浙江大学管理学院
SCHOOL OF MANAGEMENT
ZHEJIANG UNIVERSITY

NK Model

Ziqi ZHAO

Content

- **What is NK model?**
  - McCarthy, I. P. (2004). Manufacturing strategy: Understanding the fitness landscape. International Journal of Operations and Production Management, 24(1–2), 124–150. https://doi.org/10.1108/014
- **Literature about Landscape Fitness Theory**
  - Baumann, O., Schmidt, J., & Stieglitz, N. (2019). Effective Search in Rugged Performance Landscapes: A Review and Outlook. Journal of Management, 45(1), 285–318. https://doi.org/10.1177/014
- **Empirical research using NK model**
  - Uotila, J., Keil, T., & Maula, M. (2017). Supply-side network effects and the development of information technology standards. MIS Quarterly: Management Information Systems, 41(4), 1207–1226. https://doi.org/10.25300/MISQ/2017/41.4.09
  - Almirall, E., & Casadesus-Masanell, R. 2010. Open versus closed innovation: A model of discovery and divergence. Academy of Management Review, 35: 27-47.

1 What is NK model?

McCarthy, I. P. (2004). Manufacturing strategy: Understanding the fitness landscape. International Journal of Operations and Production Management, 24(1–2), 124–150. https://doi.org/10.1108/014

What is NK model

- What is a complex system?
- What is fitness?
- What is routines?

- NK model

What is NK model : Complex system

- **non-linearity**

  an input or change in the system is not proportional to the output or effect

- **self-organisation**

  defines a self-organizing system as the rate of increase of order or regularity in a system

- **emergence**

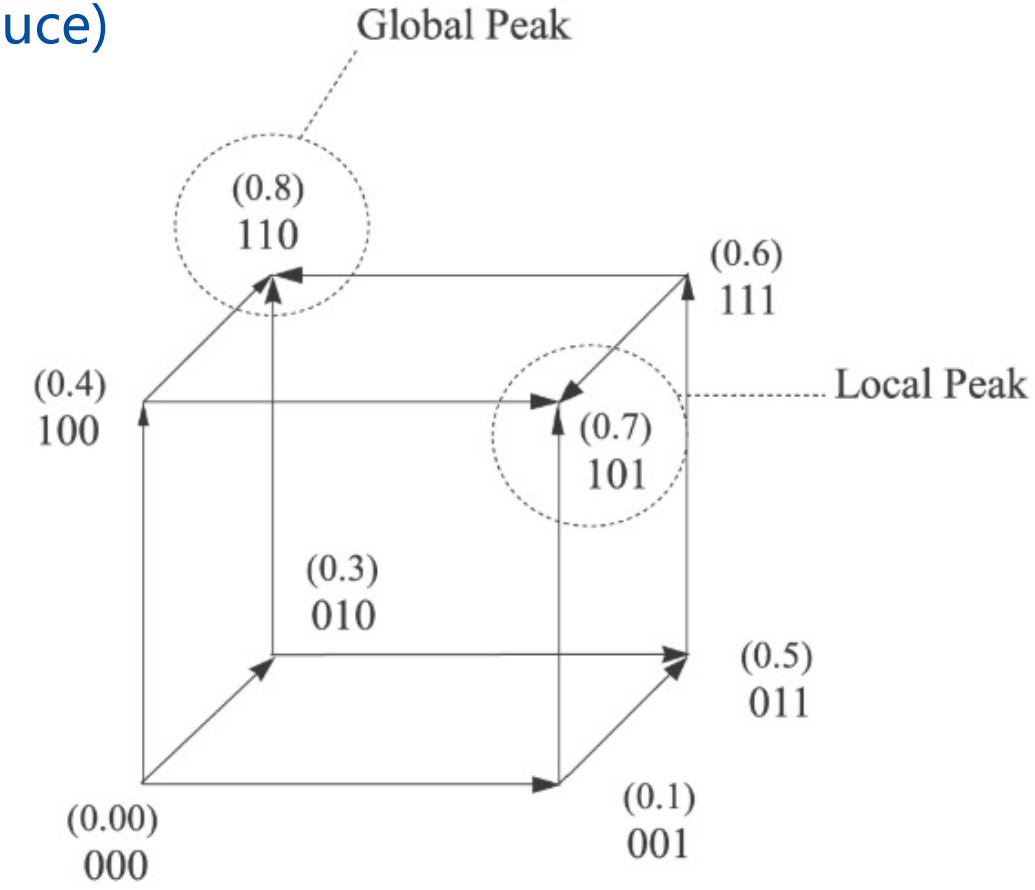
  emergence is the manifestation of new system performance due to the collective behavior of the elements, as opposed to the individual behavior of each element

All in all, it is an **internal dynamic adaptational system**.

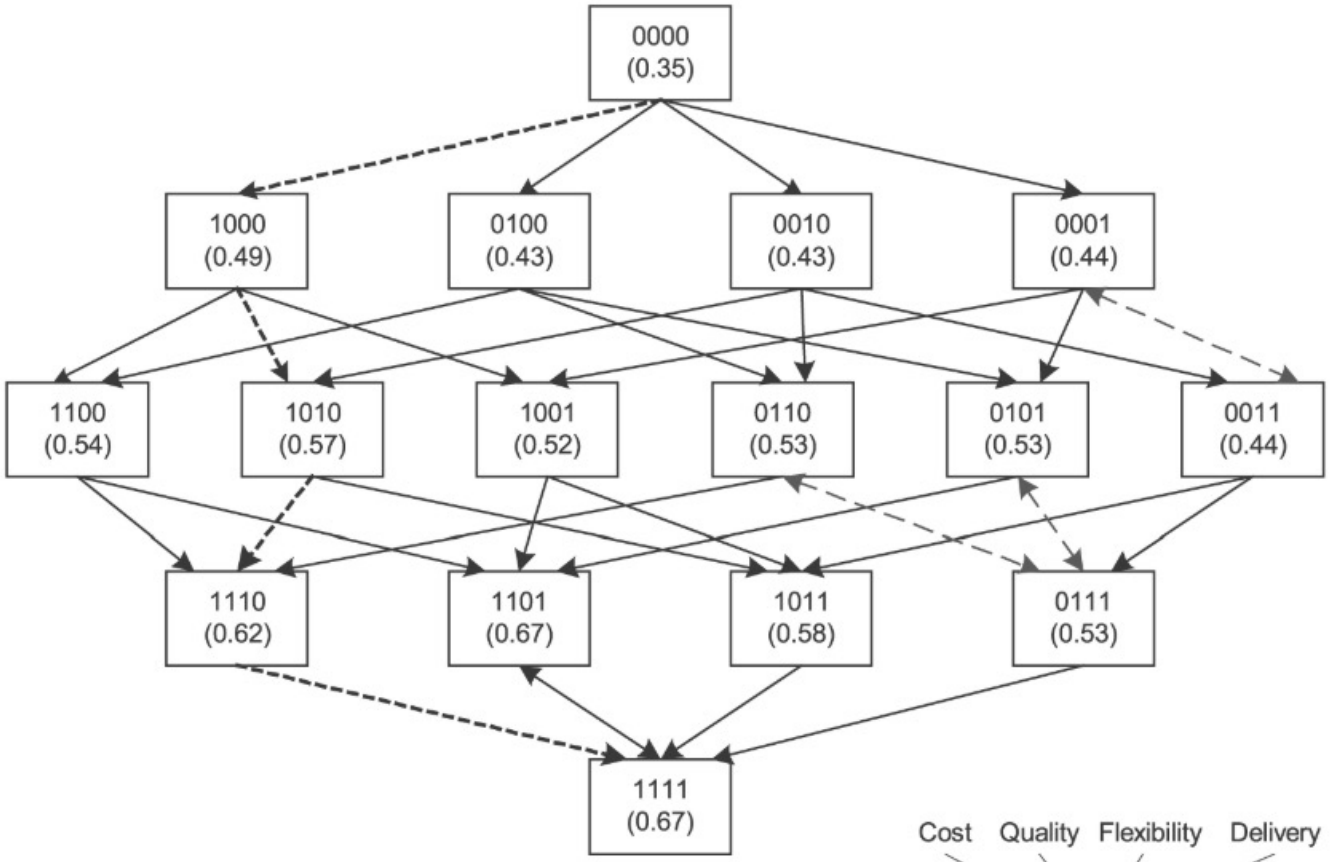
What is NK model : Fitness

- **Survival fitness** (adapt and exist)
- **Reproductive fitness** (endure and produce)

- "**Adaptive Walk**"



What is NK model : Fitness



What is NK model : Routines

- **Capability: Basic Elements.**
- **Routine: Fixed-in strategies to meet dynamic conditions.**

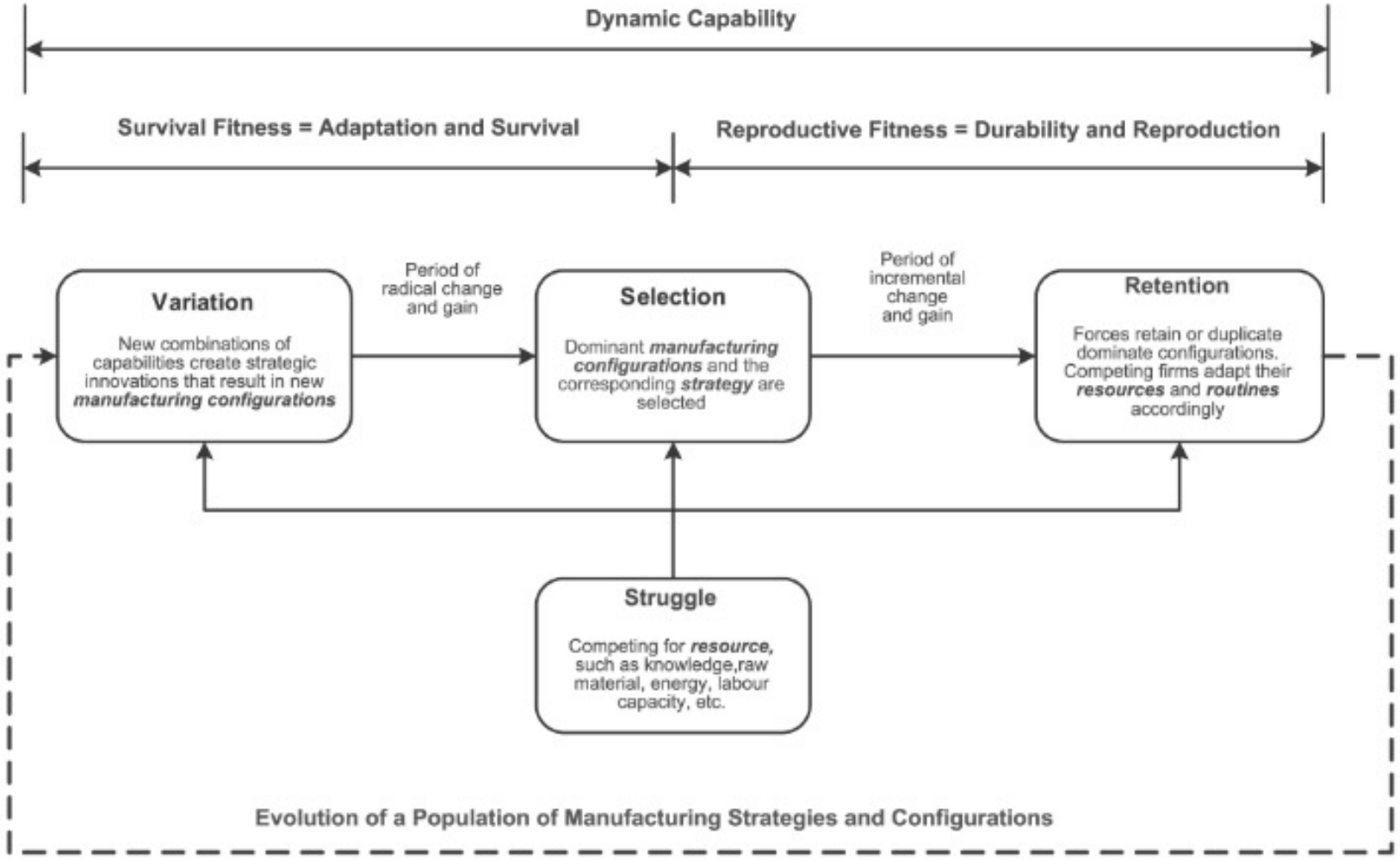
- **Struggle**
  This process governs the other three evolutionary processes by fueling or limiting their potential.

- **Variation**
  This process involves with changing resources, routines, competencies and capabilities to create a new strategy and a resulting configuration.

- **Selection**
  filtering function that removes ineffective strategies and their routines, competencies and capabilities.

- **Retention**
  the process of retention preserves and duplicates the strategy.

What is NK model : Routines



What is NK model : NK model

- **N: Capability** (n elements)
  - **S: Space**

    s of n elements are used in a specific system
  - **A: Status of capabilities**

    $A_q = 1,2,3,4$ means the q th element has four status.
- **K: Connection between elements**. $K = 0,1,\dots,N-1$
- **C: Coupledness**

  co-evolution with other competitors

What is NK model : NK model

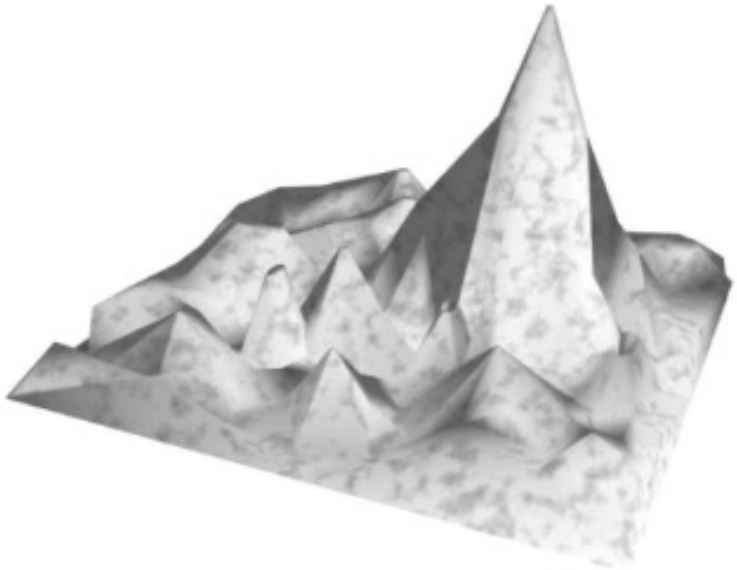


Figure 4.
Fitness landscape for
$K = 0$

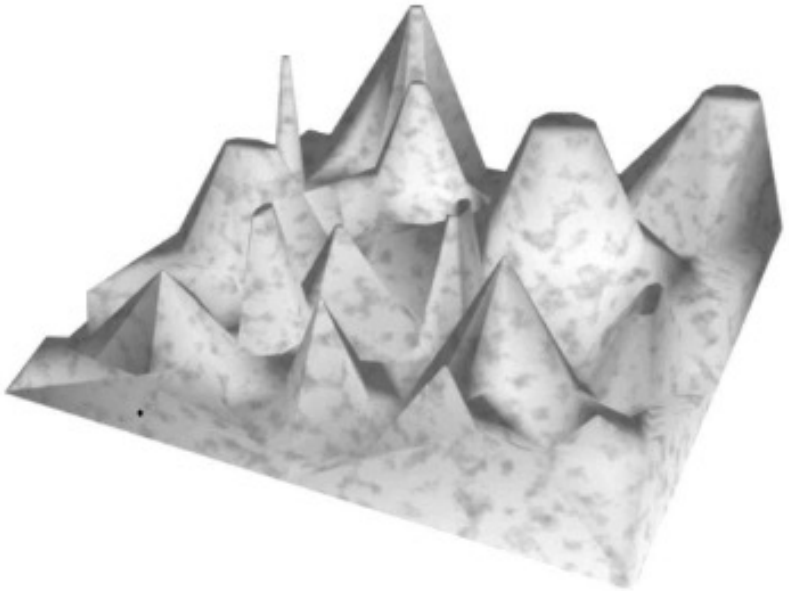


Figure 5.
Fitness landscape for
$K = N - 1$

What is NK model : Application

- What is our current position on the landscape?
  (Strategies Analysis)
- Where should we be on the landscape? (Strategic Choice)
- How will we get there? (Implementation)

2 Literature

Baumann, O., Schmidt, J., & Stieglitz, N. (2019). Effective Search in Rugged Performance Landscapes: A Review and Outlook. Journal of Management, 45(1), 285–318. https://doi.org/10.1177/014

Literature - Dilemma

- A large K means explosive complexity.
- Sensible agents or constricted strategies ?
- Individual choice OR coupled choice ?
- Accuracy OR speed ?
- Local optimal solution OR comprehensive optimal solution ?
- …

Ways to solve a few problems mentioned above.

Literature

- 71 simulation based paper
- 16 empirical research

- 6 problem structure
- 6 themes and 13 sub themes

- Capability Structure (K)
- How to be effective?

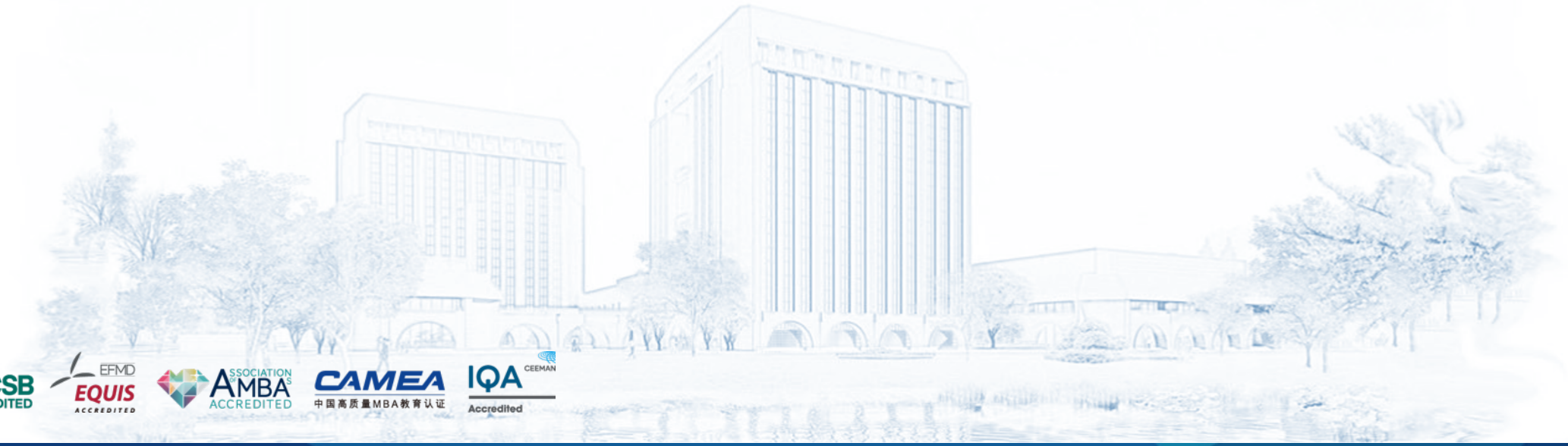
Table 2

Problem Structure Types, Themes and Subthemes, and Coding Scheme

Problem Structure Types, Themes, and Subthemes	Code
Problem structure types	
Unstructured interdependencies	K
Modular interdependencies	M
Nearly decomposable systems	N
Hierarchical interdependencies	H
Number of choices to get right	J
Other landscape-generating approach	X
Themes and subthemes	
1. Learning mode	
Experiential learning	E
Vicarious learning and imitation	V
2. Problem decomposition	
Constraining the set of choices	R
Partitioning the problem	A
3. Cognitive representation	
Insights into superior solutions	I
Insights into the problem structure	P
Changing representation	O
4. Temporal dynamics	
Sequencing	S
Time constraints	T
5. Distributed search	
Parallel search	P
Coupled search	C
6. Search under competition	
Heterogeneity	H
Competitive dynamics	D

浙江大学管理学院
SCHOOL OF MANAGEMENT
ZHEJIANG UNIVERSITY

THANK YOU



AACSB ACCREDITED
EFMD EQUIS ACCREDITED
ASSOCIATION AMBA ACCREDITED
CAMEA 中国高质量MBA教育认证
IQA CEEMAN Accredited