Supply Chain Management: A Learning Perspective

Chapter 2 Learning and Learning Perspective

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Key Learning Points

- Learning in operations is a process through which the company identifies, analyzes, and internalizes complex cause-and-effect relationships among key factors in management.
- Learning capability is the company's ability to enhance its performance through applying its understanding of those cause-and-effect relationships to solving real-world managerial problems.
- Three representative operations or managerial capabilities are controllability (i.e., efficiency), flexibility, and integrating capability.
- There is a tradeoff relationship between efficiency and flexibility.
- It is the integrating capability that enables the company to mitigate the tradeoff.
- Chain of capability postulates that three capabilities, basic – process – system-level capability, are dynamically linked with each other.
- The principle 'chain of capability' helps the manager understand and reconcile the contrasting relationship between incremental and radical changes in the organization.

1. A LEARNING ORGANIZATION'S PERSPECTIVE

- Learning is an essential part of any creative activity.
  - It is also a word many people use for a variety of different purposes and/or in a variety of different contexts.
- We define learning in operations as a process through which the manufacturing system (i.e., a company) identifies, analyzes, and internalizes complex cause-and-effect relationships among key factors in operations.
  - Learning capability is the manufacturing system's ability to enhance its performance in operations through applying its understanding of those cause-and-effect relationships to solving problems in operations (e.g., manufacturing or service management).
- An example in Figure 2.1, where the firm tries to find out why its operations performance is unsatisfactory.

1. A LEARNING ORGANIZATION'S PERSPECTIVE

- 1.1. Single-loop versus double-loop learning
  - Figure 2.2 shows a short-term learning, where the organization tries to fix the symptoms without tackling more fundamental causes of the problem.
  - Figure 2.3 depicts the double-loop learning that is directly attacking the root causes of the problem.
- Integrated learning (Figure 2.4)
  - Should a company direct its effort to single-loop learning only at the expense of double-loop learning, or vice versa?
  - A truly capable company ought to integrate the two types of learning in a balanced way – it should be able to concentrate on either type, alternately depending on the problem context.
  - A capable company should retain flexibility to comfortably engage in any type of learning the context deems.

1. A LEARNING ORGANIZATION'S PERSPECTIVE

- 1.2. Learning propensity model
  - In the mid-1990s, while conducting a comparative study on two shipbuilding companies in Korea,
    - An intriguing observation: despite the fact that the two companies shared much in common in terms of their historical, geographical, and structural characteristics, their strategies to solve operational problems were very different.
    - The research focus shifted from identifying factors for operational efficiency to explaining such a counterintuitive discrepancy between the two firms' learning strategies.
  - Single-loop learning: In Figure 2.5, the cycle of "learning propensity ➔ perceived effectiveness ➔ optimal dynamics (resource allocation and implementation) ➔ realized effectiveness ➔ reinforced learning propensity," which repeats continuously in the short run.

1. A LEARNING ORGANIZATION'S PERSPECTIVE

- 1.2. Learning propensity model
  - Single-loop learning
  - Double-loop learning – the more serious learning cycle of attempting to redirect or modify determining factors
    - Once the single-loop learning has repeated for a relatively long period of time, it will be extremely difficult to change the dynamics by simply attempting to curb the negative single-loop learning process only.
    - It is also affected by such dynamic inertia as chaos, path-dependence, administrative heritage, and so forth.
    - Now, should tackle the determining factors – to modify top management's will, the system's infrastructure or logistical mechanism, and/or other relevant factors of any fundamental belief systems

1. A LEARNING ORGANIZATION'S PERSPECTIVE

- In-depth Concept 2.1: on-shop versus off-shop problem solving

	On-site (on-shop) approaches	Off-site (off-shop) approaches
Pros	- System-specific solutions - Utilizing internal expertise - Avoiding leakage of knowledge	- Avoiding interruption of operations - Utilizing wide range of expertise - Developing generalizable solutions
Cons	- Interrupting the on-going operations - Solutions with limited applicability	- Difficulty in maintaining fidelity - Excessive lead-time

1. A LEARNING ORGANIZATION'S PERSPECTIVE

- 1.3. Parsimony versus sufficiency
  - Two conceptual criteria that a CEO can contemplate when thinking about an optimal amount of information for effective decision-making: sufficiency and parsimony.
  - Sufficiency criterion ➔ the CEO must have enough information so that she won't omit any critical factors when making a managerial decision, i.e., the more information the better.
  - Parsimony criterion ➔ since processing information incurs costs, the CEO must utilize as little information as the decision environment permits, i.e., the less the better.
  - In a real-world environment, the CEO should not solely rely on either rule at the expense of the other ➔ Balancing between the two criteria is important (Figure 2.6)

2. LEARNING IN OPERATIONS

- **Operations learning** as the process of
  1. Identifying and understanding the complex cause-and-effect relationship between critical factors in operations
  2. Generating operations knowledge based on that understanding
  3. Applying the knowledge to solving problems in operations to enhance the operations performance and to further improve the capability of identifying and understanding the cause-and-effect relationship.

2. LEARNING IN OPERATIONS

- Key components.
  - Learning is a process
  - Understanding the complex cause-and-effect relationship Generating operations knowledge
  - Applying the knowledge to solving operations problems
  - Improving performance and capability
- Figure 2.7 depicts the learning process
  - A closed loop comprised of continuous feedback interactions
  - It itself consists of successive cause-and-effect relationships

3. DYNAMIC OPERATIONS AND KNOWLEDGE DEVELOPMENT

- Figure 2.9: a static versus dynamic view of operations management*

Static OM	*Dynamic Approach*
• Known production technology; no need for internal organizational learning or research; "one optimal way"	• Knowledge not consumed by use; not automatically generated by experience ⇒ need to manage/control
• Labor's role: performing procedures; 'procedure'=defined set of actions; management=specify procedure and monitor	• Learning must be intertwined with production
• Known and stationary environment; product markets, input markets, workers, machines=deterministic + unchanging	• Contingencies due to gaps in knowledge about the internal and external world
• Homogeneous inputs: labor, raw materials, ……; standardized and available in complete markets	• Problem solving: fundamental in OM; identify and solve the problems that lead to pinpoint contingencies; implications for control = focus on contingencies and related problems
• Known goal/purpose/objective function: well-defined	

* Jaikumar, R. and R. E. Bohn (1992). A dynamic approach to operations management: An alternative to static optimization. International Journal of Production Economics, 27 (3), 265-282.

4. LEARNING PROPENSITY MODEL II

- Figure 2.5 shows the learning propensity model (LPM) ➔ based on it, we further developed LPM II (Figure 2.10)
  - LPM II has a formal mechanism to evaluate the validity of the current learning (i.e., dynamics of the original learning propensity) and thus to enable the company to decide whether to halt an undesirable dynamic or vicious circle.
  - It provides the company with flexibility in sustaining its learning process; far easier to brake a vicious cycle before than after it is solidly formed; preemptive intervention costs much less than ex post fixing.
  - By changing the course of a potentially damaging propensity among its managers, the company increases its chance to learn in the right direction.
  - How to determine whether a certain learning propensity would be eventually helpful or detrimental to the company ➔ to learn how to learn in a simulated, as well as actual, environment; a constant learning-and-updating process

4. LEARNING PROPENSITY MODEL

- **Learning and SCM:** Why and how learning is related to supply chain management?
  - Coordination between strategic supply chain partners is the key to successful implementation of various initiatives for effective SCM and such coordination cannot be forged without mutual learning between the partners.
  - Building a relationship that facilitates the coordination between strategic partners is the process of learning, learning from each other as well as learning how to solve supply chain problems together more effectively.

5. SCM AND OPERATIONS CAPABILITY

- The company should have strong operations capabilities in order to implement its supply chain strategy effectively.
- Two perspectives , horizontal and vertical, that help us understand essential characteristics of operations capability.

5. SCM AND OPERATIONS CAPABILITY

- 5.1. Horizontal perspective: controllability, flexibility, and integrating capability
  - Three representative capabilities: controllability (i.e., efficiency), flexibility, and integrating capability
  - Controllability: ability to control the firm's processes so that it can attain an enhanced level of efficiency, e.g., to achieve a high conformance quality
    - One important source of controllability ➔ economies of scale
  - Flexibility: ability to be nimble to deal with uncertainties in the market
    - Essence of flexibility is "responsiveness" to diverse market demands.
  - Important for the firm to have both controllability and flexibility: to be competitive in the market, the firm needs both efficiency and responsiveness at the same time.
    - But, there exists an inverse relationship between controllability and flexibility. (Figure 2.11)

5. SCM AND OPERATIONS CAPABILITY

- 5.2. Effects of integrating capability on the tradeoff
  - Integrating capability: ability for the company to shift its capability curve so as to mitigate the tradeoff between controllability and flexibility (Figure 2.11)
  - Long-term dynamics
    - Possible to improve controllability (efficiency) and flexibility simultaneously by developing integrating capability
    - Example: BMW case in Figure 2.12 ~ 2.14
  - Caveat: although in the long-run the company can overcome the tradeoff between capabilities as long as it enhances its integrating capability, that doesn't mean that the company can ignore the short-term tradeoff completely.
    - Unless the company deals with the short-term tradeoff successfully, it might not be able to improve its integrating capability in the first place.
    - Not whether to manage both short-term and long-term capability dynamics, but how to balance both dynamics optimally

5. SCM AND OPERATIONS CAPABILITY

- 5.3. Vertical perspective: chain of capability – basic, control, and system capability (Figure 2.16)
  - Chain of capability
    - Basic capability: consisting of the most elementary knowledge and skills a company must have, e.g., employees' general understanding of production processes, quality, safety, quantitative skills, economic and engineering concepts, and cultural aspects
    - Control (or process) capability: coupled with a particular process or processes, more focused and clearly attached to a certain process or processes, "less general"
    - System capability: company's capacity to meet the customers' demands for the attributes of the final products such as high quality, diverse product lines, high delivery speed, and responsive after-sales services
  - Interrelationship between capabilities
    - The company can expect to have a satisfactory level of system capability only when its control capabilities for the production processes are well developed, which in turn need to be firmly based on the basic capability.

5. SCM AND OPERATIONS CAPABILITY

- 5.4. Incremental versus radical improvement
  - Conflict between radical and incremental improvement?
  - An integrated framework to reconcile the potential conflict
    - There are both incremental and radical elements in a company's innovation or improvement dynamics (Figure 2.18)
    - Since it takes a long-term, sustained effort to build basic capability, the company might observe only "incremental improvement" in basic capability over time.
    - An accumulation of incremental improvements in basic capability will help the employees enhance their process or system capability in a discontinuous, radical manner.
  - The more critical issue is not whether a company focuses more on a particular type of improvement, but on how it harmonizes the two different types of improvement in order to optimize its operations performance

Discussion questions

1. Can you define a learning organization?
2. Why is it important to take a learning perspective in studying supply chain management?
3. Explain and compare single-loop and double-loop learning.
4. What is the learning propensity model (LPM)?
5. Can you suggest a case to which you can apply the LPM to analyze a managerial problem?
6. What are the major differences between static and dynamic operations management? Why do you think such differences occur?
7. Define controllability, flexibility, and integrating capability, respectively. Why do you think there is a short-term tradeoff relationship between capabilities? Is there such a relationship in the long run? Why or why not?
8. Explain the concept of chain of capability. In what ways is it different from the horizontal model consisting of controllability, flexibility, and integrating capability?
9. Define radical and incremental improvements. Which one do you think is more realistic for your (future) business? Explain why.
10. Explain how you can reconcile the two different improvement patterns by using the chain of capability.

Figure 2.1 Example of cause-and-effect analysis for learning

(a)

Poor Performance?

(b)

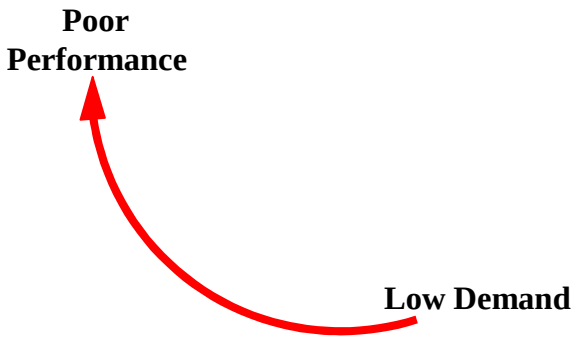

Figure 2.1 Example of cause-and-effect analysis for learning

(c)

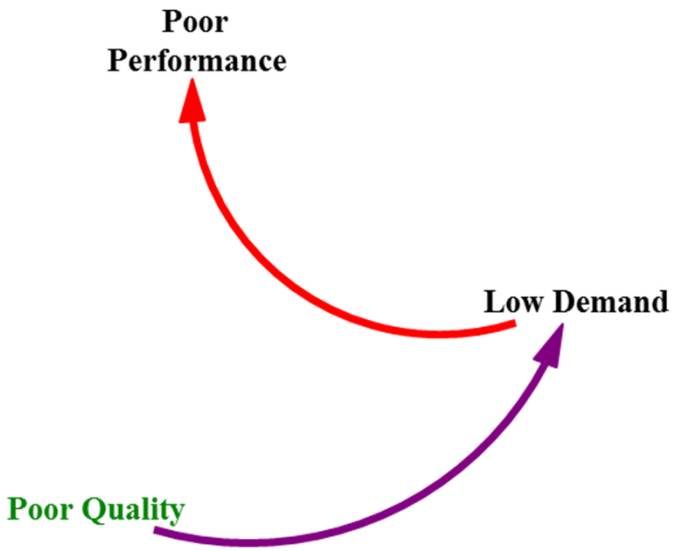

Figure 2.1 Example of cause-and-effect analysis for learning

(d)

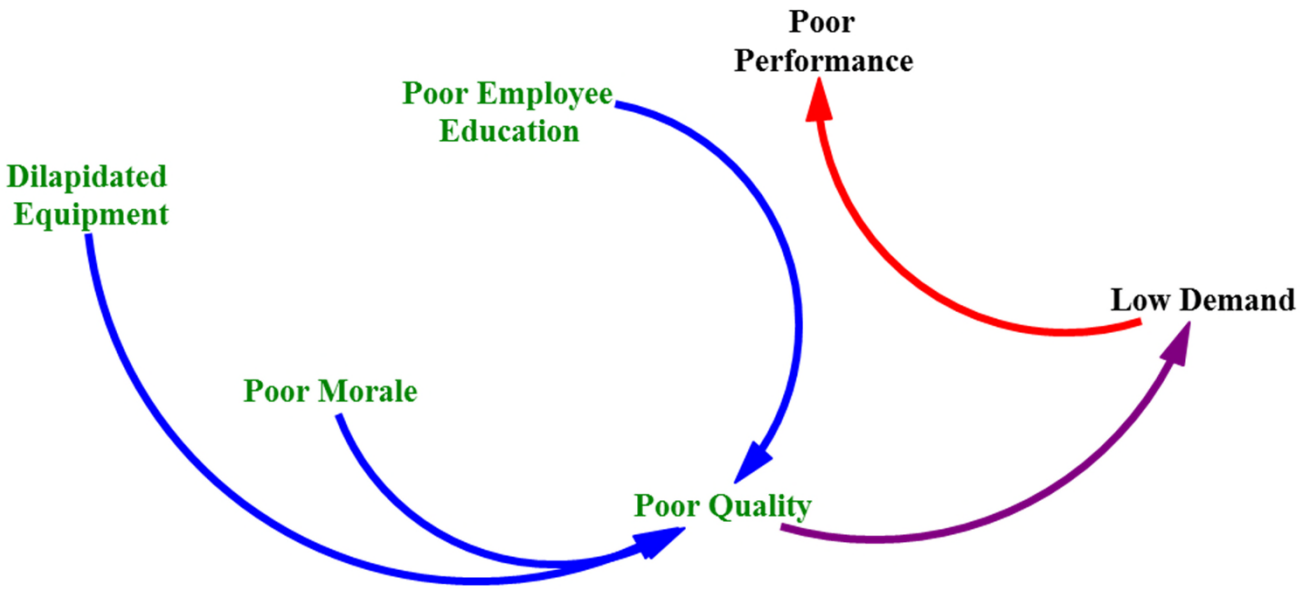

Figure 2.1 Example of cause-and-effect analysis for learning

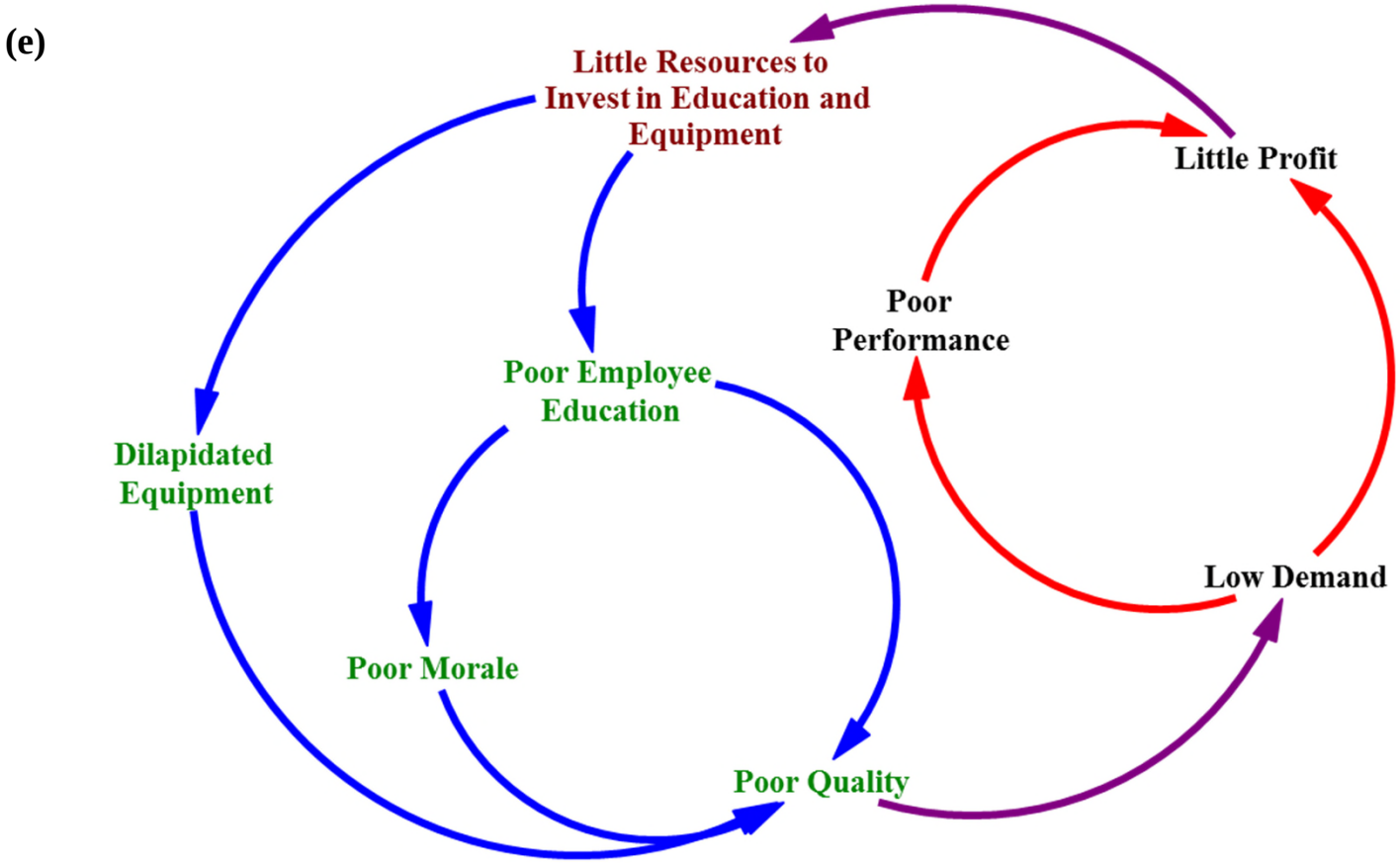

Figure 2.2 Single-loop learning

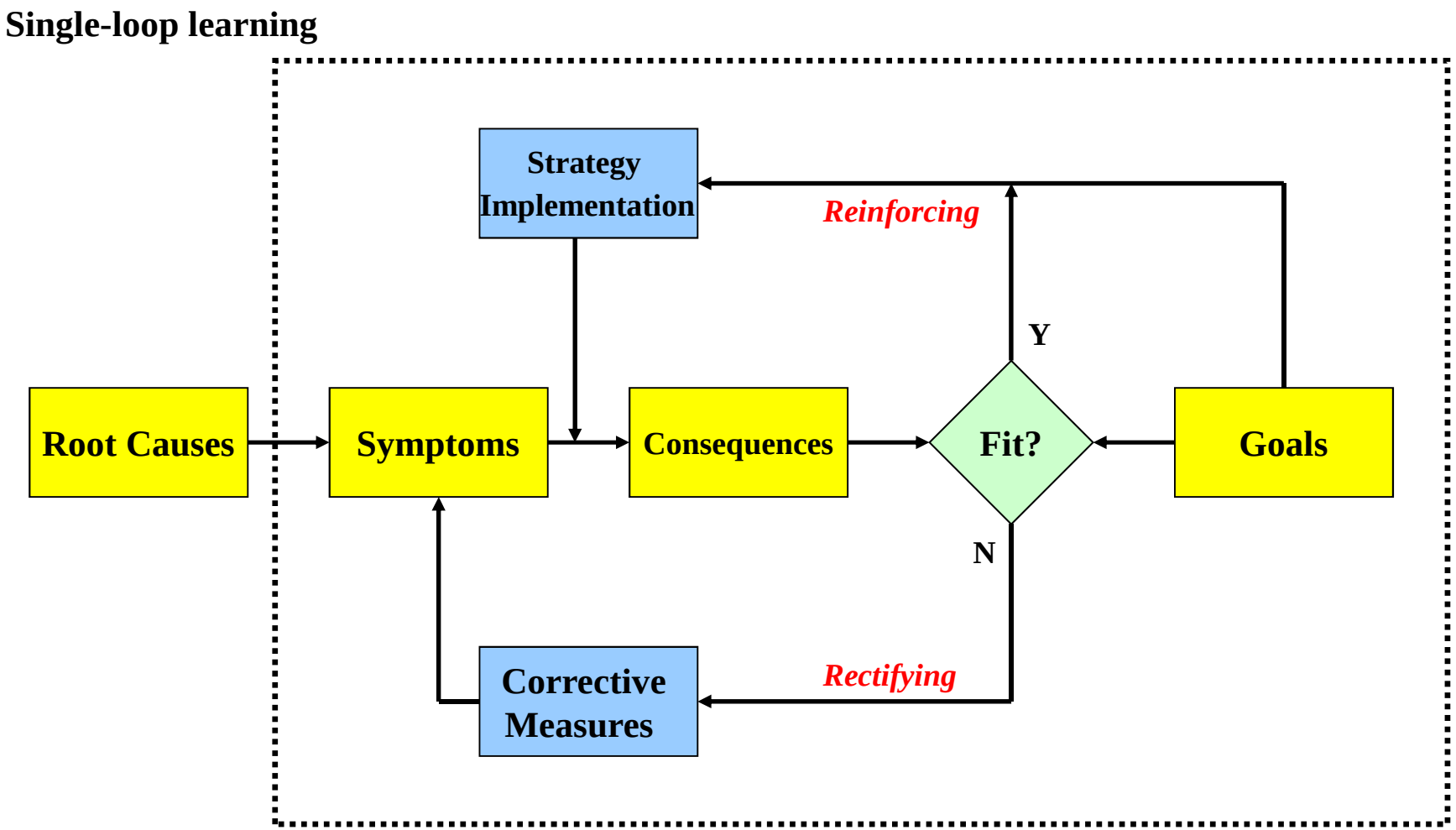

Figure 2.3 Double-loop learning

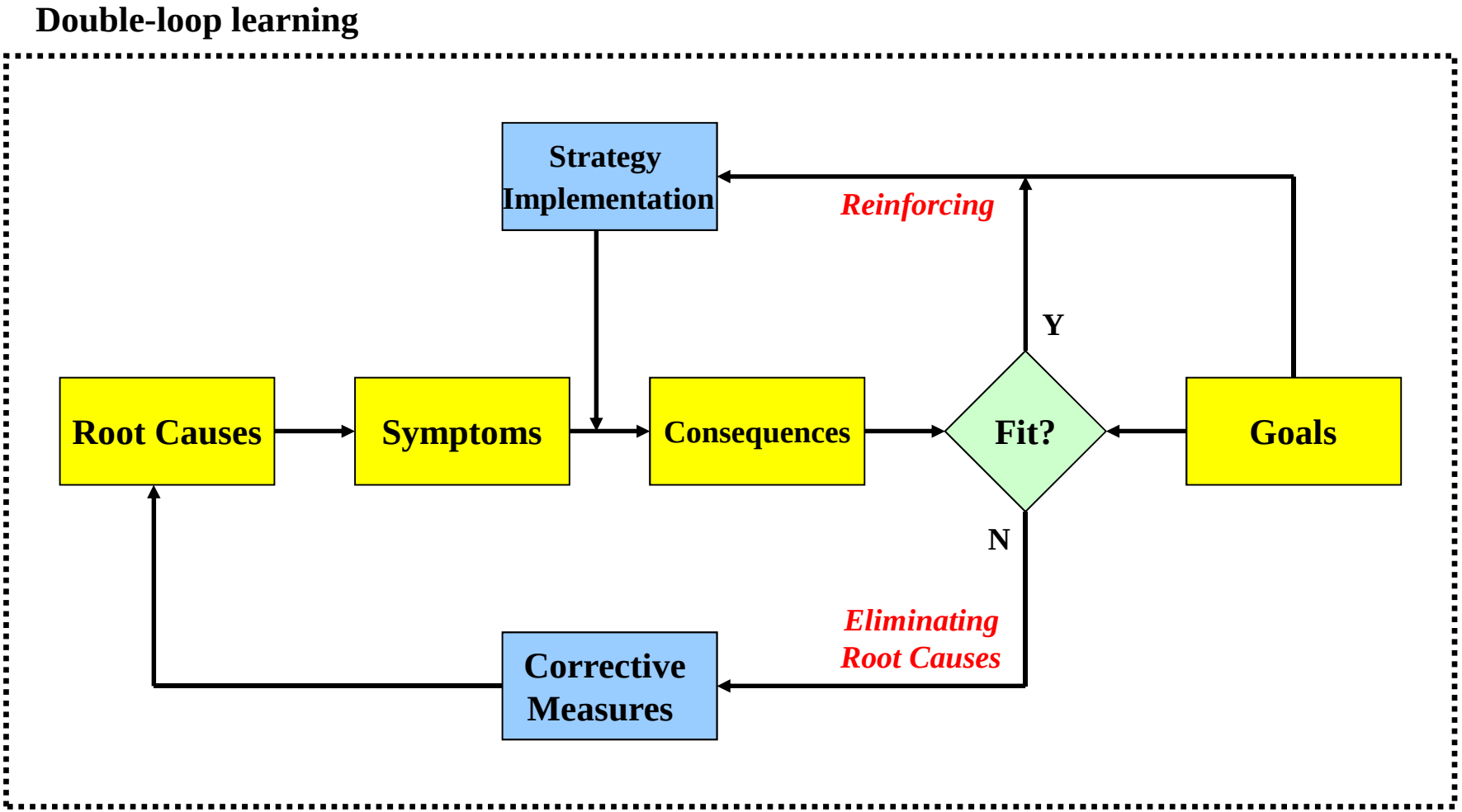

Figure 2.4 Integrated learning

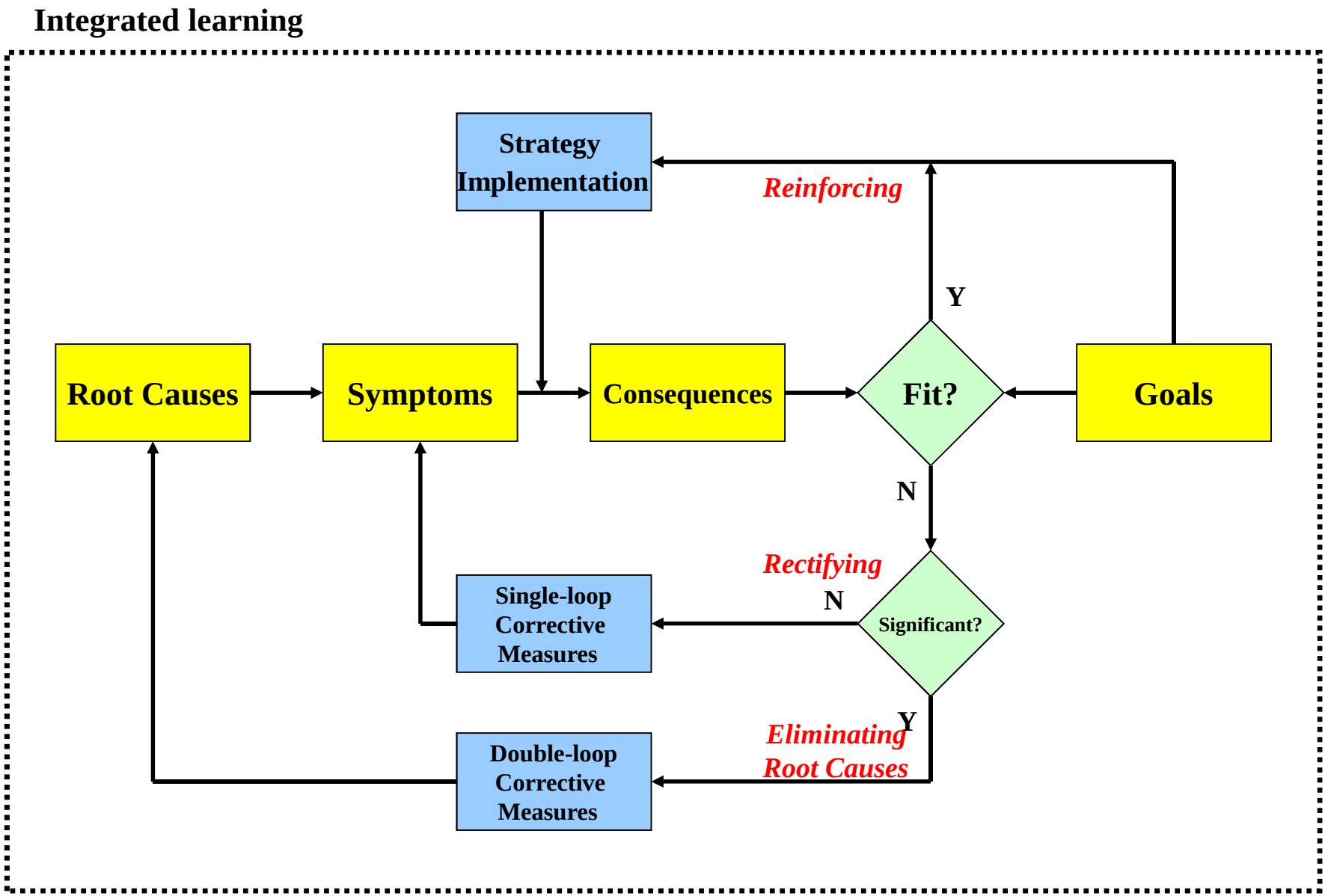

Figure 2.5 Learning propensity model (LPM)

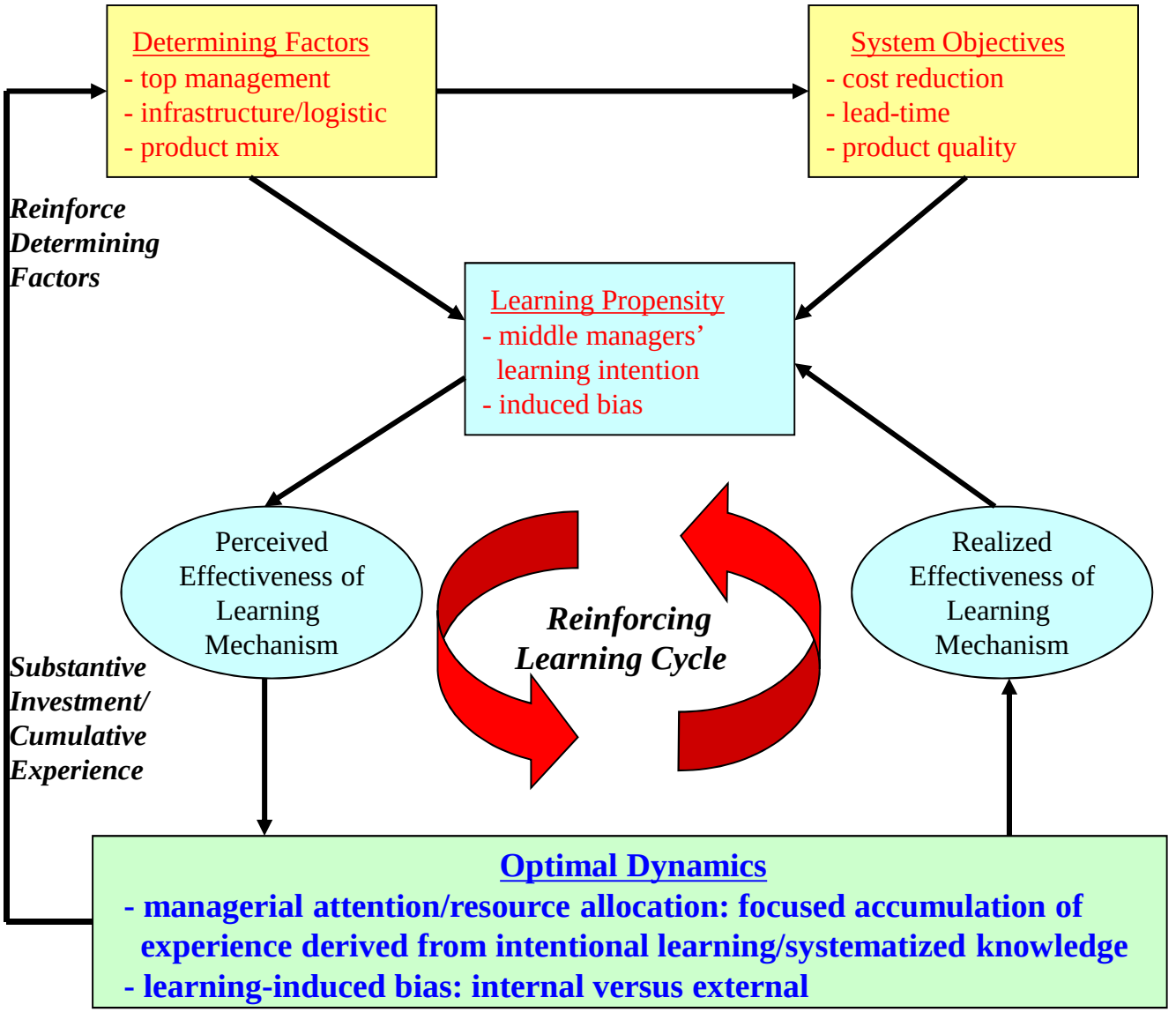

Table 2.1 Pros and cons of on-site versus off-site learning approaches

	On-site (on-shop) approaches	Off-site (off-shop) approaches
Pros	- System-specific solutions - Utilizing internal expertise - Avoiding leakage of knowledge	- Avoiding interruption of operations - Utilizing wide range of expertise - Developing generalizable solutions
Cons	- Interrupting the on-going operations - Solutions with limited applicability	- Difficulty in maintaining fidelity - Excessive lead-time

Figure 2.6 Parsimony versus sufficiency

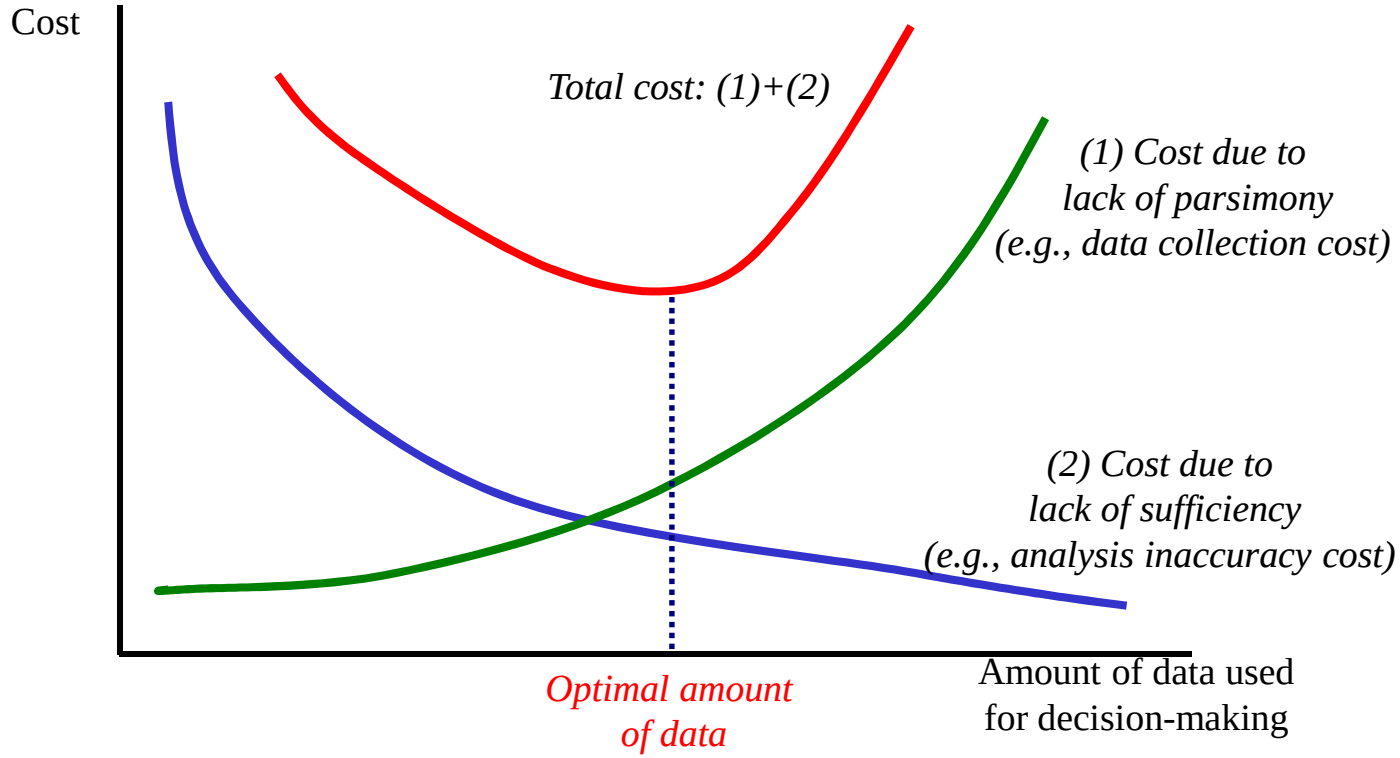

Figure 2.7 Operations learning

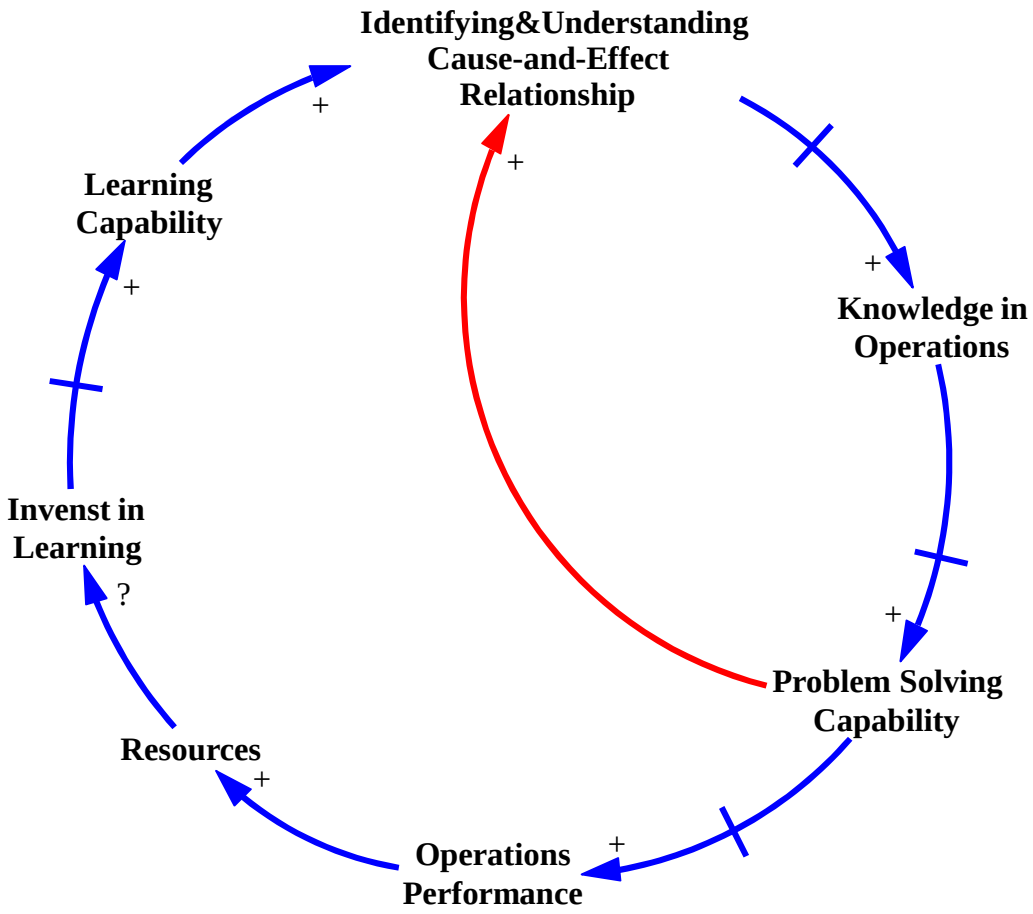

Figure 2.8 Operations learning and competing alternatives

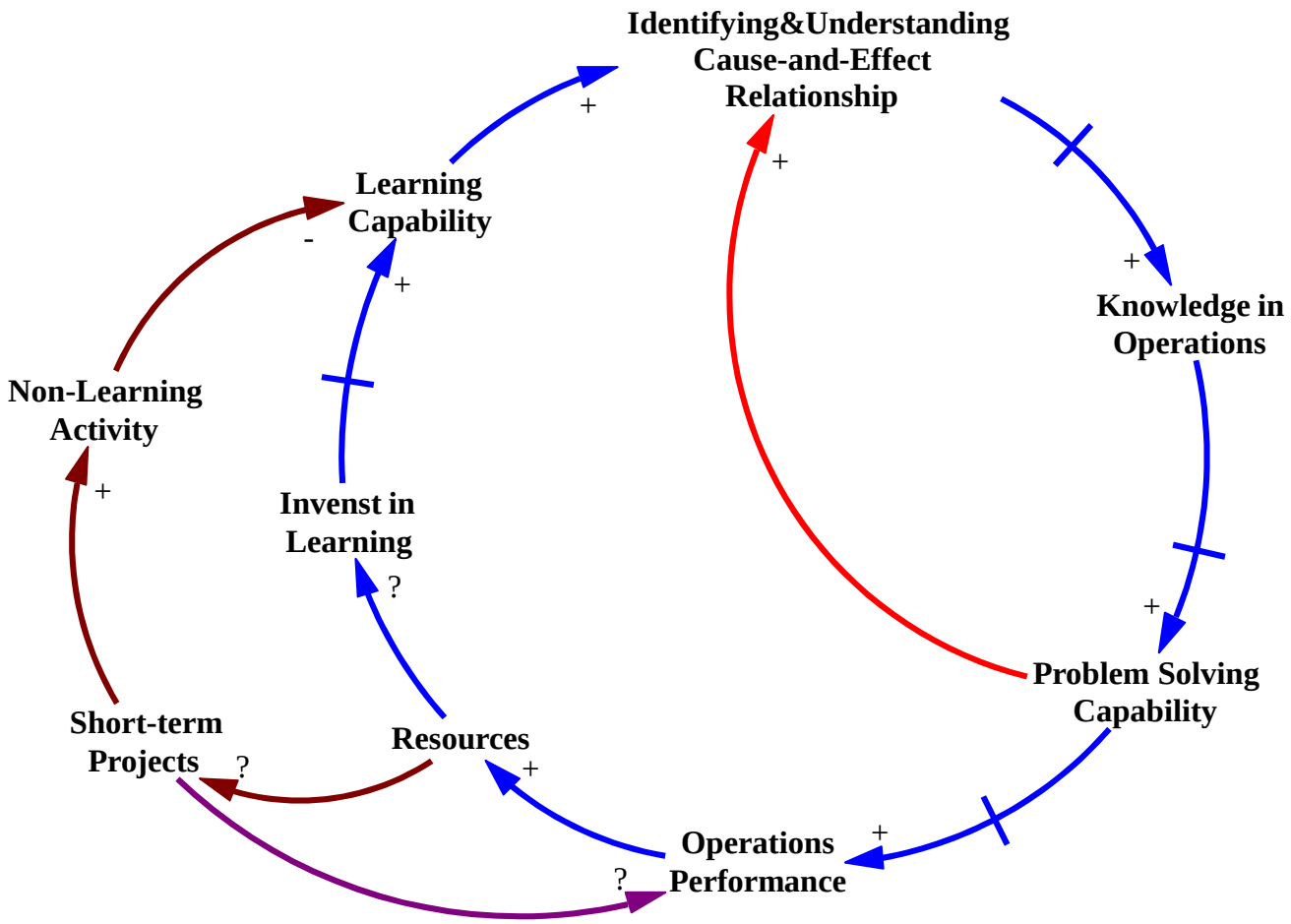

Figure 2.9 A static versus dynamic view of operations management

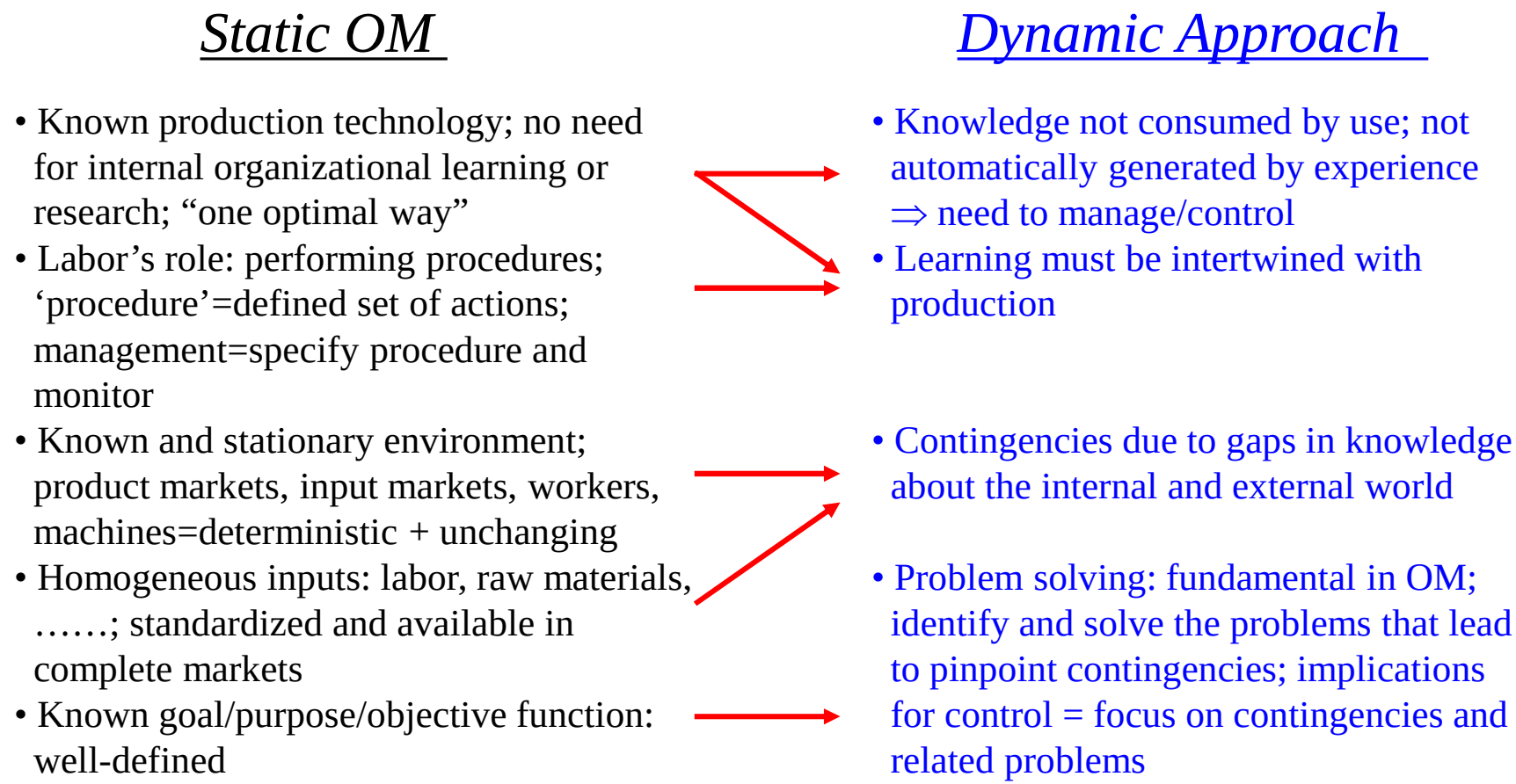

Figure 2.10 Global learning propensity dynamics – LPM II

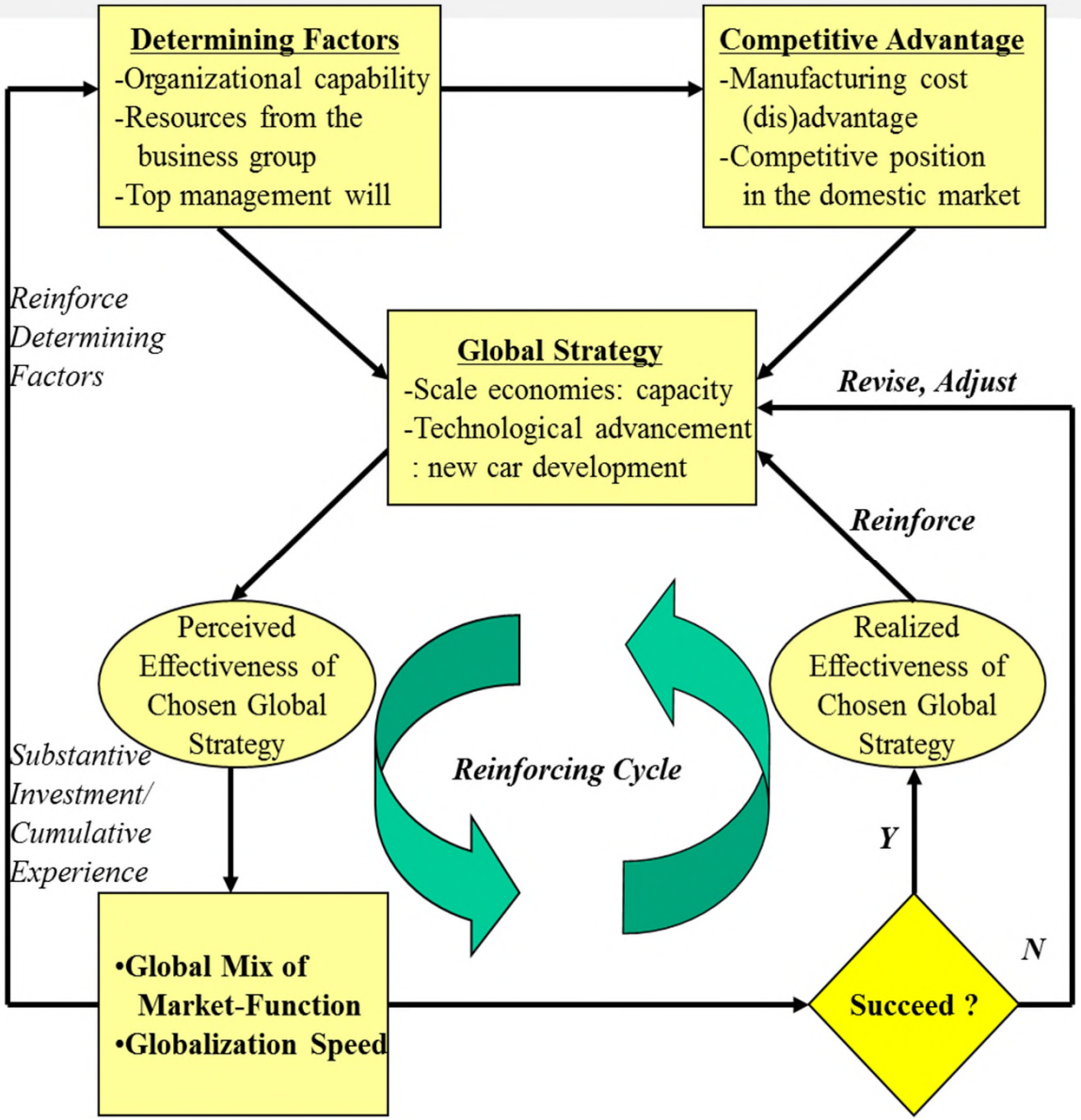

Figure 2.11 Controllability, flexibility, and learning capability

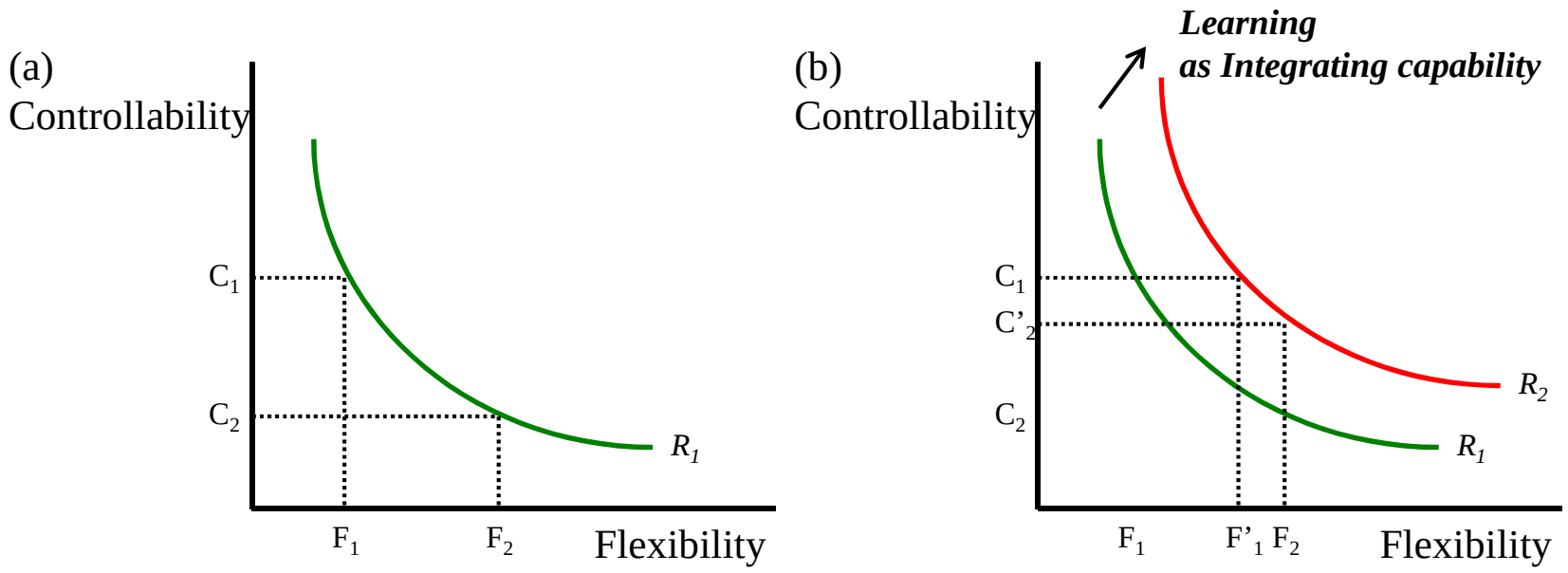

Figure 2.12 BMW capability curves

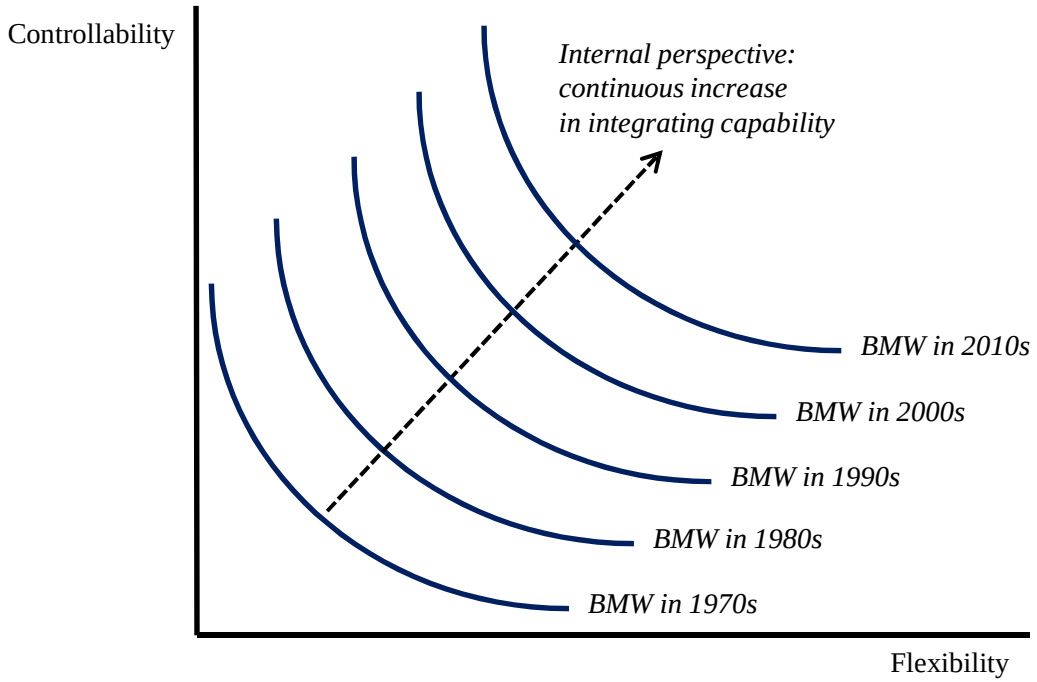

Figure 2.13 BMW capability choices

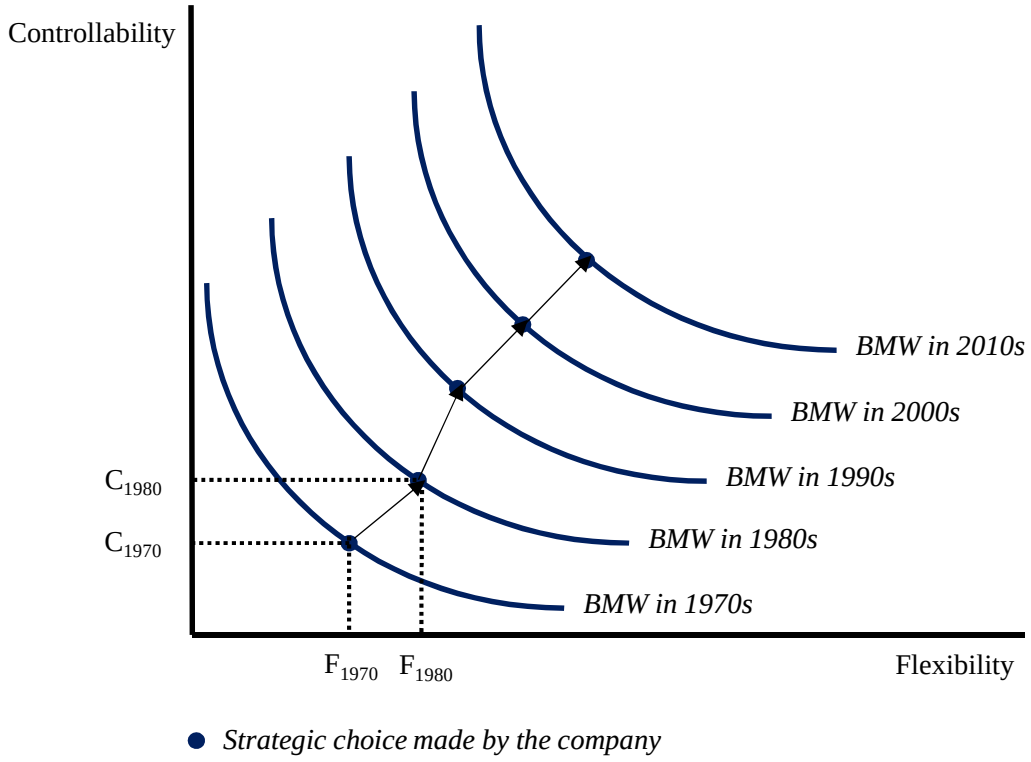

Figure 2.14 External view of BMW capability improvement

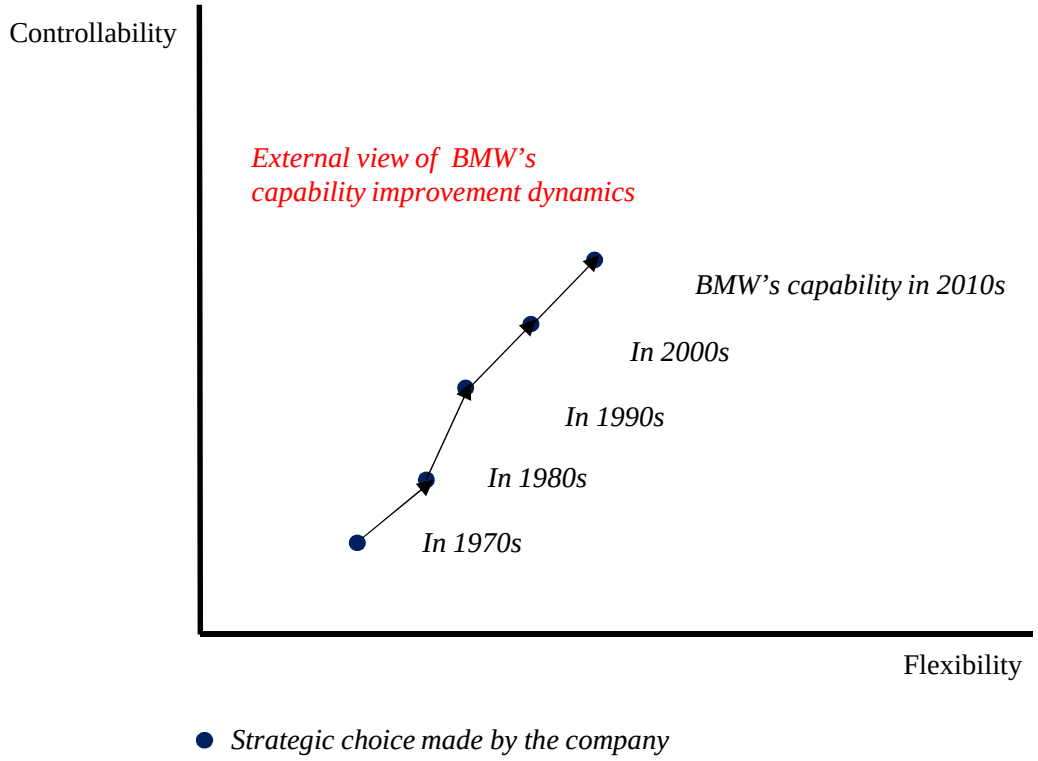

Figure 2.15 Chain of capability

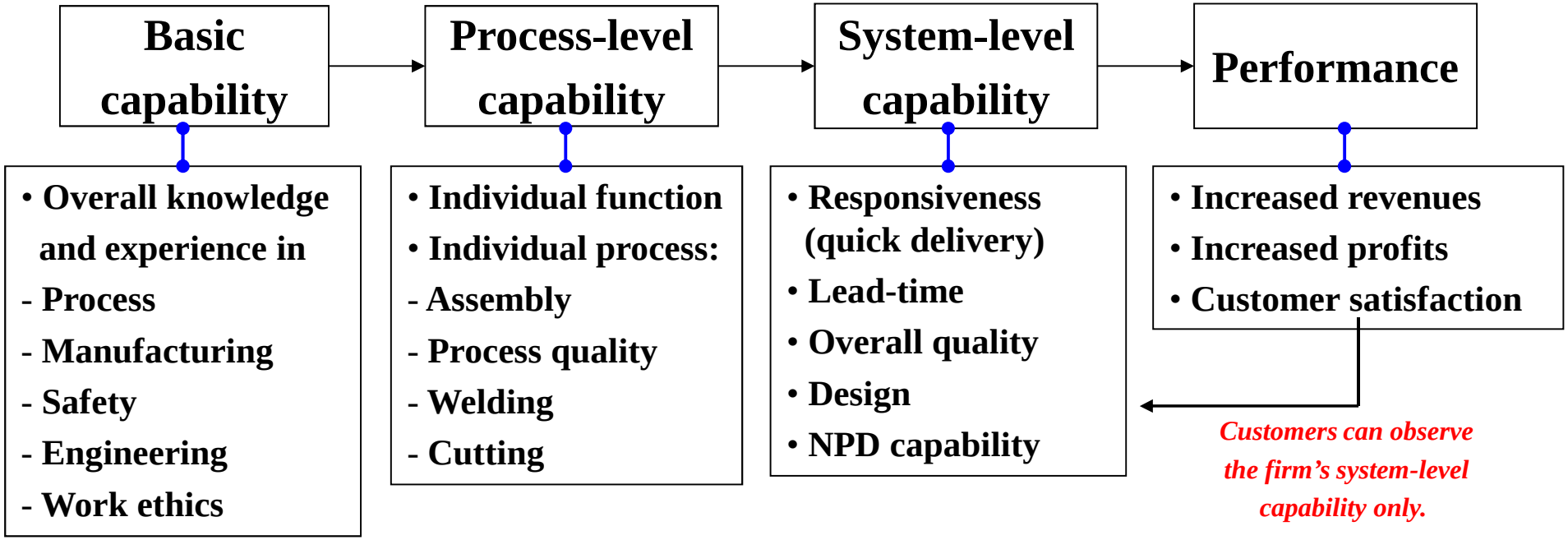

Figure 2.16 Hierarchical structure of capabilities

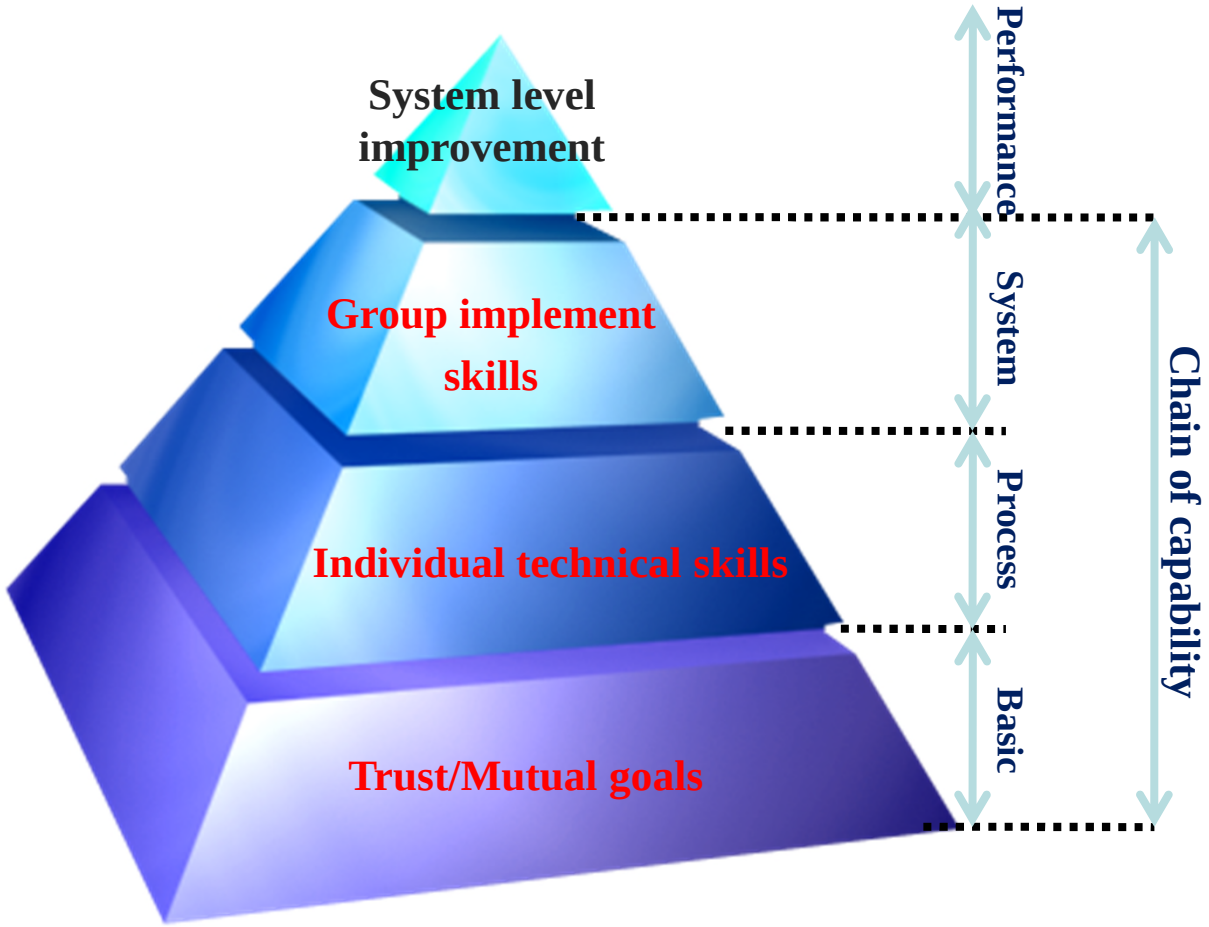

Figure 2.17 Production process at a steel company

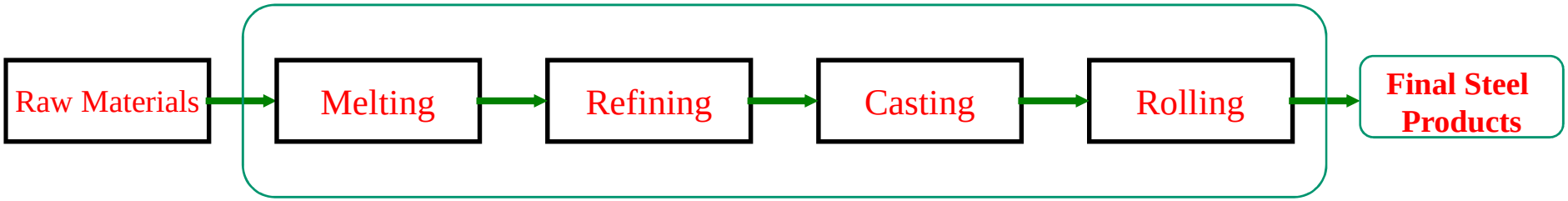

Figure 2.18 Incremental versus radical improvement