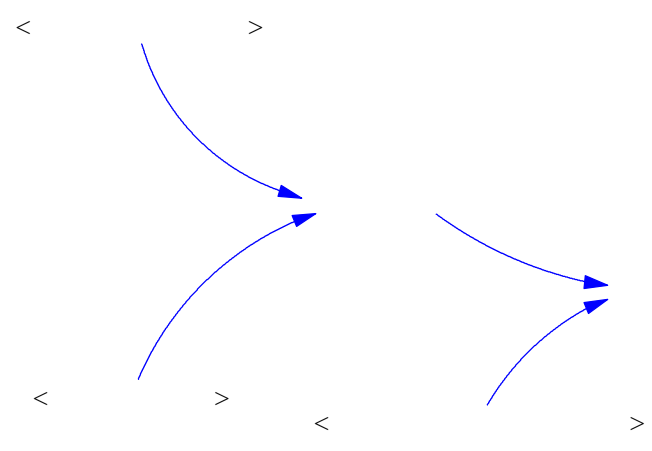
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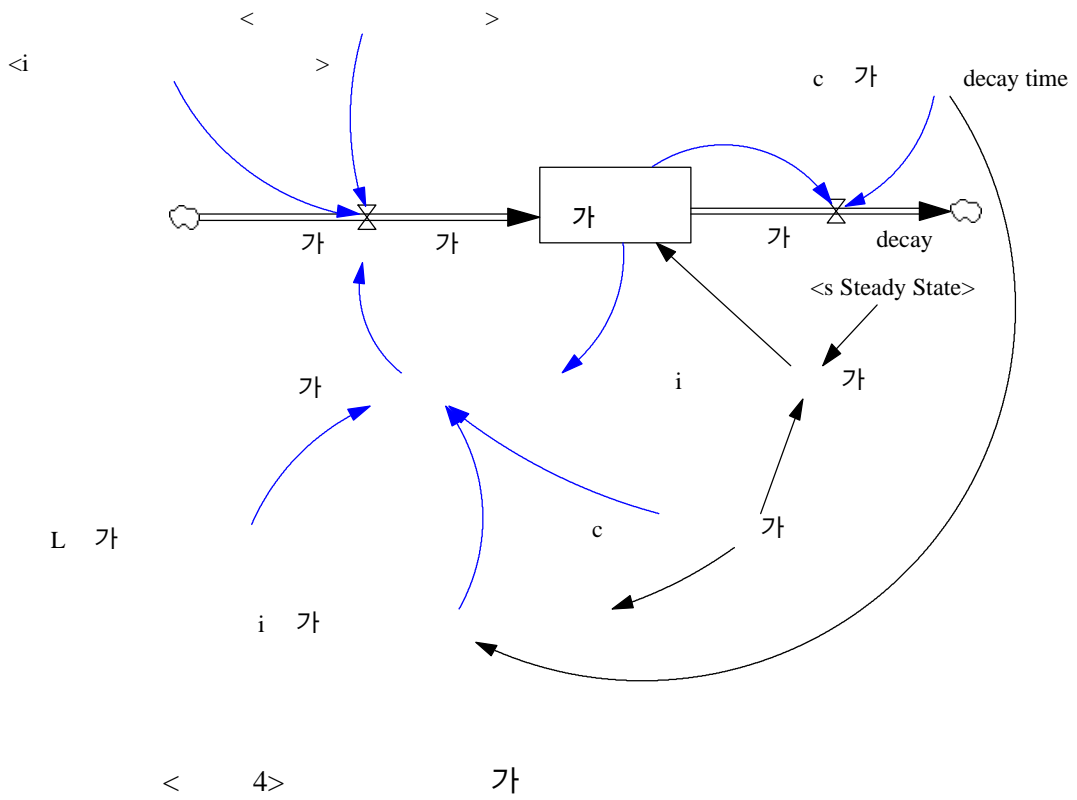


< 3 >

2.3

< 1 > 가 ,
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가 가 < 4>
 가 (Stock Flow Diagram)



2.4 가

가 가 가 < 4> 가 가 . [3]

3.

가 가 가

가 (State Variables) , ()
 (Decision Variables)
 (Decision Variables) 가
 < 2>
 (Steady state)
 가

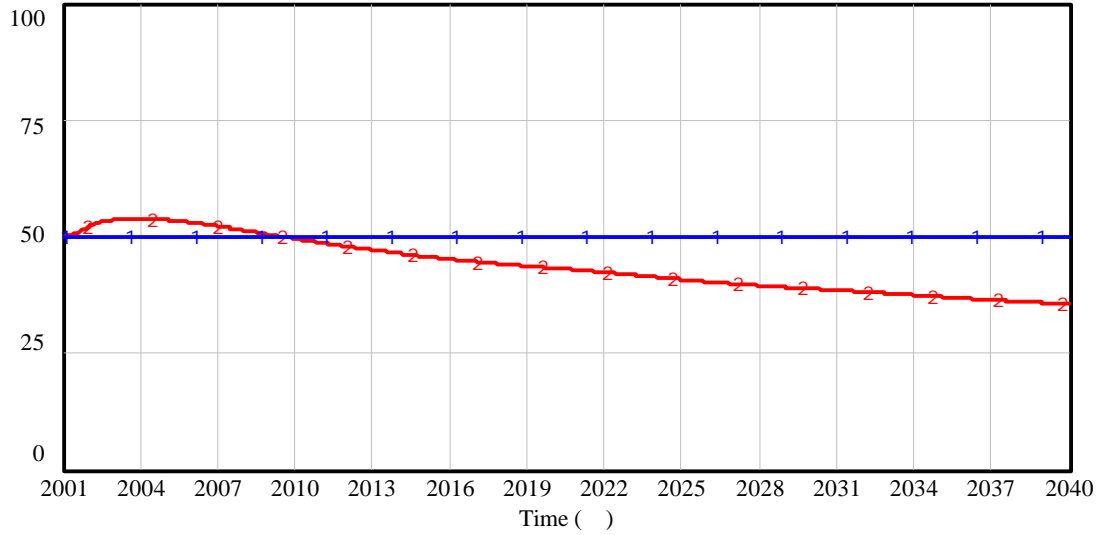
< 2>

Base	(가)	
Step 1		
Step 2		Step 1 가
Step 3		Step 2 가
Step 4		Step 3 가
Step 5		Step 4 가

3.1 (BASE CASE)

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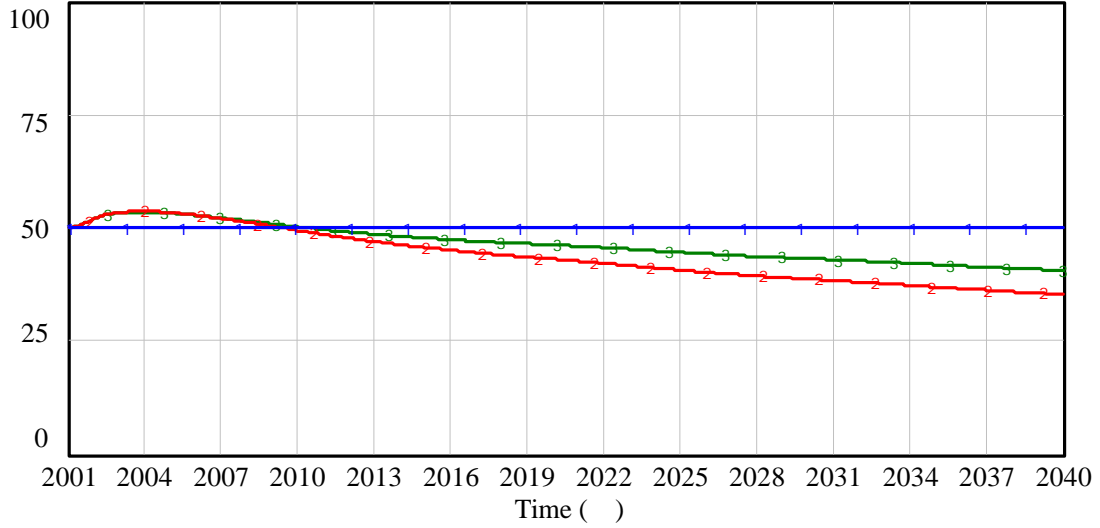
가 : Steady 1 1 1 1 1 1 1 1 1 1 1 1 Index
 가 : Base 2 2 2 2 2 2 2 2 2 2 2 2 Index

< 5> (가)

3.2 (STEP 1, 2, 3, 4 AND 5)

가 , 가 , 가 .
 가 , 가 .
 가 , 가 .
 가 , Step 1 가 .

가

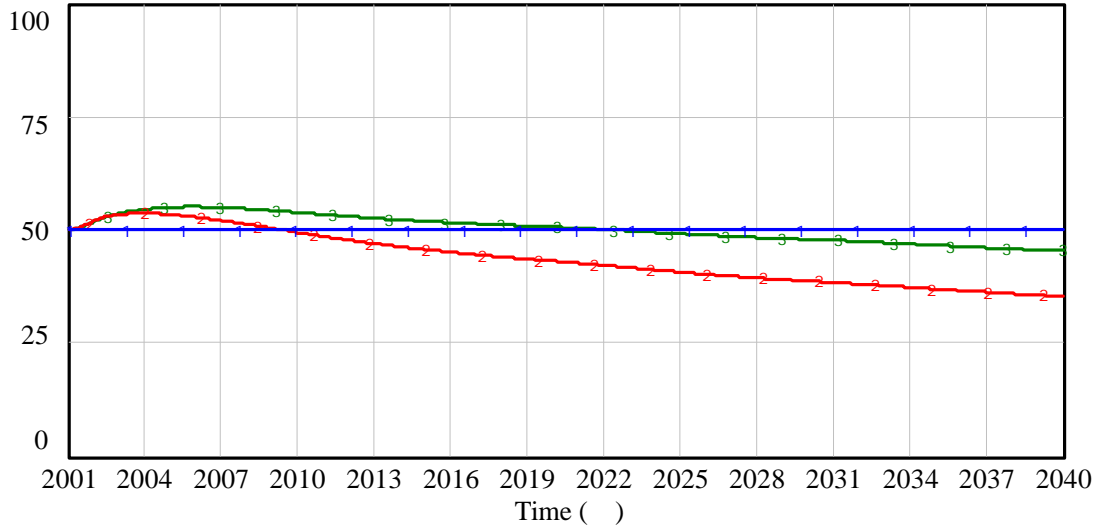


가 : Steady Index
 가 : Base Index
 가 : Step1 Index

< 6> Step 1 (가)

Step 1 , Step 2 Step 2 Step 1
 Step 2 가 , 가
 Step 1 . 가

가



가 : Steady — 1 1 1 1 1 1 1 1 1 1 1 1 Index
 가 : Base — 2 2 2 2 2 2 2 2 2 2 2 2 Index
 가 : Step2 — 3 3 3 3 3 3 3 3 3 3 3 3 Index

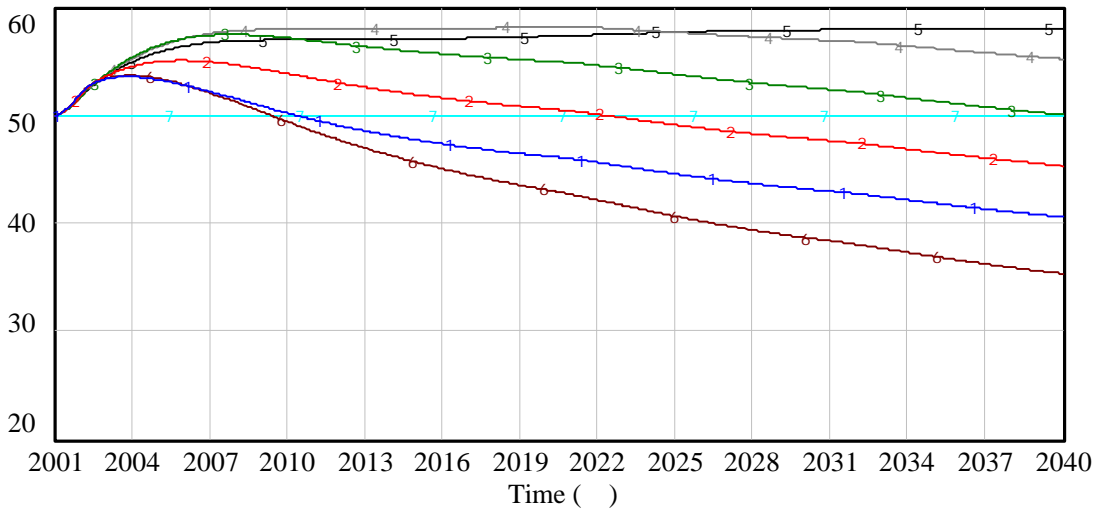
< 7 > Step 2 (가)

5 < 2 > Step

가 가 < 8 > .

Step 5 ,

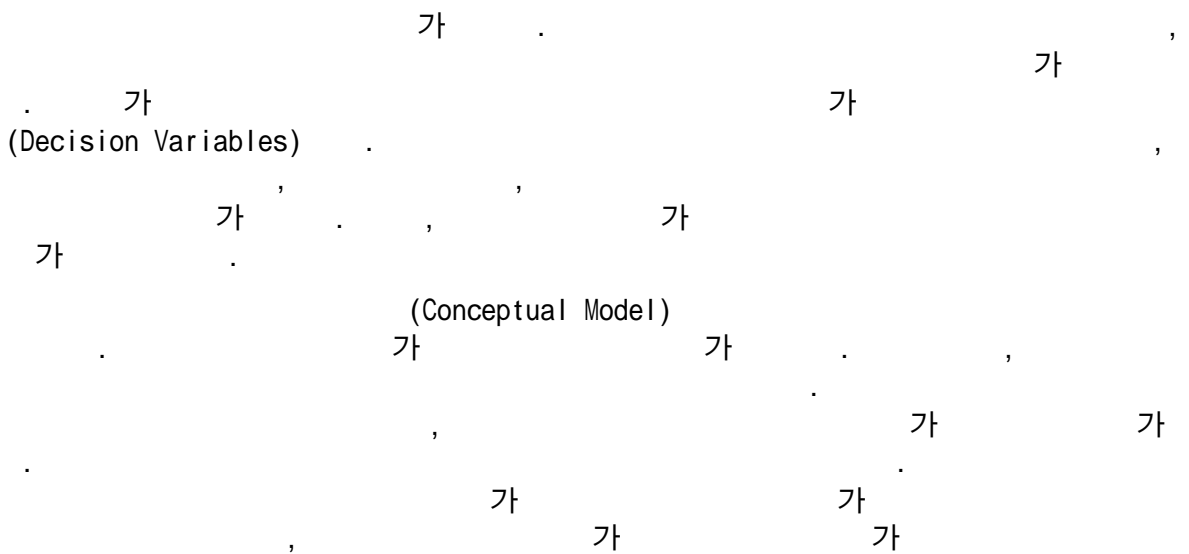
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가 : Step1 1 1 1 1 1 1 1 1 1 1 Index
 가 : Step2 2 2 2 2 2 2 2 2 2 2 Index
 가 : Step3 3 3 3 3 3 3 3 3 3 3 Index
 가 : Step4 4 4 4 4 4 4 4 4 4 4 Index
 가 : Step5 5 5 5 5 5 5 5 5 5 5 Index
 가 : Base 6 6 6 6 6 6 6 6 6 6 Index
 가 : Steady 7 7 7 7 7 7 7 7 7 7 Index

< 8 > (가)

4.





[1] Ahn, N., "A System Dynamics Model of a Large R&D Program", PhD thesis, MIT Department of Nuclear Engineering, Cambridge, Massachusetts, May 1999

[2] Hansen, K., M. Weiss, and S. Kwak., "Allocating R&D resources: a system dynamics approach." Research-Technology Management, July-August 1999

[3] Sterman J. D., "Business Dynamics", McGraw-Hill, 2000