

## Case Study Research Protocol

1. Objective: 4-8 Profiles of strategies for managing product portfolio complexity
  - a. Research Questions (also see interview guide)
    - i. What are the driving forces that create complexity in product portfolios?
    - ii. How do organizations cope with these forces in order to optimize complexity?
    - iii. What initiatives and decision processes (practices, systems, metrics, etc.) are firms applying to manage product portfolio complexity?
    - iv. What are the advantages and disadvantages of these initiatives?
    - v. What commercial/technological issues impact these initiatives?
  - b. Purpose
    - i. Examine facets of strategies for managing complexity, including both technical systems (e.g., information systems, analytical models) and managerial systems (e.g., organizational structures, procedures, value systems)
    - ii. Focus on decisions affecting product line and feature creation in new product development and in product life cycle management
    - iii. In doing i and ii above, uncover strategic types and their associations with environmental factors (commercial and technological) – build theory describing how firms match complexity management strategies with environmental demands
  - c. Unit of Analysis – Strategic Business Unit and its product portfolio (family)
  - d. Key constructs: complexity, product portfolio, product platform
2. Methodology/Case Study Design
  - a. Multiple Case Design
    - i. Each case as an experimental treatment within experimental frame
    - ii. Write up each case individually using standard case format
      1. Pattern match
      2. Implications
    - iii. Prepare overall analysis/write-up based on patterns, inferences
  - b. Population – manufacturing firms which design and produce complex products (mechanical complexity)
  - c. Sample Selection – “purposive sample”
    - i. Initial firm (pilot) chosen as representative leader in complexity management capability, convenience, and cooperation
    - ii. Willingness to participate
    - iii. Potentially important dimensions of variation
      1. level of product complexity
      2. market type (consumer, industrial)
      3. market dynamism
      4. degree of firm’s control over product technology
      5. product life cycle length
      6. product support requirements (need for backward compatibility)
      7. degree of complexity management sophistication
    - iv. Sample includes firms that design and produce durable, assembled (combinatorially complex), products representing different technological and market environments
  - d. Multiple Sources of Evidence
    - i. Semi-structured interviews with key informants – Subject matter experts from both new product development and product life cycle organizations
    - ii. SME’s from stakeholder organizations (e.g., marketing, sales, supply chain, manufacturing, etc.)
    - iii. SBU internal documentation (models, forms, memoranda, organizational charts)
    - iv. Secondary data sources (published articles)
    - v. Direct observation
3. Data Analysis

4. Open, axial, and selective coding – Open coding is going through the transcript, adding an interpretive layer to the events as they unfolded. These interpretations can then be collected to identify emerging themes. Axial coding consists of going back over the transcript for each of the postulated themes that were derived from the literature search, noting the presence or absence of evidence for each one.
  - a. Pattern Matching
    - i. Patterns in usage of managerial and technical systems types
    - ii. Patterns in reasons for usage of given approaches
    - iii. Patterns in positions, functional representation of key stakeholders involved in complexity management activities
    - iv. Patterns in how complexity management is conceptualized by managers
  - b. Explanation Building
    - i. Develop hypotheses
    - ii. Link to prior research/theory (in related and unrelated fields)
5. Proposed Outline of Case Study Report
  - a. Introduction to study objectives and scope
  - b. Summary of case study method
  - c. Comparative analysis of cases
  - d. Interpretation and discussion of results
  - e. Conclusions and implications for theory and practice
6. Proposed Individual Case Study Write-up Format
  - a. Environmental setting (background), competitive issues, key challenges, and operating constraints
  - b. Description of product portfolio and current level of communization (or “convergence”)
  - c. Conceptualization of the scope of complexity management
  - d. Perceptions of the key problems, trade-offs associated with complexity management
  - e. Managerial systems used in NPD and PLC
    - i. Organizational structures
    - ii. Approvals and sign-offs
    - iii. Metrics used to gauge performance in complexity management
  - f. Technical systems used in NPD and PLC
    - i. Analytical tools, models – categories of cost and revenue included
    - ii. Data – level, availability
  - g. Barriers to implementation of above systems
  - h. Performance status and history

## CASE INTERVIEW GUIDE

**Description:** This document serves as guideline specifying the types of questions we would like to address in the benchmarking project. The information we seek includes:

- a brief description of your business's environment and operating challenges,
- an overview of its products portfolio and structure, and
- details regarding how various product complexity and commonality related decisions are managed.

Company: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Position in the organization: \_\_\_\_\_

Responsibilities and their relationships to complexity management: \_\_\_\_\_

### Background

1. What are the key competitive challenges facing your business unit?
2. What major changes in competition have you undergone in the last year?
3. How does product complexity impact your business unit's ability to compete?
4. How much control does your firm have over its product technology?

Our definition of complexity management: *Complexity management is the collective set of decisions, supporting processes, value systems, and initiatives pertaining to determining and implementing the most effective product portfolio (i.e., mix of product variants, feature sets, component choices, etc.).*

### General Questions Regarding Product Complexity

*An example product portfolio structure:*

*Product family*

*Product platform*

*Product model*

*Product model option package*

*Product model option package feature combination*

5. Describe your business unit's overall product portfolio. Does it fit the structure shown above? What is the nomenclature used to describe different levels?
6. Can you provide an overall summary document that describes the product families (or brands), platforms, models, etc.? How many of each type?
7. How do the product families compare in terms of:
  - a. Markets
  - b. Volumes produced
  - c. Competition
8. What is the average life-cycle length for a given product model?
9. What trade-offs guide decisions regarding product line breadth?
10. Can you describe the degree of commonality/variety across product platforms?
11. Give an example of a common module or component that is used across product:  
Families
  - a. Platforms
  - b. Models
  - c. Option packages

### **Questions About Model/Product Platform Management**

12. How would you describe your business unit's general strategies regarding the design and development of product platforms?
13. How does a new product model come into existence?
14. How do you go about determining the degree of newness of its content (or, the degree of design re-use)?
15. Describe how global product development is managed (centralized or localized, how commonality is addressed across global products).

### **Questions About Component (Feature) Management**

16. At what point(s) in the product life cycle are most components originated? How many components (or what percentage) are typically added after product launch?
17. How are new components added in new product development?
  - a. Who initiates?
  - b. What approvals are required?
  - c. What analyses are involved (using what data)? What factors are considered?
18. What is the component addition process for existing products?
  - a. Who initiates?
  - b. What approvals are required?
  - c. What analyses are involved (using what data)? What factors are considered?
19. How are components dropped?
  - a. Who initiates?
  - b. What approvals are required?
  - c. What analyses are involved (using what data)? What factors are considered?
20. Does your division have a component management "strategy?" How would you describe it?
21. Describe any programs or management initiatives that have been aimed at component management (e.g., increased part sharing, component reductions, etc.)
22. How is the responsibility for component management shared or delegated across the organization? What is the relative input of marketing, sales, new product development, supply chain management?
23. Are there platform managers or others who are ultimately responsible for component management?
24. What procedures are used to assess component portfolios?
25. What commonality or complexity metrics are used?
  - a. What are the targets and how are they set?
  - b. How often are metrics assessed and reported?
26. What data are available to guide component addition/deletion decisions?
27. Do you have data showing the component addition/deletion history for a given product?
28. What information regarding component decisions would you like to have that you don't?
29. To what degree has your firm quantified the cost of maintaining components?

### **Closing Questions**

30. Is it possible for us to trace the approval process for a recent component addition or deletion? Get copies of related documentation? Operating procedures? Policy statements?
31. Would it be possible for us to observe a meeting that involves component creation, addition, or deletion decisions in its agenda?
32. What management approaches for managing complexity have worked well and what approaches have not worked so well? What lessons have you learned?
33. What is the greatest challenge your business unit faces regarding the management of product complexity?
34. Thank You!