

# Controlling is not enough

## Modeling Process II

401.661 Advanced Construction Technology



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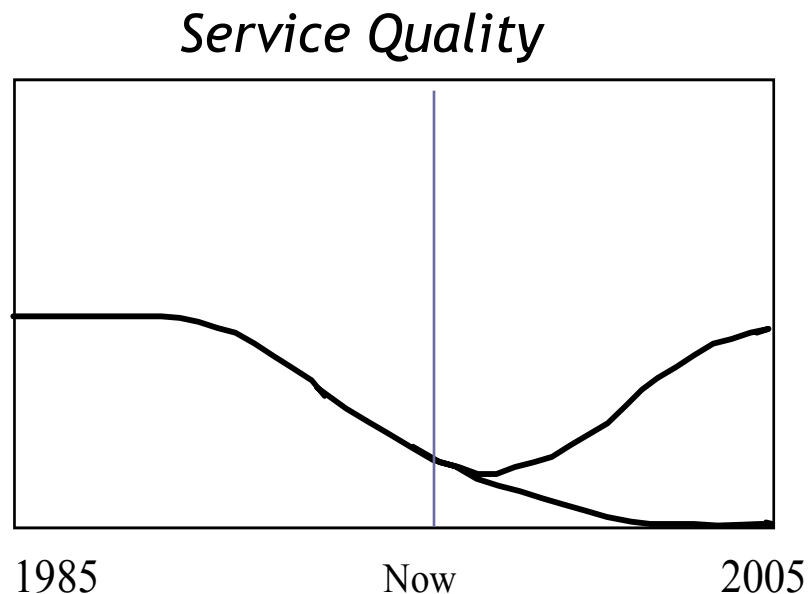
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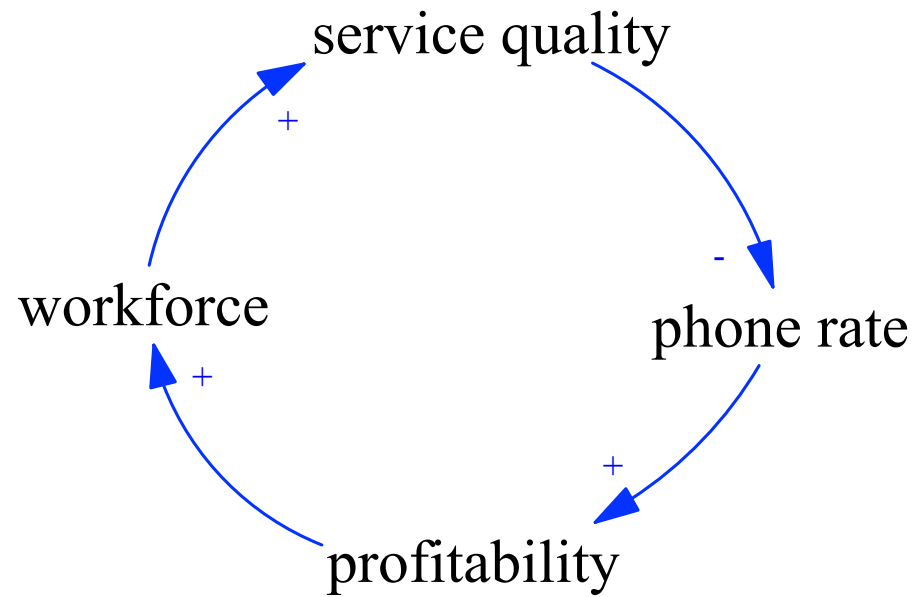
# Modeling Practice I

## Telecommunication Company

# Problem Statements

Recently, the service quality of MStelcom, a leading telecommunication company in Korea, has been declining. In spite of **a series of phone rate adjustments** (past efforts: hints for modeling topic), the company is now facing a danger to lose its customers.





MSTelcom wants to find policies that can turn the situation around.

➔ Then HOW?

# Workers

Fixing Worker



Installations Worker

# Service Quality

- ➔ Complaints
- ➔ Time to Resolve Complaints
- ➔ Attractiveness



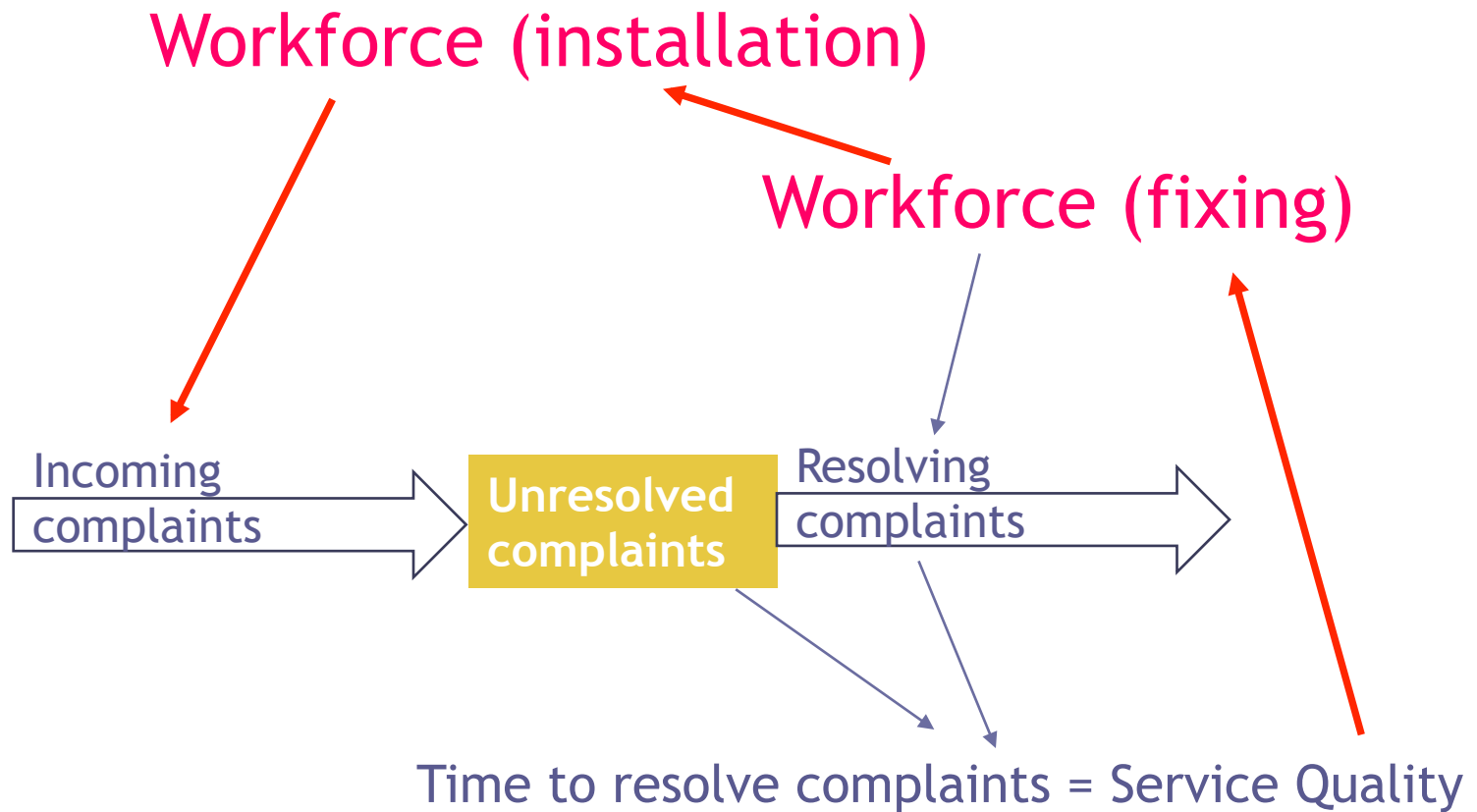
# Modeling Service Quality



Time to resolve complaints =  
**Service Quality**



# Modeling the Tradeoff



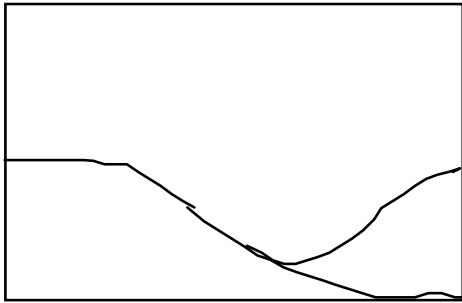
# Variables

- ◆ **Service**
- ◆ **Demand for new phone lines**
- ◆ **Customer needs**
- ◆ **Rates**
- ◆ **Speed of resolving complaints**
- ◆ **Workforce**
- ◆ **Complaints**
- ◆ **Phone lines**
- ◆ **Number of services**
- ◆ **Customer satisfaction**
- ◆ **Workforce morale**
- ◆ **Profits**
- ◆ **Costs**
- ◆ **Points**
- ◆ **Competition**

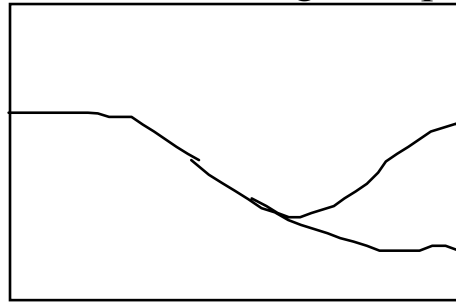
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# Reference Modes

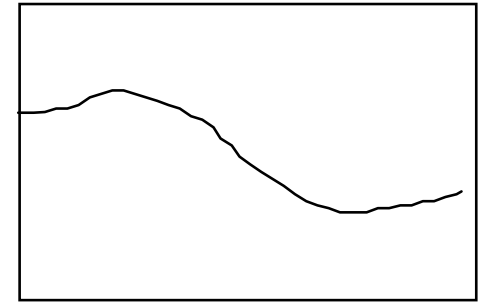
Service



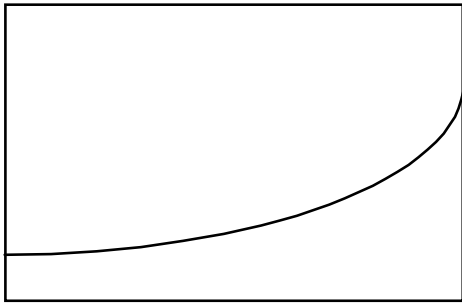
Speed of Resolving Complaints



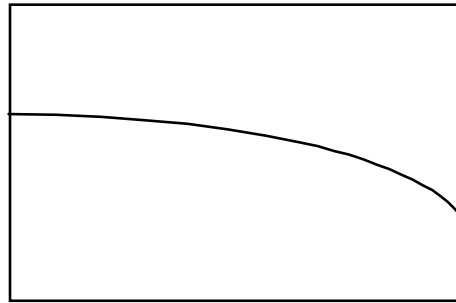
Workforce



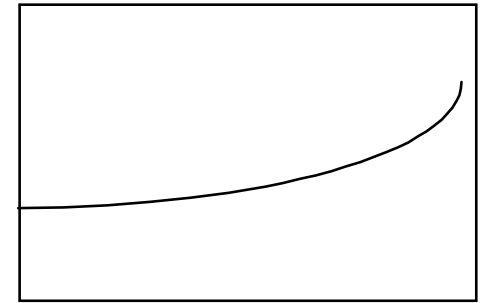
Phone Lines



Rates



Customer Needs



1985      Now      2005

1985      Now      2005

1985      Now      2005

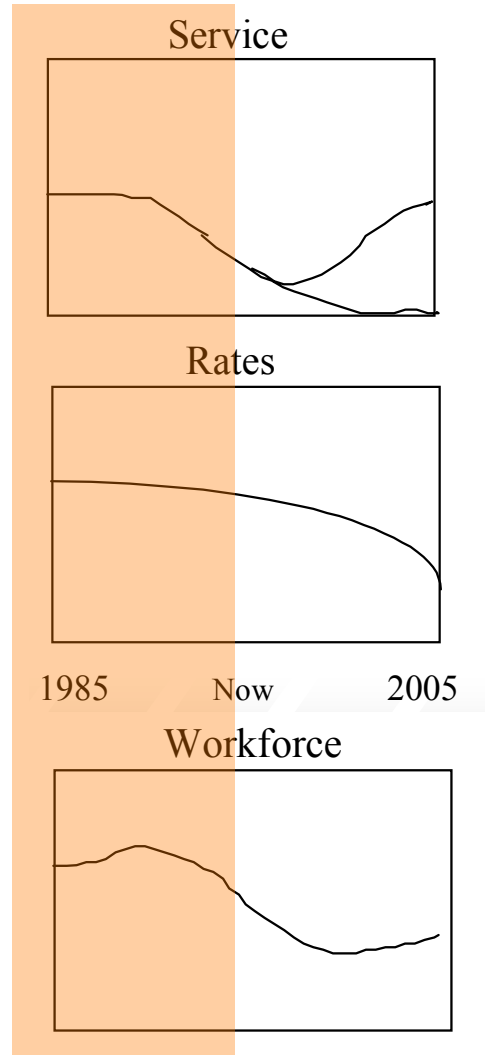
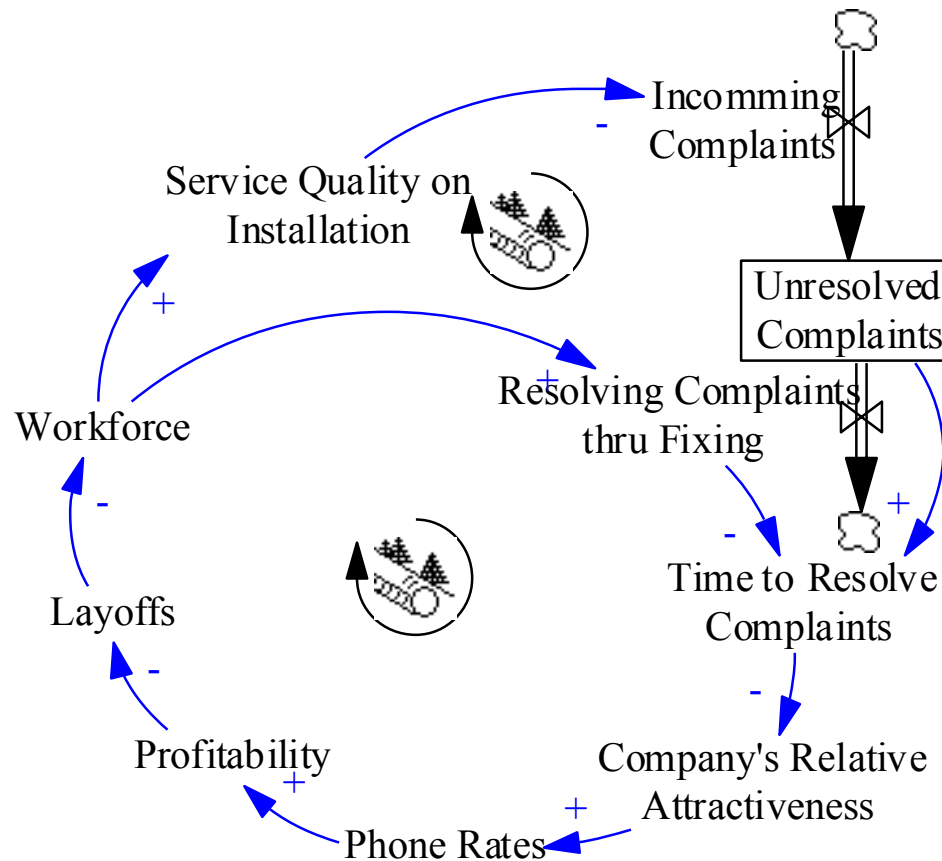
# Momentum Policies

Lay off workers (fixing and installations).

Try to have the company grow faster than the penalties.

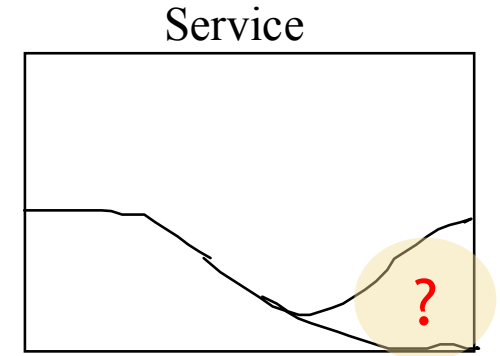
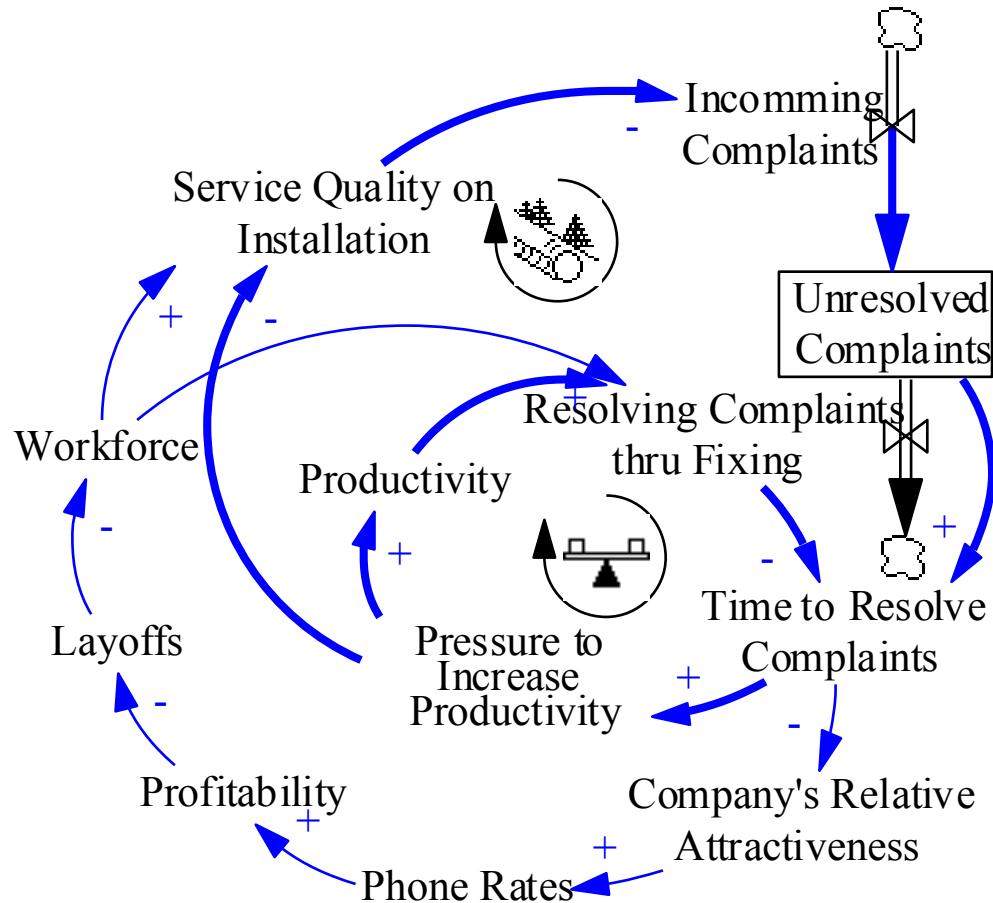
If service stays low, reduce telephone rates even more.

# The Rate-Setters' Error



Given the problem, rate setting relying on the traditional way can cause continuing deterioration.

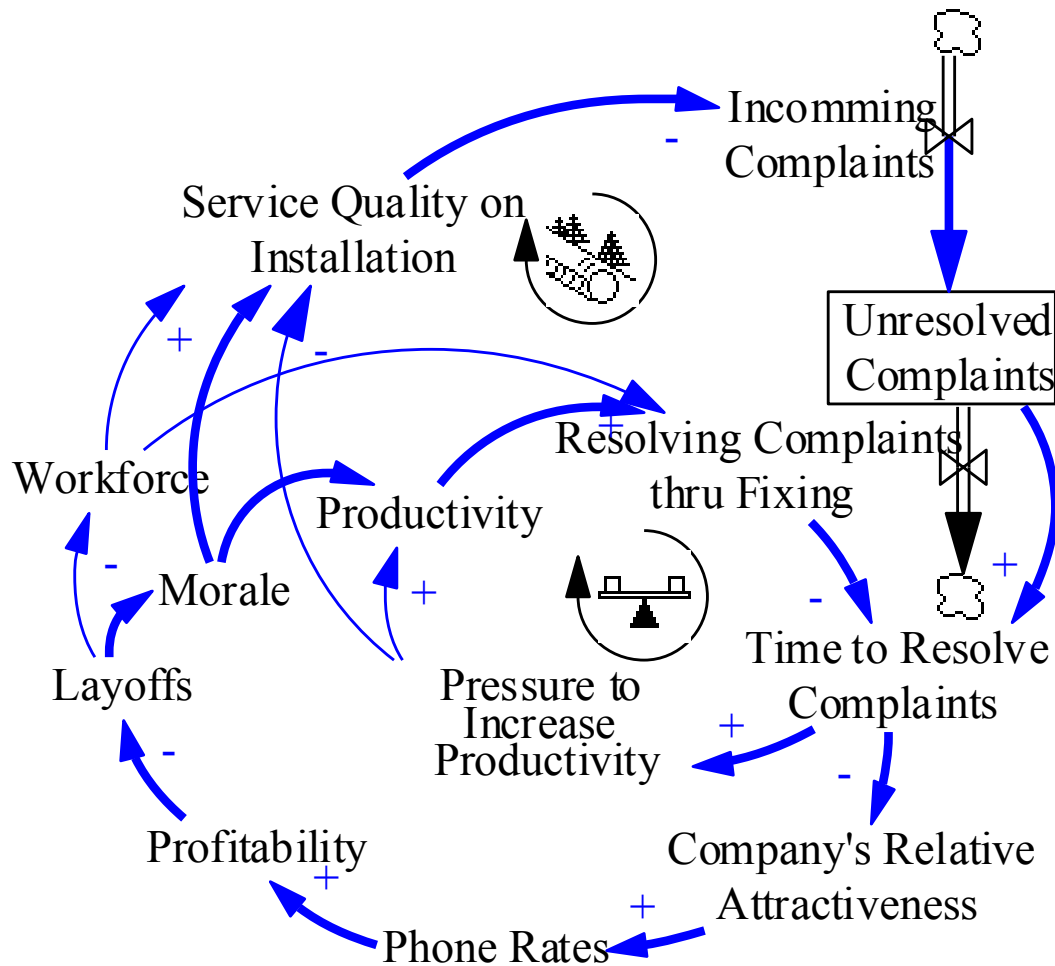
# Focus on Quality and Productivity...



Respond to rate threat by improving quality.

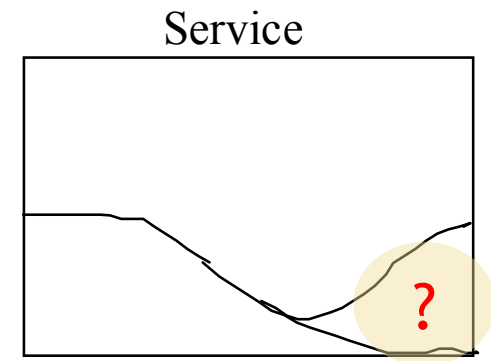
Resist pressure on productivity.

# Compounding via Morale

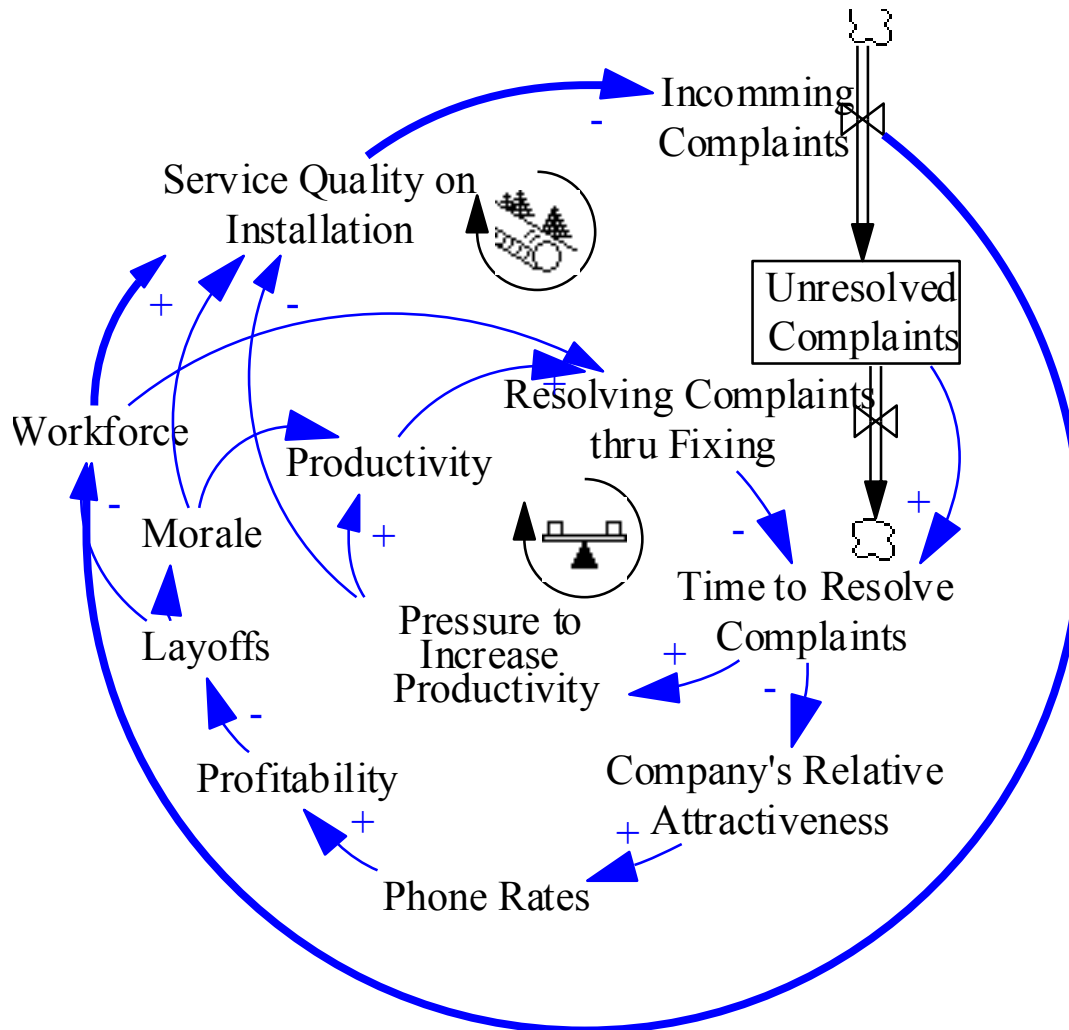


Incentives on good service and productivity

No layoffs

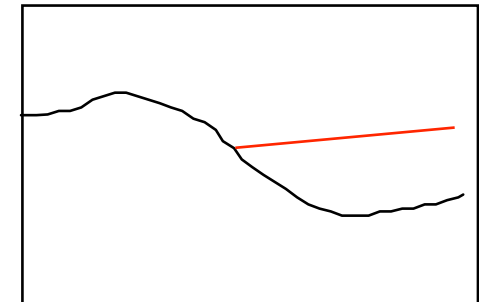


# Even Hire More ...

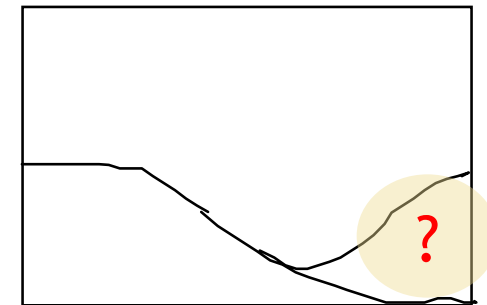


Profits will suffer in the short terms...

Workforce

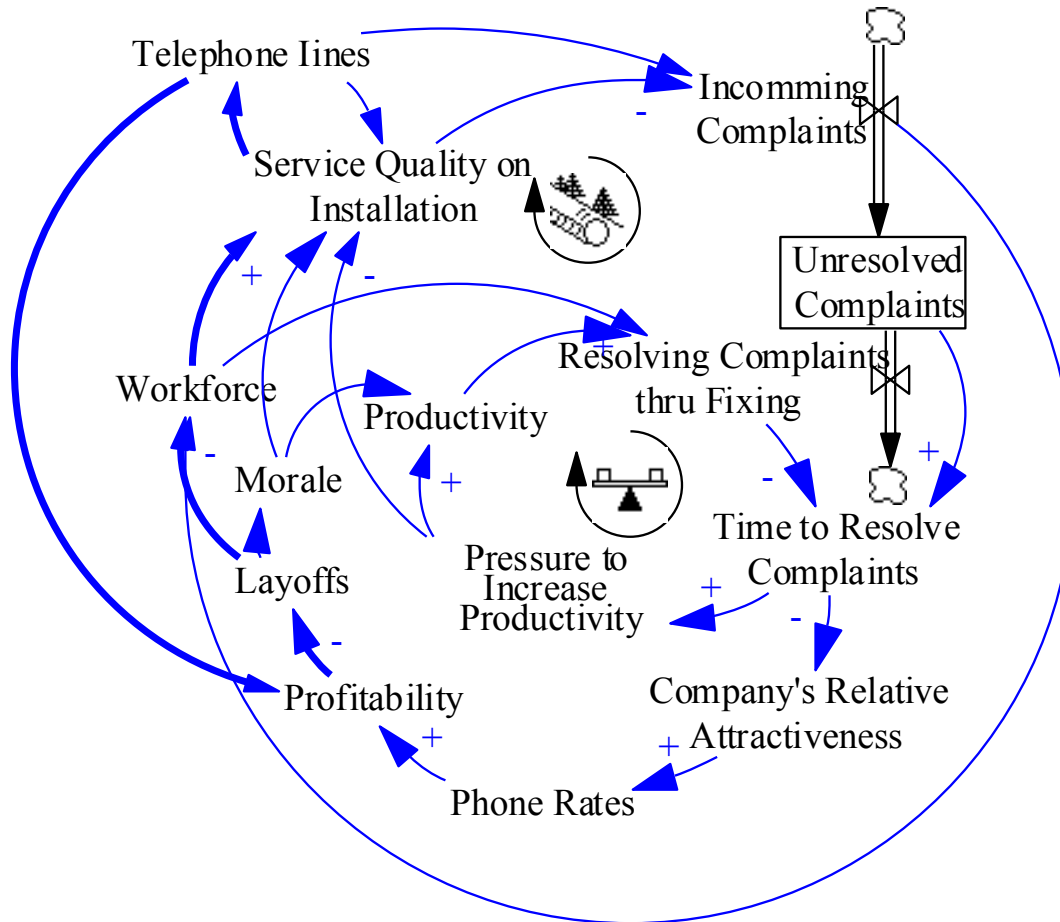


Service

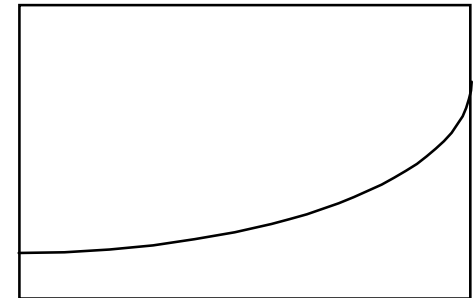




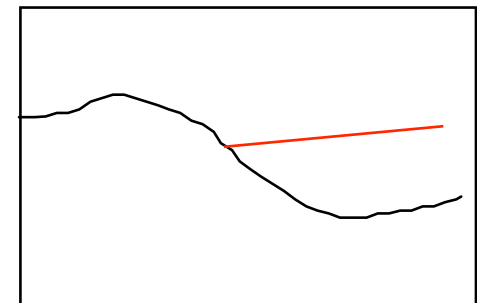
# The company Hopes...



Phone Lines



Workforce



Service



Hiring more people can increase service quality and in turn telephone lines, which increases their profits. ...However...

The diagram illustrates a complex system of causal relationships between various organizational factors. The nodes and their interactions are as follows:

- Telephone Lines** (enclosed in a dashed orange oval) has a positive (+) influence on **Service Quality on Installation** and a negative (-) influence on **Incoming Complaints**.
- Service Quality on Installation** (with a tree icon) has a positive (+) influence on **Workforce** and a negative (-) influence on **Incoming Complaints**.
- Incoming Complaints** (with a cloud icon) has a positive (+) influence on **Unresolved Complaints**.
- Unresolved Complaints** (in a box) has a negative (-) influence on **Resolving Complaints thru Fixing** and a positive (+) influence on **Time to Resolve Complaints**.
- Resolving Complaints thru Fixing** (with a balance scale icon) has a negative (-) influence on **Time to Resolve Complaints** and a positive (+) influence on **Company's Relative Attractiveness**.
- Time to Resolve Complaints** (with a cloud icon) has a negative (-) influence on **Company's Relative Attractiveness** and a positive (+) influence on **Pressure to Increase Productivity**.
- Company's Relative Attractiveness** has a positive (+) influence on **Phone Rates**.
- Phone Rates** has a positive (+) influence on **Profitability**.
- Profitability** has a positive (+) influence on **Layoffs** and a negative (-) influence on **Workforce**.
- Layoffs** has a negative (-) influence on **Morale**.
- Morale** has a positive (+) influence on **Productivity**.
- Productivity** has a positive (+) influence on **Workforce** and a negative (-) influence on **Service Quality on Installation**.
- Workforce** has a positive (+) influence on **Service Quality on Installation** and a negative (-) influence on **Telephone Lines**.
- Pressure to Increase Productivity** (with a balance scale icon) has a positive (+) influence on **Productivity**.

The diagram uses a large blue oval to group the internal organizational factors (Workforce, Morale, Productivity, Layoffs, Profitability, Phone Rates) and a dashed orange oval to group the external factors (Telephone Lines, Service Quality on Installation, Incoming Complaints, Unresolved Complaints, Resolving Complaints thru Fixing, Time to Resolve Complaints, Company's Relative Attractiveness, Phone Rates). The icons (tree, balance scale, cloud) likely represent different types of feedback loops or system dynamics.

# Policies

Start hiring (profits will suffer in the short term).

Introduce incentives on good service and productivity increases.

Do not put newly hired people in line expansion, which is counter to the 'company's hope'. However, our conclusion suggests that the company's hope is dangerous.

Utilize them for resolving customers' complaints:  
Increasing service with slow growth.

# Modeling Practice II

## Prefabrication

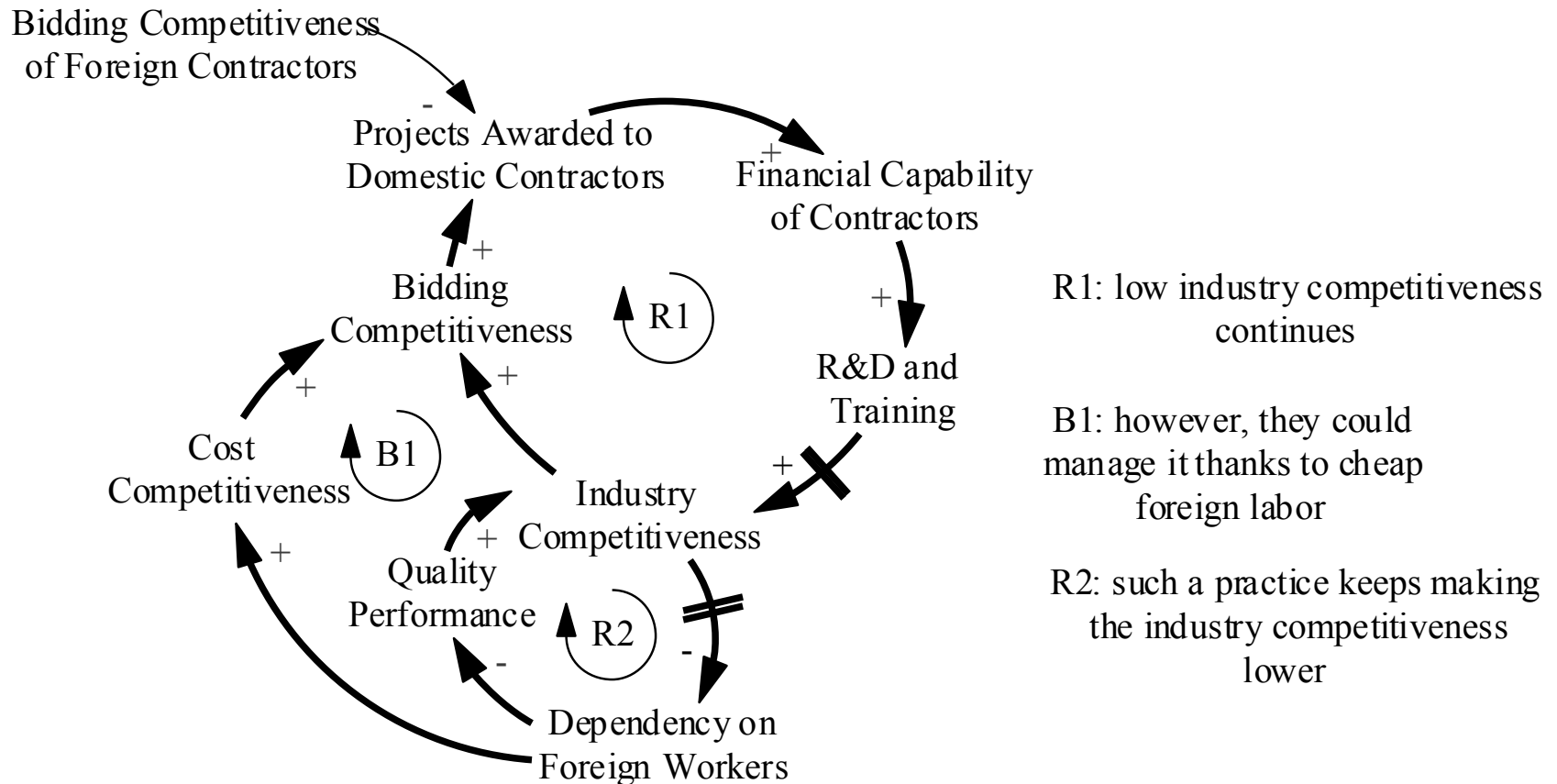
# Problem Statements

Although the prefabrication method has potential advantages over the standard method, private companies have undervalued its advantages and are reluctant to adopt them.

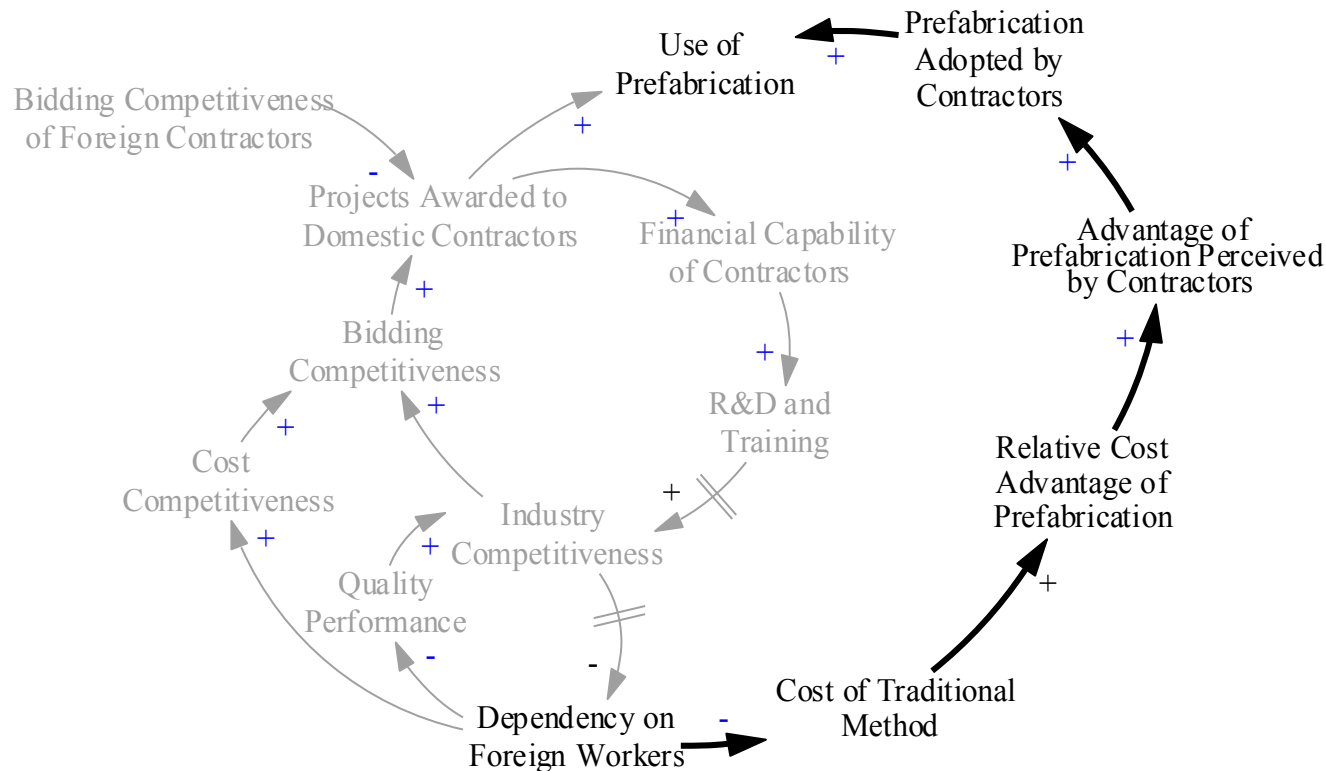
Building and Construction Authority wants:

- to find the drivers that have inhibited prefabricated construction in the private sector and,
- to know how to increase their use of the prefabrication method, by improving the perceived attractiveness of the method.

Why the Singapore construction industry has been dependent on cheap foreign labor instead of using high tech such as the prefabrication method? (think why the government forces the private sector to use PF...probably they think the industry competitiveness)



Dependency on cheap foreign labor has also resulted in less use of PF in the private sector

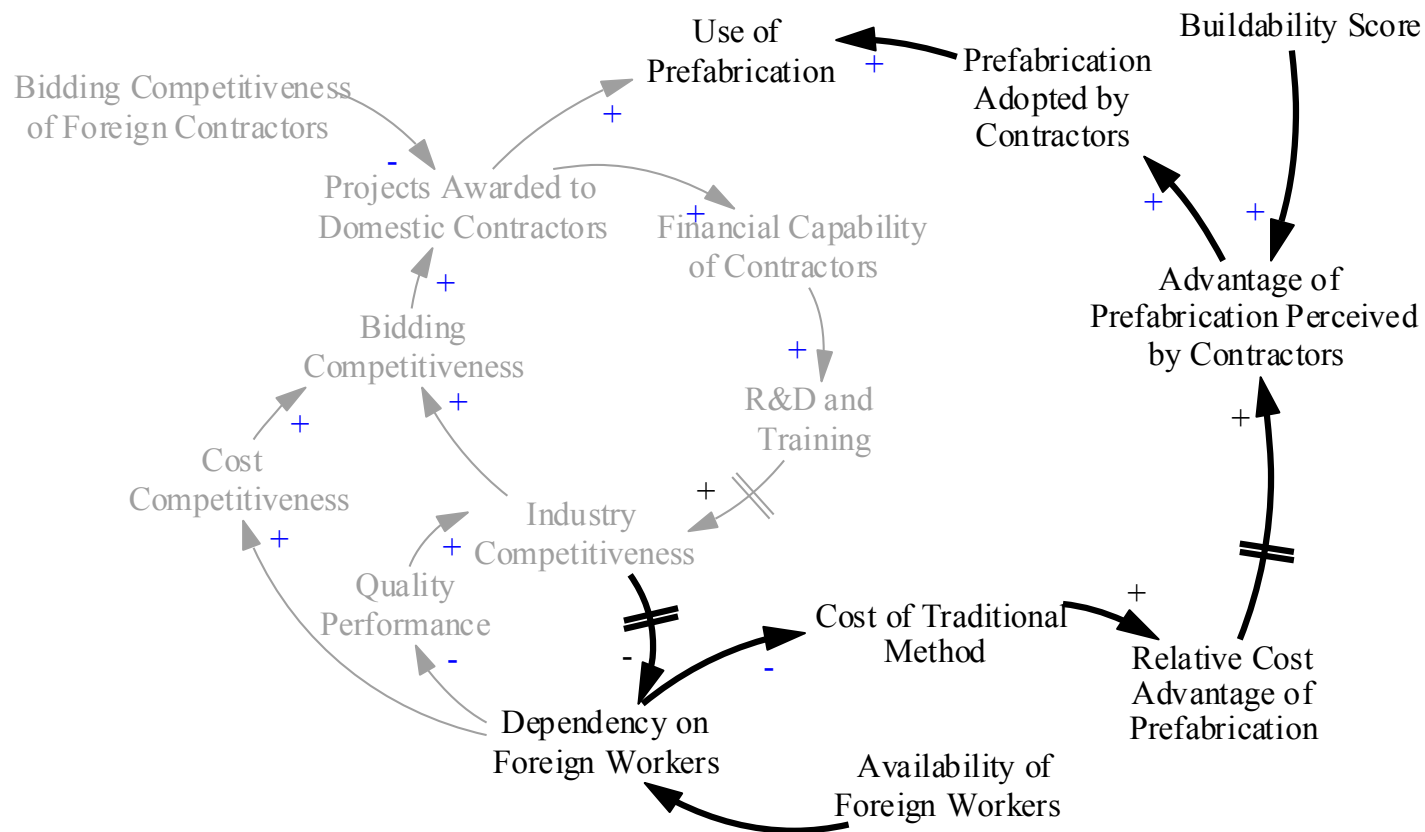


Hypothesis 1: no big gap  
between the real and perceived  
attractiveness of PF

Hypothesis2: PF has higher quality,  
less diversity, less advantage  
compared to foreign workers

Hypothesis3: not considering foreign workers can result in even higher costs and delays during project execution.

Hypothesis4: use of PF can increase tech competitiveness

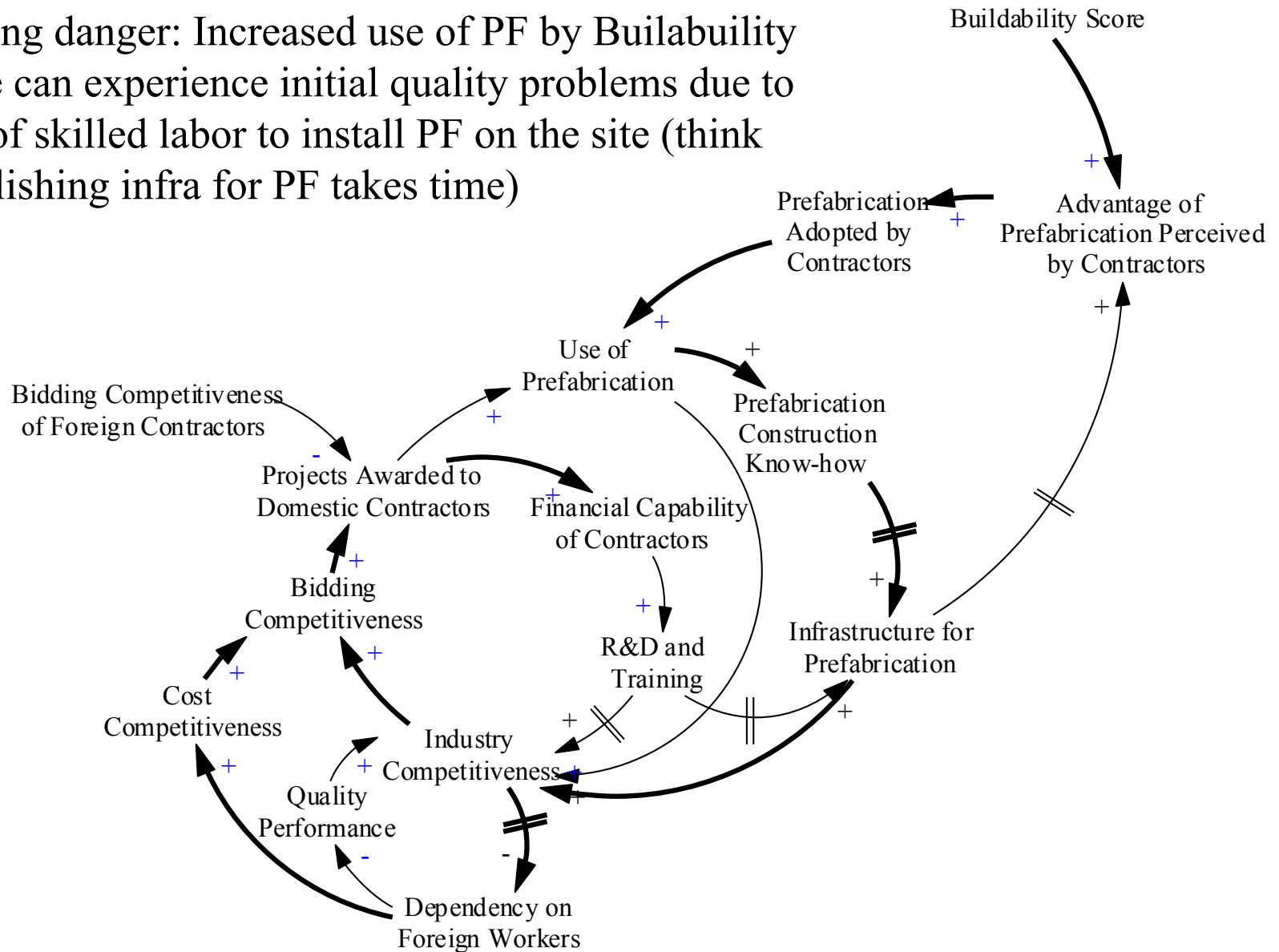


**Policy Implication 1.** Limiting Availability of Foreign Workers: will work but takes time due to significant time delays

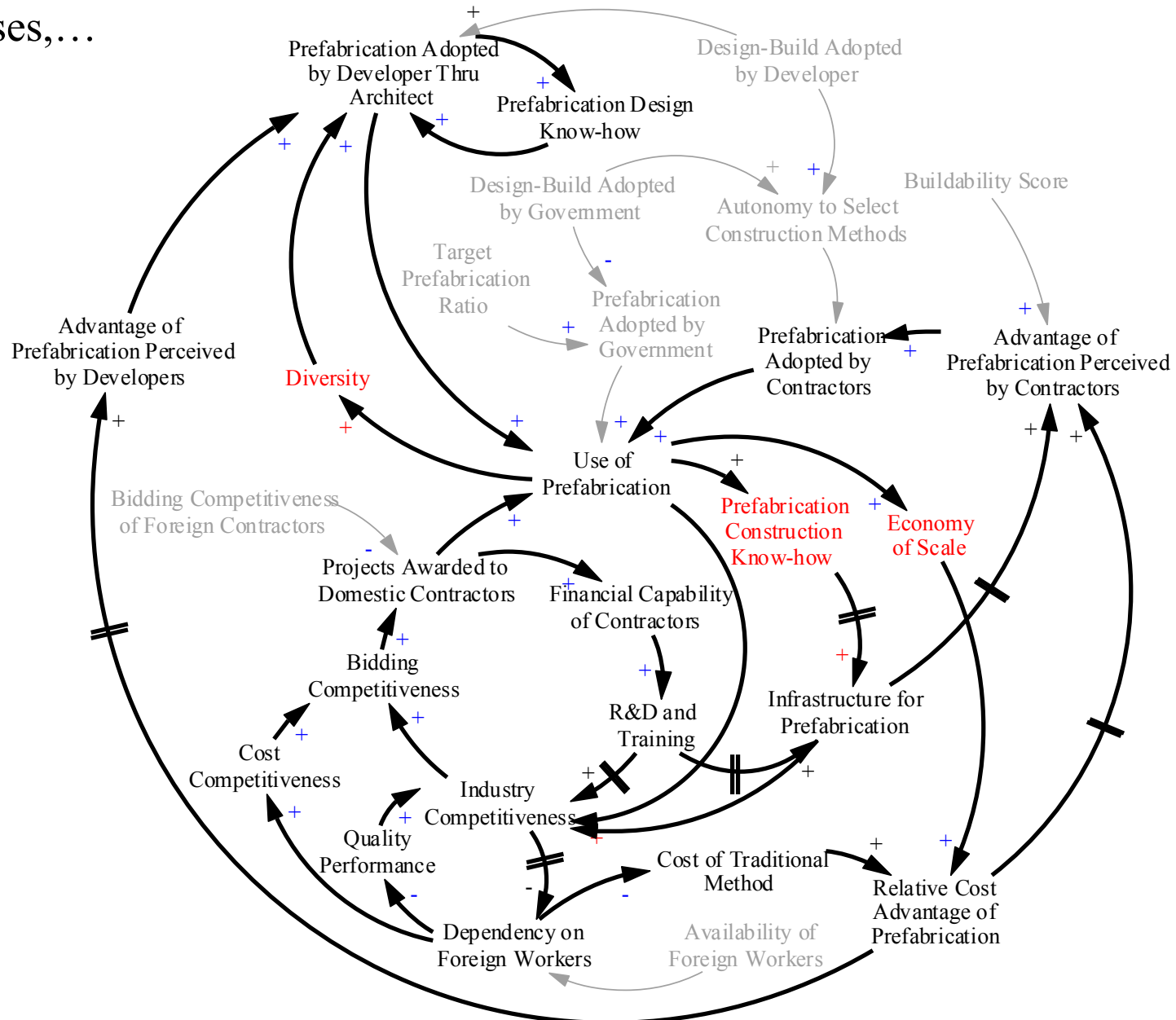
**Policy Implication 2:** Regulating the buildability Score: will work but...



Lurking danger: Increased use of PF by Builability Score can experience initial quality problems due to lack of skilled labor to install PF on the site (think establishing infra for PF takes time)



Once the use of PF increases,...



# References

- Avraham Shtub, Jonathan F. Bard, Shlomo Globerson, "Project management : engineering, technology, and implementation", Englewood Cliffs, NJ, Prentice Hall, 1994
- Frederick E. Gould, Nancy Joyce, Chapter 8, "Construction project management", Upper Saddle River, NJ, Prentice Hall, 1999
- James M. Lyneis \*, Kenneth G. Cooper, Sharon A. Els, "Strategic management of complex projects: a case study using system dynamics", System Dynamics Review, Vol. 17, No. 3, 2001
- Christopher M. Gordon, "Choosing appropriate construction contracting method", J. of Construction Engineering & Management, Vol. 120, No. 1, 1994
- Feniosky Pena-Mora, Jim Lyneis, "Project control and management", MIT 1.432J Lecture Material, 1998
- Barrie, D.S., and Paulson, B.C., "Professional Construction Management", McGraw Hill, 1992
- Halpin, D.W., "Financial and Cost concepts for construction management", John Wiley & Sons, 1995
- Yehiel Rosenfeld, "Project Management", MIT 1.401J Course Material, 2000
- Sarah Slaughter, "Innovation in construction", MIT 1.420 Course Material, 1999
- Chan, Albert P. C.; Ho, Danny C. K.; Tam, C. M., "Design and Build Project Success Factors: Multivariate Analysis", J. of Construction Engineering & Management, Vol. 127, Issue 2, 2001