A Methodology to Capture, Evaluate and Reformulate a Firm's Supply Chain Strategy as a Conceptual System

by
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Submitted to the Engineering Systems Division in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy in Engineering Systems

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Abstract

A variety of events inside a firm and in its environment can motivate managers to rethink their supply chain strategy. However, the evaluation and reformulation of a firm's supply chain strategy is not a trivial problem, and has no clear answer in the literature. Part of the difficulty stems from the 'elusiveness' of strategy, but additionally supply chain strategies are often left tacit, which makes their discussion more difficult. In this thesis we develop a better understanding of supply chain strategy and of the strategic imperative it is expected to support. We also present a methodology we developed, tested and refined to capture, evaluate and reformulate the supply chain strategy of a firm. For this, we make extensive use of two research methodologies: grounded theory and action research.

Working with a pool of 20 secondary case studies, we employ grounded theory to develop a better understanding of how the strategic imperative is articulated and communicated to the functions. Working on one particularly rich case study, we then develop a better understanding of supply chain strategy, and of how it serves as bridge between the operations in the field with the strategic imperative. This understanding was later tested and refined through two action research projects.

Based on the literature, and adapting some principles from tested methodologies in other fields, we devise a methodology to capture, evaluate and reformulate the supply chain strategy of a firm. Our proposed methodology was tested and refined during our two action research projects . Our data

sources during these projects included 68 interviews, eleven panel discussions, and six online questionnaires. The resulting methodology to capture, evaluate and reformulate a supply chain strategy is presented in this thesis, divided into three distinct yet interdependent phases.

The first phase, 'capture', proposes steps to reveal and conceptualize a firm's supply chain strategy to render it explicit and tractable as a conceptual system. The output of the first phase, the 'Functional Strategy Map,' will serve as platform or the next two phases.

The second phase, 'evaluation', assesses the merits and flaws of the firm's supply chain strategy in its current form along three dimensions: alignment, coverage and sufficiency. Central to our alignment evaluation is a tool we call 'evaluation matrices', which we compare to other matrix-form tools used in related fields, including the 'design structure matrix' (DSM) and the 'techniques-tools matrix'.

The third phase, 'reformulation', proposes a novel approach to reformulate the supply chain strategy. This approach is built upon the principles of controlled convergence, yet operates using an original structure and a set of rules, amenable to the problem of supply chain strategy reformulation, devised to promote alignment, coverage and sufficiency.

Every step of every phase is presented in full detail, and illustrated using examples from actual deployments, to facilitate the replication of this methodology by managers and by other researchers. The results and limitations of the methodology are discussed, and suggestions for further research are provided. Although the thesis is focused on supply chain strategy, we anticipate the methodology we have proposed should be, for the most part, applicable to other sets of interrelated functional strategies.

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This effort is dedicated to my wife, Monica… thanks for sharing the dream, and to our girl, Sara Judit… may you grow wise, strong, happy and in peace.

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Biographical Note

Roberto Joaquin Perez-Franco, born in Chitré (Panama, 1976) grew up in La Heroica Villa de Los Santos, which named him Distinguished Son in 1999. He finished first among public high-school students in Panama's First Physics Olympics in 1992. He won the IEEE Student Paper Contest for the Latin American Region in 2000. Recipient of the IFARHU Merit Scholarship since 1996, he graduated Valedictorian at the Technological University of Panama in 2001, which named him Distinguished Alum in 2008 for his efforts in Social Responsibility. He received the Fulbright and Barsa Scholarships in 2003, ranked 1st among 225 Panamanian candidates, to complete his Masters in Logistics at MIT. He won Panama's *J.M. Sanchez* National Short Fiction Award in 2005. Author of five collections, his short stories are taught in schools and have been dramatized for radio. Married to Monica Rivera since 2000, he has a daughter, Sara Judit. When he has some spare time, Roberto enjoys writing, painting and playing chess.

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CHAPTER 1. INTRODUCTION

"Of what use is knowledge unless it be made to function? In truth, to know how to function in today's world is the truest of sciences."
Baltasar Gracián (1601–1658)[*]

After launching a breakthrough product as a small venture a decade ago, Cajan Technica[†] became a multi-billion dollar player in medical device industry. Encountering new challenges brought by such dramatic growth, the firm appointed a new CEO, who stated a radically different business strategy and requested the heads of each function to '*align*' their operations with this new business strategy. As a result, Cajan's VP of Supply Chain faces the task of reevaluating their current supply chain strategy. However, the evaluation and reformulation of a firm's supply chain strategy is not a trivial problem, and it has no clear answer in the literature.

The case of Cajan is far from unique: a variety of events inside a firm or in its environment can motivate managers to rethink their supply chain strategy. For example, Libica[‡], a $100B distribution company based in the U.S., was forced to rethink its business strategy and supply chain strategy when a regulatory change challenged their operating model: customer satisfaction replaced capital availability as the main competitive advantage. As a result, Libica redefined itself as a supply chain company and Libica's Senior VP of Supply Chain and Operations realized he had to reevaluate the firm's supply chain strategy.

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[*] From "*The Wisdom of Baltasar Gracián*", translated by J. Leonard Kaye (1992).
[†] The real name of this company has been disguised for confidentiality.
[‡] The real name of this company, and other differentiating details, have been disguised for confidentiality.

A third example is provided by Unit-X[§], a business unit from a $9B manufacturing corporation with operations in the Americas, Europe and Asia. After recently entering the Chinese marketplace and facing competition from new, lower-cost Chinese providers, Unit-X's VP of Supply Chain decided it was time to reexamine their current supply chain strategy, in order to find areas for improvement.

An elusive and tacit subject

Part of the difficulty involved with the evaluation and reformulation of a firm's supply chain strategy may stem from the 'elusiveness' of strategy itself (Bakir & Bakir, 2006). Some evidence suggests, additionally, that supply chain strategies are often left tacit, which makes their discussion more difficult. An international survey by Harrison and New (2002, p. 264) found that more than half of the supply chain strategies in over 250 firms across diverse sectors "*were either non-existent, patchily defined with poor definition, or had only some elements defined and lacked detail*". This may explain why, as Hicks (1999, p. 27) laments, "*it is often the case that high-level discussions of supply chain strategy are completely void of facts*".

Our own analysis suggests that supply chain strategy is seldom made explicit: we found that, from a pool of 20 case studies prepared in 2005 at the MIT Center for Transportation and Logistics, only 2 made explicit reference to the firm's supply chain strategy. This is surprising, considering that, (a) in 18 of these 20 case studies the business strategy was explicitly stated, and (b) the focus of the case studies was precisely how the supply chain practices of these firms help them excel and achieve their goals. During our interactions and projects with multiple firms, we have also collected anecdotal evidence that, for managers, the prospect of rethinking their supply chain strategy is a daunting challenge, in part because of its elusive and tacit nature.

[§] The real name of this business unit, and other sensitive information, have been disguised for confidentiality.

Defining the research problem

Early in our research on supply chain strategy improvement, we faced the question of revealing a supply chain strategy and operationalizing it as an actionable starting point for the efforts of evaluation and reformulation. This, we soon realized, required us to understand better the nature of supply chain strategy and of the strategic imperative it was expected to support. We also faced the questions of finding actual mechanisms to conduct the evaluation and the reformulation of an existing supply chain strategy. These questions are the subject of this thesis.

We state our research problem as follows: *"Develop a methodology for the capture, evaluation and reformulation of a firm's supply chain strategy."* This research problem consists of several sub-problems:

- Develop a better understanding of:
  - how firms state their strategic imperative,
  - what role the supply chain strategy plays
- Propose, test and refine a methodology to:
  - make explicit an existing supply chain strategy,
  - evaluate its strengths and weaknesses, and
  - generate an improved supply chain strategy

Defining supply chain

Following Mentzer, *et al*. (2001, pp. 3-5), for the purposes of this thesis, a supply chain is defined as a group of entities directly involved in the flows of products, services, finances, and information from a source to a customer.

Defining supply chain strategy

Building upon Narasimhan, Kim, & Tan (2008, p. 4), for the purpose of this thesis, *supply chain strategy* will be defined as patterns of decisions related to supply chain activities, in accordance with the overall corporate competitive strategy. Among these supply chain activities we find the procurement of raw materials, the sourcing of products, capacity planning, demand management, communication across the supply chain, and the delivery of products and services.

Applicability to other areas

Throughout this thesis, we focus on supply chain strategy. However, we think that most of what we learn working with the supply chain strategy, and the tools we develop to deal with it, should be, for the most part, applicable to other groups of interrelated functional strategies.

Literature review

On the capture problem

Trying to conceptualize a single functional strategy on its own would hardly lead to success, because functional strategies are not isolated entities. A firm's multiple operational objectives often require multiple functional strategies, which are pursued simultaneously through a coordinated effort, so that they are coherent and congruent with each other (Hines, 2004, p. 39). So, our effort to conceptualize a supply chain strategy should acknowledge it as an entity interconnected to other functional strategies.

Searching the supply chain management literature for techniques to conceptualize a supply chain strategy yields scant results. A modest attempt is found in Frohlich & Westbrook (2001), who envision supply chain strategies as "*arcs of integration*" and propose that *"different supply chain strategies can be empirically classified into at least five valid types, defined by the direction (towards suppliers and/or customers) and degree of integration".* The obvious limitation of this approach is that it focuses only on a single feature, namely integration (in terms of its direction and degree), at the expense of all the other features that make a given supply chain strategy what it is. It ignores, for example, whether a supply chain strategy is 'efficient' or 'responsive', which Fisher(1997) argues is a crucial feature for the firm's success. Despite this limitation, Frolich & Westbrook deserve full credit for admitting openly that a challenge exists: *"many questions remain unanswered about how best to characterize supply chain strategies"*(2001, p. 185).

In recent years, other authors have proposed more refined classification systems for supply chain

strategies, in the form of typologies and taxonomies. Narasimhan, *et al*. (2008) explain that *"a taxonomy, without defining ideal type, attempts to classify firms into mutually exclusive and exhaustive groups"* whereas *"a typology describes ideal types, each of which reflects a particular combination of organizational attributes, although no existing firms may fit exactly the suggested ideal type."* Recent supply chain management literature has seen contributions along both lines. Narasimhan, *et al*. (2008) proposed a typology of supply chain strategies with six distinct types, two of which seem to coincide with the flexible and efficient types postulated by Fisher (1997). McKone-Sweet & Lee (2009) derived a taxonomy that classifies supply chain strategies into three groups, according to their organizational and IT capabilities. Knowledge about these groups and types is useful in general, especially since their relationship to the firm's performance is explored. However, for the specific problem that interests us, namely characterize an existing supply chain strategy with aims at evaluating and improving it, they are of limited value, because the fixed groups and types fails to capture the rich nuances and complexities that make each supply chain unique.

A more feasible approach is proposed by Cigolini, Cozzi, & Perona (2004). Taking heed of Porter's (1996, p. 4) assertion that *"the essence of strategy is in the activities"*, Cigolini, *et al*. propose studying the activities of the firm as a way to reveal the supply chain strategy: *"what companies actually did, rather than what they claimed their strategic intent to be, is the best clue to reveal their very supply chain management strategies"* (2004, p.12). Cigolini, *et al*. explicitly state the question, probably for the first time in the literature, of *"how can (a* supply chain strategy*) be operationally defined and represented?"* Cigolini, *et al*. developed a partial catalog of techniques that operate at the interface between companies, and then identified in the literature the supply chain tools that support the implementation of these techniques. They propose that we create what they call a 'techniques-tools matrix': a matrix listing the techniques as row headers and the tools as column headers, that contains a checkmark in each cell where a tool is providing support to a technique. *"Perhaps the most promising*

usage of the techniques-tools matrix is in its inherent ability to synthesize and represent supply chain management techniques." The tool proposed by Cigolini, *et al*. (2004) is a pioneering effort to operationally define and represent a supply chain strategy. Nevertheless, we have some reservations about it. Some reservations are theoretical: (1) the techniques-tools matrix fails to capture how the supply chain techniques relate to the firm's strategic imperatives, and (2) it deliberately ignores the activities that take place inside the firm (focusing exclusively on the interface between firms). Other reservations concern its application: (3) the matrix lacks the intuitive readability that should be expected from a representational device, (4) since Cigolini, *et al*. make no provision for the tacit nature of supply chain strategy, it is not clear how a person is to go about building the matrix, how a person can identify which techniques and tools are actually being used in the case of a particular firm, (5) the need for a catalog restricts the applicability of the matrix to areas for which a catalog exists, and may tempt the matrix builder to pick items from the catalog that sound good, as opposed to items that are grounded on the activities of the firm, and (6) even after the matrix has been built, it is not clear how it can be used as an actionable starting point for evaluating and reformulating the supply chain strategy.

On the evaluation problem

Evaluating the merits of a supply chain strategy is not a simple task, in part due to its elusiveness and complexity, but also due to the fact that a supply chain strategy cuts across diverse functional areas, and to the current lack of agreement in literature about what criteria should be used to evaluate a supply chain strategy. In the supply chain management literature we find many studies evaluating the impact of a single factor. For example, Frohlich & Westbrook (2001) explore how integration impacts performance. Other more ambitious projects have identified two factors: i.e. McKone-Sweet & Lee (2009) found supply chains with higher organizational and information technology capabilities tend to outperform other firms with lesser capabilities in these areas. Yet these partial approaches are not sufficient for managers on two accounts. First, they tend to cover only one or another aspect of the

problem. Second, and probably most importantly, they are often perceived by managers as theoretical and foreign, as not likely applicable to what they consider a rather unique set of circumstances their particular firm is facing in the current business environment. Let us illustrate this with a comment made by the VP of Supply Chain of Unit-X: he told us, before we started our project with them, that he had been looking in the literature for a *"roadmap to do"* supply chain strategy, but found none. *"There are many books about strategy,"* he said, *"but they are basically theory."* Theory, as opposed to a real-world, actionable *"process that we can walk,"* that is.

On the reformulation problem

In the supply chain management literature, we found two distinct methods explicitly proposed for the reformulation of a supply chain strategy.

The first method is found in Martinez-Olvera and Shunk (2006), and is presented as a "c*omprehensive framework for the development of a supply chain strategy*." It is based on the premise that there are six "business models" that manufacturing firms may follow: I) engineer to order, II) make to order, III) make to order and assemble to order, IV) assemble to order, V) make to stock, and VI) make to forecast. In this paper, the authors propose, and make the case for, what they call a 'customer-product-process-resource' (CPPR) framework. This framework associates to each one of these six 'business model' a series of specific values for the 'supply chain structural elements' that, in the authors perspective, define a supply chain strategy. The 'degree of alignment of a supply chain strategy' is determined by how closely its 'set of supply chain structural elements' corresponds to the ones presented in their CPPR framework. To put it in simpler terms, and at the expense of some accuracy, the authors seem to postulate there are six *desirable* or *pure types* of supply chain strategies, and that the merit of the actual supply chain strategy of a firm can be assessed by determining how closely it conforms to one of the six pure types. Improving a supply chain strategy, then, is a matter of 'migrating' to one of the 'business models' (or *pure types*), and "*the CPPR framework becomes a realignment tool*

when used in combination with a realignment methodology." This 'realignment process' is consists of four steps, which can be described as follows: (1) assess the 'as-is' situation, the current way of operation of the firm's supply chain in terms of the attributes given by the CPPR framework, (2) determine the feasibility of migrating from the 'as-is' situation to each one of the 'business models' given by the CPPR framework, (3) calculate an aggregate measure of the effort required to realign all the different supply chain structural elements into a single 'business model', and (4) chose as the target for the migration the 'business model' that would require from the firm the least effort to reach, and calculate how many of the 'variables' the firm can afford to change towards that goal, given the finite *budget* of effort that the firm is willing to invest in the migration. In a nutshell, the idea is that a supply chain strategy can be reformulated by taking it as close as possible to one of six pure types.

The approach proposed by Martinez-Olvera and Shunk strikes us as overly simplistic. First, their approach to the problem of defining and recasting a supply chain strategy is in stark contrast with the rich and nuanced nature of supply chain strategy as a phenomenon. Their reduction of 'business models' to a mere half-dozen runs counter to the diversity we found when exploring how business strategy is communicated to supply chain managers (discussed in Chapter 3.) The strategic imperatives of firms may not be infinite, but their number is certainly larger than six. And, in the words of Richard Feynman, *"the thing that doesn't fit is the thing that is most interesting."* Second, it seems to us that, by equating of operations strategy with 'business models,' Martinez-Olvera and Shunk (2006) have failed to recognize the difference between strategic means and strategic goals of a firm, the divide that exists between the vision a firm sets for itself and the path it takes to get there. Their recommendation to migrate into the closest of six predetermined buckets fails to acknowledge that some organizations have differentiating ideas that define what they are and where they want to be. Probably aware of the difficulty caused by this oversimplification, in a subsequent paper that develops the methodology further (Martínez-Olvera, 2008), Martínez-Olvera suggests as a direction for future research the

possibility of including 'hybrid models,' namely models that go beyond the six outlined before, by combining features from more than one of them. He suggests this may be achieved by using Quality Function Deployment (QFD).

A second method that has been proposed for the formulation and, to a lesser extent the *re-*formulation, of a supply chain strategy is presented in Schnetzler, Sennheiser and Schonsleben's *"A decomposition-based approach for the development of a supply chain strategy"* (2007). The authors applied the principles of axiomatic design (AD) and their knowledge of the supply chain literature to derive, from the top down, a list of goals paired with means about what a supply chain strategy is supposed to achieve. The result of their effort, a pyramidal arrangement of goals and means for the supply chain that they call 'supply chain design decomposition' (SCDD), is so large that it is only shown partially in the paper: for the complete version, the reader is referred Schnetzler's doctoral thesis (written in German), entitled "*Coherent strategies in supply chain management - a methodology for developing and implementing supply chain strategies*" (2005). The authors present *"a methodology for utilizing the SCDD for systematic development and operationalization of a supply chain strategy."* The authors list among the applications of the methodology the development of 'improvement strategies,' for the supply chain *"when there is an urgent need for action."* This we interpret to mean that the methodology can be used not only to formulate a new supply chain strategy, but also to improve an existing supply chain strategy. This interpretation is reinforced by the examples provided by the authors and the doctoral thesis, which refer to existing firms with supply chain strategies already in place, being improved by the use of their methodology. The methodology consists of twelve steps, grouped into four phases. The phases are: (1) intelligence, (2) design, (3) choice and (4) implementation and review. Phase 1, intelligence, consists of gathering information regarding the customer needs and analyzing it *"according to 'order winners' and 'order qualifiers'"*. Phase 2, design, starts by setting strategic priorities, informed by the competitive and corporate strategy and the position of the firm, and then

operationalizing these priorities step by step. This operationalization is done by following the SCDD cascade from the top down: starting with the top-most objective, the designer asks: *"How can this objective be achieved through supply chain management?"* After answering this question, the designer then moves to the second level, where a series of objectives in areas such as quality, reliability, lead time, etc. will have to receive the same treatment, e.g. asking "How can this objective be achieved?". The authors postulate that following the SCDD blueprint in this *cascading questioning fashion*, the designer will be able to translate strategic objectives into strategic means, then into operational objectives and finally into specific resource decisions. Phase three, choice, looks for *"potential conflicts among objectives"* and for *"synergistic effects,"* and verifies that all objectives and sub-objectives are fulfilled. In Phase 4, Implementation and review, *"preparations for implementation are made"* and the implementation is monitored.

The work by Schnetzler (2005) and Schnetzler, Sennheiser, & Schönsleben (2007) should be noted for tackling the question of supply chain strategy formulation as a design problem that can benefit from tapping into the design literature, as evidenced by their use of axiomatic design (AD). The approach they outline, however useful it may be for the formulation of a supply chain strategy for a new firm, may prove less useful as an aid for the reformulation of an existing supply chain strategy. The reason is simple: as it works its way down from a central objective, the methodology makes no provision whatsoever for the implementation the firm has already in place. The current supply chain strategy (what Martinez-Olvera called the 'as-is' situation) is basically ignored, if not deliberately, at least in practice. This is no trivial matter: it is not every firm that is willing to throw its existing supply chain strategy out the window and start anew every time a reformulation is needed. In this sense, Schnetzler's approach and Martinez-Olvera's approach are antipodes: whereas Martinez-Olvera focuses solely on going from where we are today to the closest 'best spot' with no regard to what the firm's topmost objective is, Schnetzler focuses solely in deriving from the top down a whole strategy with the sole

purpose of satisfying the topmost objective of the firm yet paying no attention to where the firm is today. It is hard to see how a firm can benefit from migrating without a vision of the future, or from building without grounding in today.

Thus, we conclude that the literature lacks an actionable methodology that existing firms can use to devise improvements to their supply chain strategy, one that considers both the starting point and the final objective, of the firm's supply chain.

Outline of the thesis

The present thesis is structured as follows.

- In Chapter 1 we outline our research problem and its relevance, and review the literature relevant to the problem of supply chain strategy capture, evaluation and reformulation.
- In Chapter 2 we state our choice of research methodologies, list our data sources and discuss the literature relevant to grounded theory, case study research and action research.
- In Chapter 3 we develop an understanding of how the business strategy of a firm is typically communicated to the supply chain function, and propose a framework for its articulation.
- In Chapter 4 we develop a better understanding of supply chain strategy in its context, and expand upon the previous framework to include the conceptualized supply chain strategy.
- Chapter 5 presents the methodology we propose to make explicit (or 'capture') the supply chain strategy of a firm, along with its strategic imperative, the business strategy. The series of steps listed in this chapter are referred to as Phase 1.
- Chapter 6 presents the methodology we propose to evaluate a supply chain strategy. The series of steps listed in this chapter are referred to as Phase 2.
- Chapter 7 presents the methodology we propose to reformulate a supply chain strategy. The series of steps listed in this chapter are referred to as Phase 3.

In Chapters 5 through 7, the ideas behind the methodology, their theoretical foundation and the

specific steps to be followed are presented. Each one of these chapters is followed by a companion Appendix that provides real-life examples to the steps of capture, evaluation and reformulation.

- Chapter 8 assesses the merits of the proposed methodology, discusses its limitations and points to directions for future research.
- An Appendix at the end of the thesis suggests an approach to use a metric derived from the values of the evaluation matrices as a tool to compare alternative supply chain strategies.

CHAPTER 2. RESEARCH METHODOLOGY

We made extensive use of two research methodologies: grounded theory and action research.

- For developing a better understanding of the nature of supply chain strategy, we used theory generation methodologies from the grounded-theory toolkit, particularly the generation of preliminary theory. This is in line with the recommendation that Yin (2003) makes that researchers planning to conduct case study research are advised to develop a preliminary theory (an *"understanding - or theory - of what is being studied"* (Yin, 2003) before conducting the data collection.
- For developing a set of tools that managers can use to capture, evaluate and reformulate their supply chain strategy, we decided to engage firms through action research case studies. Action research (AR) is "an informed investigation into a real management issue in an organization by a participating researcher, resulting in an actionable solution to the issue;" it "involves fluid and overlapping cycles of investigation, action planning, piloting of new practices, and evaluation of outcomes, incorporating at all stages the collection and analysis of data and the generation of knowledge;" it also provides "unique access to insider knowledge" and "forms a bridge between manager understanding and the generation of theoretical knowledge" (Harris, 2007; Somekh, 2008). Action Research case studies are considered especially suited for supply chain management problems, an applied field facing real-world problems that are often ill-structured, even messy (Muller, 2005; Naslund, 2002).

List of Data Sources

Both grounded theory and action research require a flexible approach to sampling: the sample set is

not predefined from the beginning of the project. Instead, there is an initial sample, and then as the research progresses, new sources of data are added. Now that our research project is complete, we can – in retrospective – list the data sources we employed. These are as follows:

1. Our first data source was a series of five semi-structured interviews with managers on the subject of their supply chain practices and strategy. These interviews lasted one hour. They were later analyzed using qualitative content analysis. The main insight we derived from them was the awareness that asking managers directly about their supply chain strategy would yield results tainted by social desirability (answering what the respondent thinks is desirable) and acquiescence (answering what the respondent thinks the interviewer wants to hear). This motivated us to refocus our attention on activities, to infer from them the executed strategy.
2. Our second data source was a pool of twenty case studies on supply chain excellence prepared in 2005 for the Center for Transportation and Logistics' Supply Chain 2020 Project. These cases helped us generate some preliminary theory of how the nominal strategy is articulated (Chapter 3) and an emergent framework of supply chain strategy (Chapter 4). The foundation for the approach we employed to generate the preliminary theory is presented later in this chapter, while the process of generating the theory is discussed in the next two chapters.
3. Our third data source was a 2-year long action research project with a manufacturing and distribution company, that we have called Unit-X. This project included the following data collection:
    a. Forty one open and semi-open interviews with 40 respondents, scheduled for one hour, on the subject of the firm's activities.
    b. Five panel discussions with a team of 8 supply chain managers from the firm from the supply chain function. Each panel discussion was scheduled for 4 hours.
    c. A series of four online questionnaires, sent to ten members of the supply chain function.

Combined, they included 356 questions. A total of 3,055 answers were received, for a response rate of 86%.

4. Our fourth data source was a 7-month long action research project with a distribution company, that we have called Libica. This project included the following data collection:
    a. Twenty two open and semi-open interviews with as many respondents, scheduled for one hour, on the subject of the firm's activities.
    b. Three panel discussions with a team of 24 managers from different functions in the firm. Each panel discussion was scheduled for 4 hours.
    c. Three panel discussions with sub-teams of 8 managers from different functions in the firm. Each panel discussion was scheduled for 1 ½ hours.
    d. Two online questionnaires, sent two separate sub-groups of 12 and 13 respondents from different functions in the firm. Combined, they accounted for 83 questions sent to 25 individuals. A total of 1,981 answers were received, for a response rate of 95%.

Summary of data sources. In summary, our data sources included 20 secondary-data case studies, 68 open and semi-open interviews (from which almost 60 hours of recordings were collected and analyzed), eleven panel discussions (encompassing approximately 36 hours of group discussion), and six online questionnaires (including 439 questions, for which 5,036 answers were received).

In this chapter, we discuss our approach to theory generation in more detail, along with relevant literature, since its combination of traditional and novel elements may require some explanation.

As we mentioned above, we had access to previous case studies on a closely related subject: a pool of 20 existing cases on the subject of supply chain excellence, prepared in 2005 by students at the Center for Transportation and Logistics at MIT. These cases would prove a useful source of secondary data for developing the preliminary theory. In the following sections, we discuss specifically how we used secondary data to generate our preliminary theory of supply chain strategy, including validity

considerations and the emergence of a working theoretical framework.

Generating theory

The grounded theory tradition

In their seminal work on theory generation, Glaser and Strauss (1967) describe theory as *"a strategy for handling data in research, providing modes of conceptualization for describing and explaining";* a good theory will be *"readily understandable"*, and *"must fit the situation being researched, and work when put into use"* (p. 3). Glaser and Strauss identified five interrelated jobs of theory: (1) to enable prediction and explanation, (2) to be useful in theoretical advance of the field, (3) to be usable in practical applications, providing understanding and some control of situations, (4) to provide a perspective on the phenomenon, a stance to be taken towards data, and (5) to guide and provide a style for research on particular problems.

Generating middle-range theories: According to Glaser and Strauss (p. 32), comparative analysis can be used to generate two kinds of theory: substantive and formal. Both these types fall between the extreme types of *'minor working hypothesis'* and *'all-inclusive grand theories'*, for which they are often called *'middle-range'* theories. They are distinguishable in their level of generality, which establishes a sequence for their discovery. Substantive theory is developed first, by a comparative analysis between or among groups within the same empirical area of inquiry (p. 33). Once substantive theory has been discovered, then formal theories can be developed by comparative analysis among different kinds of substantive cases which fall within a conceptual area of inquiry.

Clarifying the methodology: Brytting (2006: 163) has pointed out that *"some critical voices have been raised against"* Glaser and Strauss's 1967 book, the most important being that the work *"lacks practical descriptions of how the research can actually be carried out. Categories and theories are said to emerge in the mind of the researcher,"* yet a *"description of how this process occurs and how it can be*

designed and supported is neglected. Only vague and sweeping descriptions are given". This lack of actionable advice has remained a sore point, and contributed to the schism between the initiators of grounded theory. Seeking to provide actionable guidelines to researchers willing to learn and apply the methodology, experienced managers of grounded theory have produced guidelines on how to build theory. In the area of business management, it is worth mentioning the efforts of Goulding (2002) and Brytting (2006).

Building grounded management theory

Brytting (2006) has advanced a detailed illustration on how grounded theory may be used to build theory in management. As an example for the illustration, he uses his doctoral research on organizing in small firms (Brytting 1991). A simplified representation of Brytting's approach is shown in Figure 1.

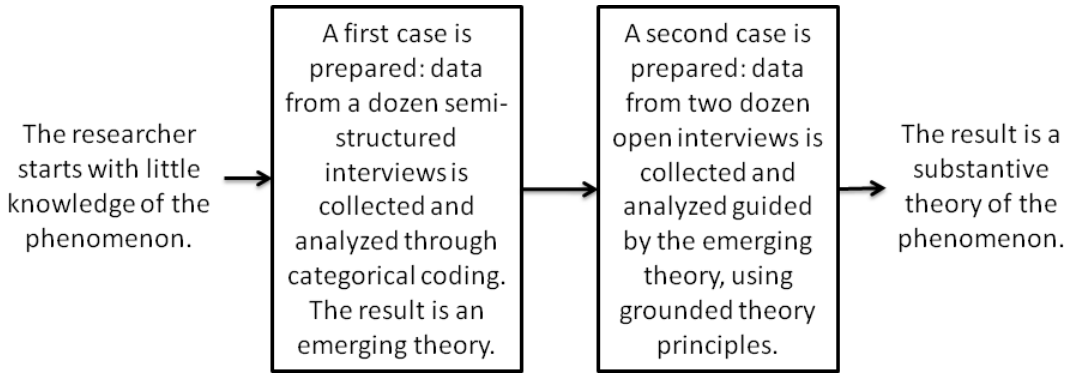


Figure 1: Brytting's (2005) grounded theory approach to generate theory in management

Brytting's approach: To better understand the phenomenon of interest, organizing in small firms, Brytting's made use of only two 'cases', chosen for intensely manifesting the phenomenon.

Case 1 focused on a mid-size firm, deliberately chosen because it had recently reorganized. Data from a dozen semi-structured interviews to its employees was collected on the subject of what organizational structure was and how it had emerged. The notes from these interviews were redistributed to the respondents for their comments. The data from case 1, the notes from the

interviews, were analyzed through open and categorical coding: conceptual categories were identified to capture recurrent themes. The categories were compared two by two, and the relationships between them were coded at a basic level. The result of this first case is an preliminary theory (an *'emerging theory'*) of the phenomenon.

Case 2 focused on a very small firm, observed directly during three years of growth, with the purpose of elaborating upon experiences identified in the first case. Data was collected through open, free-flowing interviews to the owner/manager every 2-3 months. A total of 25 formal interviews and three entire staff meetings were conducted. Roughly 300 pages of interview protocols were collected. The data were analyzed in a similar way to case 1: open coding and then categorical coding. The difference is that in case 2, the analysis was guided by the emerging theory produced from case 1. The reader is referred to Brytting (2006: 158-177) for details on how the analysis was conducted and the theory developed.

Brytting is not the first one to use grounded theory in the realm of management. Yet the clarity of his approach has made it a reference: it has been presented recently (Lowstedt and Stjernberg 2006) as an exemplar of how management theory can be built through a structured, grounded theory approach.

The Case Study Research tradition

While acknowledging there is no standard definition, Benbasat (1987: 370) defines a case study as an examination of *"a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities"* where *"the boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used."* More recently, George and Bennett (2005: 17) have defined a case as "*an instance of a class of events"* (e.g. a phenomena *"of scientific interest"*) that *"the investigator chooses to study with the aim of developing theory (or 'generic knowledge') regarding the causes of similarities or differences among instances (cases) of that class of events."*

Strengths: Benbasat proposed three reasons why case study research is a viable research strategy. *"First, the researcher can study information systems in a natural setting, learn about the state of the art, and generate theories from practice. Second, the case method allows the researcher to answer 'how' and 'why' questions, that is, to understand the nature and complexity of the processes taking place.... Third, a case approach is an appropriate way to research an area in which few previous studies have been carried out."* These were called the *"outstanding strengths"* of case study approach by Meredith (1998: 443).

Weaknesses: Meredith (1998) has listed as some of the difficulties of doing case research the following (p.444): *"the requirements of direct observation in the actual contemporary situation cost, time, access hurdles; the need for multiple methods, tools, and entities for triangulation; the lack of controls; and the complications of context and temporal dynamics,"* and *"the lack of familiarity of its procedures and rigor"* by researchers.

Building theory from case studies

George and Bennett highlight "*four strong advantages of case methods"* (e.g. within-case analysis and cross-case comparisons) *"that make them valuable in testing hypotheses and particularly useful for theory development"* (p.19): (1) their potential for achieving high conceptual validity, (2) their power to produce new hypotheses, (3) their value in examining closely the hypothesized role of causal mechanisms, and (4) their capacity to address causal complexity. George and Bennett warn that, since cases are not *"representative,"* case researchers should not make claims of applicability (p.30) and should balance *"a trade-off among the goals of attaining theoretical parsimony, establishing explanatory richness, and keeping the number of cases to be studied manageable"* (p.31).

Clarifying the methodology: George and Bennett (2005) state that, although case study methods have in some sense been around for very long (p.5), the systematic development of case study methods for the cumulative building of theories is a comparatively recent phenomenon: only in the past three decades have scholars formalized case study methods and linked them to underlying arguments in the

philosophy of science (p.6). Since case study research has not been historically tied to the objective of theory generation, it is not surprising then that the classical literature on case study research usually does not contain enough actionable advice on developing theory from case studies. For example, the most cited reference for case study research, Yin (1984, 1994, 2003, 2008), offers only passing advice on the subject of theory building. Social scientists are given explicit and up-to-date advice on how to develop theory through case study methods in George and Bennett's 2005 work. Researchers interested in management theory, on the other hand, have made Eisenhardt (1989) their favorite reference.

Building management theory from cases

Eisenhardt (1989) synthesizes previous work from three important traditions, namely qualitative data analysis (e.g. Miles and Huberman 1984), case study research (e.g. Yin, 1981), and grounded theory (e.g. Glaser and Strauss 1967), to produce a *"roadmap for building theories from case study research,"* one *"more nearly complete ... than has existed in the past."* Eisenhardt's roadmap consists of eight steps: getting started, selecting cases, crafting instruments and protocols, entering the field, analyzing data, shaping hypotheses, enfolding the literature, and reaching closure. The result is mid-range theory developed through a series of case studies. In Eisenhardt's approach, the researcher starts with no theory, with at most some preliminary constructs, and then goes to develop first-hand 4 to 10 new case studies for building the theory. As theoretical insights emerge, theoretical sampling is used to select the new cases. From an iterative, cross-case analysis, a mid-range theory emerges. See Figure 2 for a simplified representation of this approach.

Impact: The prominence that Eisenhardt's paper has enjoyed as a widely cited work during the last two decades is a testimony to the appeal of her synthesis of existing methodological literature into a single, clear, well-structured reference for building theory from case studies. A thoroughly annotated example of how Eisenhardt's approach was applied to building theory in the area of business logistics is presented in Wilson and Vlosky (1997). A deeper look into the methodological and epistemological

issues related to building theory from case and field research is presented in Meredith (1998). Nearly two decades after the original paper, Eisenhardt and Graebner (2007) came as a corollary, the purpose being to "highlight the opportunities that differentiate building theory from cases from other research strategies, describe some of its common challenges, and suggest possible antidotes."

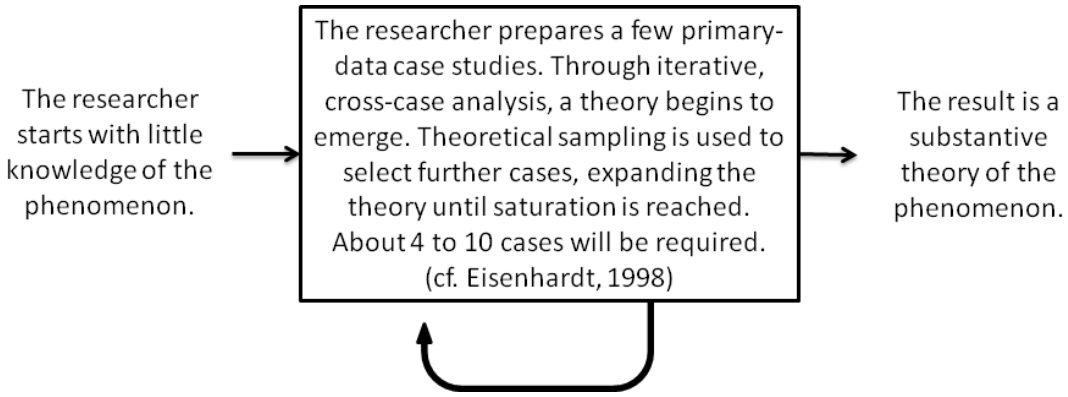


Figure 2: Eisenhardt's (1989) Case Study-Based Approach to Generate Theory in Management

The Role of Preliminary Theory

Several authors have argued for the need of a preliminary understanding of the phenomenon that will be studied before a case study research is undertaken. Gerring (2006) states that there is no such thing as case selection or case analysis in the abstract, since *"it is impossible to pose questions of research design until one has at least a general idea of what one's research question is."* Yin (2003: 28) has strongly advocated for the same idea in the following terms: a case study research design should include five elements, namely a study's question, its proposition, its units of analysis, the logic linking the data to the propositions, and the criteria for interpreting the findings. Yin argues that these five components of the research design will *"effectively force"* the researcher to *"begin constructing a preliminary theory"* related to the topic of study.

Preliminary theory as an essential precursor: Yin asserts that theory development is an essential part of the design phase for case studies (e.g. before the case starts), irrespective of whether the case study has as a purpose to develop or to test theory. Yin identifies the need for a preliminary theory, the

"role of theory development, prior to the conduct of any data collection," as a point of difference between case studies and related methods such as ethnography and grounded theory, which typically avoid in a deliberate way *"any theoretical propositions at the outset of an inquiry."* Yin warns against proceeding quickly into the data collection phase of the work, to make the field contacts as quick as possible. No guidance could be more misleading, he warns: even the selection of *"relevant field contacts depend on an understanding - or theory - of what is being studied"* (p.28)

On how to generate preliminary theory: Citing Eisenhardt (1989), Yin concedes that theory development takes time and can be difficult, and then provides some general advise. For some topics, he advises, *"existing works may provide a rich theoretical framework for designing a specific case study"* (p.29), while *"in other situations, the appropriate theory may be a descriptive theory"*, in which case answering some questions about the topic of interest may be helpful (p.30). For yet other topics, Yin warns, *"the existing knowledge base may be poor, and the available literature will provide no conceptual framework,"* in which case the case study would take the form of an exploratory study. Finally, Yin provides some advice on how to *"overcome the barriers to theory development:"* prepare for your case study by reviewing the relevant literature, discuss the topic and ideas with peers and mentors, and ask yourself challenging questions.

Using Secondary Data

McGinn (2008) defines secondary data as *"preexisting data that have been collected for a different purpose of by someone other than the researcher,"* data that *"may have been gathered originally for another research study."* Corti (2008) points out that, since the collection of new data is typically expensive, using already collected sources helps avoid duplication of research effort and investment. McGinn (2008) concurs: *"Conducting research using secondary data can entail considerable savings in time, money and labor compared to gathering firsthand data,"* and reduces the intrusions suffered by the participants of the research, because *"the data that they supply in a single research study could*

inform a broad range of research projects," maximizing its contribution.

A recent tradition: Unlike the case with quantitative data, the practice of secondary analysis of qualitative data is far less well-established, and it entails *"different and more challenging theoretical, epistemological, methodological, ethical, and practical problems for the potential user to consider"* (Corti 2008). Secondary data has *"a more recent history in qualitative research traditions, with the first methodological publications about secondary analyses of qualitative data appearing in the mid-1990s"* McGinn (2008). Typical sources of secondary data include in-depth or unstructured interviews, group discussions or focus groups, fieldwork diaries and observation notes, diaries and other personal documents, and photographs (Corti 2008).

Reanalysis: Corti and Thompson (2004) have identified six approaches to secondary analysis: description; comparative research, restudy, or follow-up study; reanalysis; research design and methodological advancement; verification; and teaching and learning. The most relevant to the present text is the *reanalysis* of qualitative data, which according to Corti (2008) allows both for new interpretation and new questions to be asked of data, new perspectives to be applied, and new analytical methods and tools to be employed. Corti states that the 'richer' the original research material, the more potential there is for further exploitation; and that secondary analysis is particularly valuable where *"access may have been difficult to negotiate or data hard to collect."* The question of access gains particular relevance in a business setting when the researcher intends to intervene in an organization, or when the organization expects to take action based on the findings of the researcher. For a discussion of access for qualitative management research, see Gummesson (2000: 25-56).

Our approach to preliminary theory as part of theory building

Chapters 3 and 4 of this thesis describe how a preliminary theory was developed based on secondary case studies. Based on this experience, an alternative approach to developing theory from case studies is recommended. It consists of generating a preliminary theory based on multiple secondary

case studies, and then enriching the emergent theory with 1 or 2 primary data case studies.

Compare this approach, represented in Figure 3, to the approaches presented by Brytting (Figure 1) and Eisenhardt (Figure 2). In our alternative approach, the researcher starts with no theory, and uses a pool of ~20 extant case studies as secondary-data for producing a preliminary theory through a similar iterative, cross-case analysis. Theoretical sampling is used within the limits of the case pool. The researcher then builds upon that preliminary theory by preparing and analyzing 1 or 2 new primary-data case studies. The first of these cases will help expand and enrich the theory, while the following will serve as replication and to help the researcher reach *'closure'*.

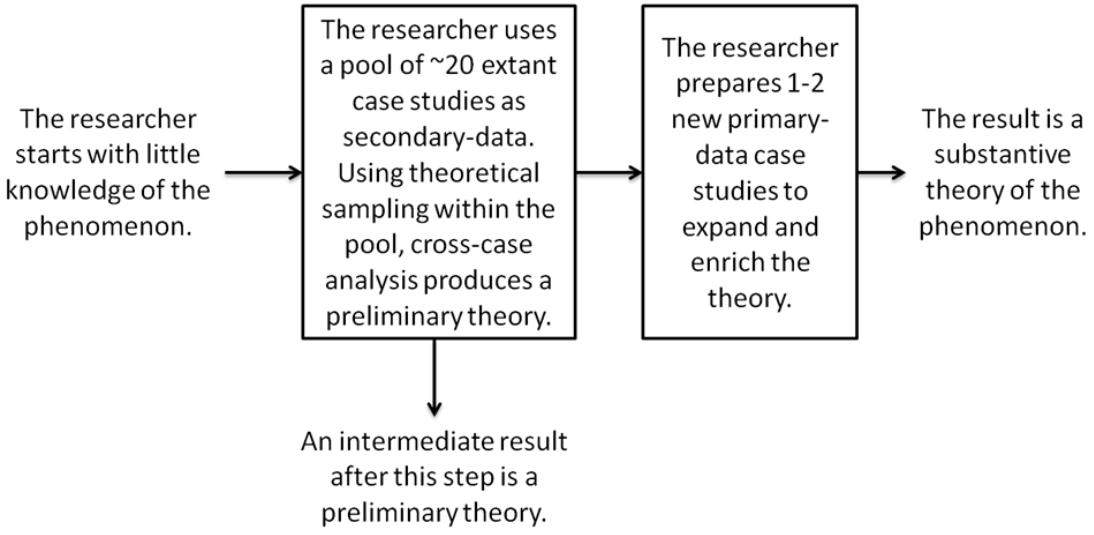


Figure 3: A preliminary theory-based approach to generate theory in management

The main advantage of this proposed alternative over the more traditional approach is the ability to generate a wide-footprint preliminary theory, based on over a dozen cases, in a relatively short time. This makes it particularly suitable for projects where researchers are expected to have produced a theoretical contribution by the end of the project, while at the same time providing an actionable solution to a real-world problem in a relatively short time span.

Action Research

What is Action Research

Harris (2007) defines action research as *"an informed investigation into a real management issue in an organization by a participating researcher, resulting in an actionable solution to the issue. It is a method by which the researcher may bring new knowledge to organizational members, and discover a workable local theory of benefit to the organization, which may also inform the research community."*

As a research methodology, action research is *"flexible"* and *"uniquely suited to researching and supporting change."* Somekh (2008). What sets it apart from other field methods is "*the concept of an intervention, involving the researcher in an active role with other organizational participants in bringing about some change"* Harris (2007).

Researching in successive cycles

"Action research is built upon the idea that theory is developed through successive cycles of combined reflection and action in practice." Docherty (2006). Thus, it *"involves fluid and overlapping cycles of investigation, action planning, piloting of new practices, and evaluation of outcomes, incorporating at all stages the collection and analysis of data and the generation of knowledge"* (Somekh, 2008).

Contributions to theory and practice

"Action research aims to contribute both to the practical concerns of organizations in a problematic situation and to the goals of science by joint collaboration within a mutually acceptable ethical framework" (Naslund, 2002).

"*The outcomes of action research are both practical and theoretical: The knowledge it generates has a direct and ongoing impact on changing practice for participants and on a wider audience through its publications"* (Somekh, 2008).

Bridging theory and practical knowledge

Action research *"forms a bridge between practitioner understanding and the generation of theoretical knowledge to inform action,"* states Somekh (2008), through which *"knowledge generation and the development of new practices are integrated and theorized."*

The challenge for action researchers, states Muller (2005), lies precisely in this balancing act: *"engage in both making the action happen and stand back from the action and reflect on how it happens in order to contribute theory to the body of knowledge."*

Ability to make explicit the tacit knowledge

Somekh (2008) points out that *"one of the most important contributions of action research as a methodology for building understanding of change and development is its unique access to insider knowledge. Through adopting the role of researchers, practitioners are able to reflect on and make explicit the tacit knowledge that guides their practice, and their involvement as co-researchers ensures that the knowledge generated by action research incorporates this unique—and often neglected—component."*

In action research, says Docherty (2006), *"researchers and practitioners are sharing their different kinds of knowledge in the process of analyzing the conditions in need of change and designing ways of accomplishing the changes desired." Docherty adds that, "given the growing complexity of the issues facing companies, the need to include all stakeholders actively in transformation processes makes participation more important."*

Action research in supply chain management

In his paper *'Logistics needs qualitative research - especially action research*', Naslund (2002) makes the case for using action research to address research questions in the field of logistics: *"Logistics problems are often ill-structured, even messy, real-world problems."* Since the research problem drives

the research project and the choice of methods (Eriksson and Kovalainen, 2008), Naslund's recommendation makes sense: *"action research case studies are especially suited for an applied field such as logistics since they strive to advance both science and practice"* Naslund (2002).

A similar case is made by Muller (2005) in *'Action Research in Supply Chain Management,'* when he says: *"In general, supply chain management is a rather young field of research, and the need for further conceptual and theory-build[ing] research is frequently highlighted."* Muller argues that *"action research projects can contribute to generating new knowledge"* in supply chain management.

Learning more about Action Research

There is much diversity in Action Research (Cassell and Johnson, 2006). A lot of what we do in this thesis falls under what can be described as the *collaborative inquiry* branch of Action Research. As a relatively new and evolving research approach, Action Research is still being actively debated in, and shaped by, the literature. For further details on Action Research, its many variants and current applications, the reader is referred to "*The SAGE Handbook of Action Research: Participative Inquiry and Practice*", edited by P. Reason and H. Bradbury (Sage, 2007).

Summarizing, in this chapter we stated our choice of research methodologies, listed our data sources and discussed the literature relevant to grounded theory, case study research and action research. In the next chapter we will develop an understanding of how the business strategy of a firm is typically communicated to the supply chain function, and propose a framework for its articulation.

CHAPTER 3. UNDERSTANDING HOW NOMINAL STRATEGY IS ARTICULATED

Very early in our analysis of case studies and of interviews with managers, it became clear that the overall nominal strategy of the organization (e.g. the business strategy) is a major force shaping its supply chain strategy. What we heard from managers suggested that the purpose of the supply chain strategy was largely to make the business strategy *happen*. In other words, what we heard from managers suggested that the business strategy is what gives purpose to the supply chain strategy : the managers in charge of the functions receive the business strategy from the top, as a given, as a strategic imperative, and then be asked to formulate and implement the supply chain strategy to support it.

Given the importance that this *articulated nominal strategy* has for the organizations, particularly to the functions, it comes as a surprise that scant attention has been given in the specialized literature to the question of how the business strategy is articulated. Given the relevance that the nominal strategy has for our research as part of the context of, and arguably the main driver of, the supply chain strategy, we decided very early to invest an important amount of time into better understanding how nominal strategy is being articulated when it is made explicit and communicated to the functions. In this chapter we discuss at length how, by means of an inductive, grounded theory-building approach, we analyzed a pool of 21 case studies and developed a theoretical framework of the articulated nominal strategy.

Introduction

Business strategy (referred to as **'strategy'** in the remainder of this chapter) is a much researched, discussed and debated field. Mintzberg, Ahlstrand, & Lampel (1998), for example, list ten different schools of thought on strategy formulation. However, despite the overwhelming richness of the strategy literature, there is an evident lack of consensus among academics and managers alike on various

important aspects of strategy.

We decided to step back from these schools of thought and to take a fresh look at other somewhat poorly researched areas, such as whether strategy should be made explicit, and how strategy is articulated when it is communicated to the functions of an organization. The present chapter attempts to addresses the question of articulated strategy, through an inductive, theory-building approach, grounded on empirical data from a diverse and ample selection of cases.

Review of the relevant literature

The actual articulation of strategy is not well understood, despite its relevance, since description is necessary for communication. The strategy literature, mostly concerned with strategy formulation and execution, barely touches upon the subject of how strategy is articulated. For the most part, the articulation of strategy is not discussed, being instead tacitly taken for granted. In the few instances in which strategy articulation is actually discussed, the discussion seems to shun the question of *how* it is articulated, and instead revolves almost exclusively around the question of whether the expected benefits of articulation outweigh the presumed risks.

Along these lines, some authors have presented arguments with a prescriptive intention, based on their expert opinion, both in favor (Andrews, 1982) and against (Mintzberg, 1990; Quinn, 1977) the explicit articulation of strategy. Other authors have employed empirical data to test the relationship between articulating strategy and firm performance, with the level of centralization of the firm as a third, mediating variable (Love, Priem, & Lumpkin, 2002).

Even as these authors address the question of whether strategy articulation is valuable, the obvious and patently relevant issue of 'how strategy *is* articulated' has been the subject of scant attention from specialized literature. For example, Andrews (1982), who is described in Mintzberg (1990) as a proponent of strategy articulation, treats the reader to a single example of an articulated strategy in the very text where he is advocating the benefits of making strategy explicit. Furthermore, Andrews himself

questions the quality of the sole example he presents in his text.

A painstaking search in the specialized literature yielded no study presenting a systematic analysis, based on empirical data, of how successful firms actually articulate their strategy. The non-specialized literature, on the other hand, has seen some prescriptions for strategy articulation, yet lacking a rigorous and grounded theoretical framework to support them. For example, Hambrick and Fredrickson (2005), and Kaplan and Norton (2004), offer prescriptive frameworks for the representation of strategy, apparently based solely on their expert opinion. The fact that no disclosure is given of what analysis – if any – was conducted to develop and validate these frameworks, prevents us from assessing the theoretical contribution of these proposed models.

Why strategy articulation matters to our problem

The fact that the literature is mute on how strategy is articulated came to us as a surprise as we worked in a larger project focused on our domain, supply chain strategy. We approached the subject business strategy from an execution point of view, from the perspective of a functional need, which demands articulation and clarity. Since strategy articulation is so core to our overall research, we considered the business strategy literature in an unyielding manner to seek guidance and frameworks, failing which we embarked on this research to address the central, yet so far ignored issue of how business strategy is articulated.

The absence in the literature of a rigorously developed theoretical model of articulated strategy requires that researchers willing to advance this area should address this problem first. A way to tackle the problem is to use an inductive, theory-building approach (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). The lack of a systematically developed theory worthy of being tested prevents the use of a theory-testing approach since, before a theory can be tested, it must be constructed (Snow, 1994).

The gap in the literature also affects management managers. As Dr. Mahender Singh has pointed out, «if strategy is what you do and what you don’t do (Porter, 1996), then by the same token, what you

do or don't do constitutes your strategy». Singh has argued that a thorough understanding of strategy must include awareness of both the areas that the firm addresses and does not address through their strategy. According to Singh, by turning the strategist's attention to those areas that have been ignored – deliberately or not – in the strategy formulation process, the bargain of addressing some issues while ignoring others becomes explicit, and enters the awareness of the decision maker. This reveals and sharpens the focus on the true intentions and precise choices that are being made by the organization. Encountering strategy in this manner – 'stress-testing' the strategy as Singh calls it – before it is put into motion, will force decision makers to validate strategic decisions and make necessary revisions and preparations to increase its chances of success.

The purpose of the present chapter is to present the results of our attempt at filling the gap in the literature regarding how strategy is articulated. This is done by means of a rigorous, grounded analysis of case study data, focused at developing a theoretical model of the structure and content of articulated strategy.

Our research approach

To address both the theoretical and practical concerns outlined above, we have defined a two-fold research question, with descriptive and prescriptive aspects: How is strategy articulated by successful companies? And, what can this teach us about how strategy could be articulated? The present study was conducted following the multiple case-study research approach (Yin, 2003; Stake, 2006). The analysis was performed utilizing a combination of techniques for the analysis of qualitative data, including open and categorical coding, and discourse analysis (Miles & Huberman, 1984; Eriksson & Kovalainen, 2008).

Our data came from a larger project on supply chain best practices, known as the MIT Supply Chain 2020 Project. In-depth data from a varied sample of firms deemed successful, in terms of their perceived performance and reputation, was collected and analyzed as individual cases. Fifteen documents, including theses and papers prepared in 2005, illustrated cases on Dell (Roy, 2005), Zara (Chu, 2005),

Wal-Mart (Chiles and Dau, 2005), Amazon.com (Chiles and Dau,2005), IBM (Roy, 2005), Rolls-Royce (Tiwari, 2005), P&G (Rah, 2005), Gillette (Rah, 2005), Elli Lilly (Singh, 2005), Cardinal Health (Singh, 2005), Cisco (Boasson, 2005), Lucent (Boasson, 2005), Exxon Mobil (Santos, 2005), General Motors (Braese, 2005), Inbev (Finkelstein, 2005), Limited Brands (Kumar, 2005), Victoria's Secret (Kumar, 2005), Metro C&C (Schranz- Whitaker, 2005), Metro AG (Schranz-Whitaker, 2005), and Shell (Röthlisberger, 2005).

The firms covered in these papers spread across seven industry categories in the Industry Classification Benchmark (ICB): Basic Materials, Consumer Goods, Consumer Services, Health Care, Industrials, Oil & Gas, and Technology. They spread across twelve ICB sectors: Aerospace & Defense, Automobiles & Parts, Beverages, Chemicals, Food & Drug Retailers, General Retailers, Leisure Goods, Oil & Gas Producers, Personal Goods, Pharmaceuticals & Biotechnology, Software & Computer Services, and Technology Hardware & Equipment.

Each case describes in detail an array of aspects of the sampled firm, among which is the firm's strategy. Each document was prepared by a separate researcher, over a period of nine months, under the close supervision and guidance of faculty members and more senior researchers at MIT and the MIT-Zaragoza International Logistics Program. The data employed to prepare the cases came from both primary and secondary sources. Primary sources included interviews with personnel from different levels and functions in the organization, from C-level executives to mid-level managers, from functions such as sales, marketing, finance, operations, procurement and supply chain management, among others. Secondary sources included documents, both internal and external to the organization, from internal strategy documents to publicly available information. Although the researchers were provided a conceptual guide outlining general categories of data to be collected and analyzed, the researchers were given discretionary power to determine the course of their data collection and data analysis, as well as presenting their findings. Thus, although they were produced in the context of a common project with

shared guidelines, each case was independently analyzed and synthesized. The results were captured in separate document that were independently produced. The cases can be considered separate instances of the phenomenon of interest. Diversity, both in terms of industry, sources and authorship, makes each case "a distinct experiment that stands on its own as an analytic unit" (Eisenhardt & Graebner, 2007), to serve "as replications, contrasts, and extensions to the emerging theory" (Yin, 1994). Eisenhardt (1989) has indicated that such "replication logic" is "central to building theory from case studies".

A preliminary analysis resulted in two of the cases being excluded from any further consideration, as they were found to be lacking, one in terms of clarity, and the other in terms of depth. Thus, a total of thirteen documents, covering twenty different cases, were used as data.

The case study pool was supplemented with one additional case that came from a totally different source: an intensive, in-depth research project we conducted with a firm that was not part of the original case pool. As part of the research project we are conducting with this company, we were given access to internal strategy documents. The purpose of this additional case is to provide a contrast with the pool of cases prepared back in 2005, to control for issues such as researcher bias and other methodological variables that could have influenced the way the data was collected or processed. This should help blunt "criticism and skepticism" regarding the "uniqueness or artifactual condition" surrounding the cases (Yin, 2003).

Since our goal is to generate new ideas inductively for a theoretical model of articulated strategy, the choice of research techniques from the qualitative toolkit, instead of the quantitative one, was not difficult (Easterby-Smith, Thorpe, & Lowe, 2002). Qualitative methods help the researcher keep his assumptions in check and open his thought process to emergent – and often unsuspected – findings that enrich the theory-generation effort (Gummesson, 2000; Eriksson & Kovalainen, 2008). Open and categorical coding, techniques often used for the analysis of qualitative data in the discovery of grounded theory (Charmaz, 2006), were employed extensively to analyze the passages of the cases that

referred to the strategy of the firms. The purpose of using open coding was to stay close to the data, while categorical coding was used afterwards to help us identify the deeper concepts behind the text (Goulding, 2002). Discourse analysis was used to analyze particular passages of interest, and interpret the meaning behind the strategy discourse (Eriksson & Kovalainen, 2008). Other techniques for the analysis of qualitative data were applied when they were deemed needed. For example, tables that summarize the evidence (Eisenhardt, 2007) were used to compare and contrast some key features of the cases. Also, conceptual maps (Miles & Huberman, 1984) were used to summarize in a graphical form the theoretical model that emerged from the analysis.

Several exercises to assess the *analytical generalizability* (Yin, 2003) of this theoretical model were conducted. Evidence in favor of the robustness of the sample employed was provided by the variety of categories that emerged in our different analyses of structure and content, across boundaries of authorship, explicitness and industry. However, since the purpose of this research was theory-building, we do not make claims beyond that of assuming our proposal is a plausible framework for describing the articulated strategy of a firm. The proposed theoretical framework will have to be tested through further theory-testing research in the future, which could further validate and enrich it, and delimit the sphere of its applicability. In order to enhance the reliability of the analysis and its results, every stage of the analysis was discussed by both authors of this study. The use of inter-researcher discussion resulted in the revision of several intermediate categories, both in the categorical coding and the content analysis. Consistent with the nature of inductive inquiry, we remained open to emerging themes and conducted our analysis in a flexible way. Instead of having a predefined analysis agenda pre-established from the beginning, we let the data speak to us, and explored the different interesting threads that emerged during the analysis (Goulding, 2002; Charmaz, 2006).

The present chapter has been structured in a way that facilitates the presentation of the analysis, and highlights the theoretical framework that emerged (Yin, 2003). The presentation is structured in a

way that better serves the purpose of clarity and thoroughness, and includes quotations and tables that illustrate the findings, analysis, and data on which they are grounded (Eisenhardt, 2007).

Developing the theoretical framework

The 'core strategy'

Roy (2005) presents **Dell**'s strategy in the following terms: "Dell's business strategy is to be the 'highest value to price provider of computers and accessories to price conscious customers'." The use of quotation marks by Roy indicates that he is citing Dell. Here we have a single statement being presented as articulating Dell's "business strategy".

Describing **Gillette**'s strategy in his case study about that firm, Rah (2005) states the following: "Gillette's business strategy is to 'build total brand value by innovating to deliver consumer value and customer leadership faster, better, and more completely' than its competition." Notice that here the author is citing Gillette. A single statement is used to articulate the firm's "business strategy".

In the case about **Elli Lilly**, Singh (2005) presents this firm's strategy in a concrete statement: "the core strategy of Lilly is to 'pursue products for unmet medical need'." Here the author uses quotes from Elli Lilly. A single statement is being used to articulate, in a succinct way, Elli Lilly's "core strategy".

These statements reveal an interesting pattern: the authors are using a single statement to articulate a firm's strategy. The reader might be surprised both by the simplicity of these statements and the author's implicit claim that these statements, in some manner, are sufficient to articulate the main idea of the strategy of the firm that occupies them.

The temptation to disregard these statements as oversimplifications perpetrated by inexperienced authors is nullified by the fact that it is not the words of the authors that are used to articulate the strategy, but quotations that they are borrowing from other sources to which the authors had access during the data collection period. Also, the three examples given above can hardly be considered

exceptional, as others can easily be found in our pool of case studies. The following two, for example, are similar in the sense that they present the strategy using a single statement and make use of the firm's own words: "**IBM**'s business strategy is to be a 'diversified and value added provider of networked technology solutions to businesses around the world'." (Roy, 2005.) "**Wal-Mart**'s business strategy is to provide 'Every Day Low Prices' or EDLP for all of its products and services." (Chiles & Dau, 2005)

Several examples can also be found of cases where the author uses his or her own words to articulate the firm's strategy: "In **Lucent**'s case, the overall business strategy seems to be about shaping the telecommunication market while dominating it." (Boasson, 2005.) "**P&G**'s business strategy is to be the leader of innovative branded products to the consumer markets." (Rah, 2005.) "**Shell**'s strategy is to invest more in the upstream and use the downstream to finance this investment" (Röthlisberger, 2005)

The point we are trying to illustrate with the previous eight examples is that, when articulating their strategies, some firms resort to a statement that presents a central, important idea. This statement we call the 'core strategy,' borrowing the terminology employed in Singh (2005).

Not all statements use such a straightforward phrasing in the form of "strategy is". Other presentations of the core strategy that we have found in our case pool use an introductory title and then the statement describing the strategy. Here are two examples: "**Rolls-Royce**'s Business Strategy: Rolls-Royce pursues parity in operational excellence with its competitors." (Tiwari, 2005.) "The **Unit-X** Strategy: The Unit-X business will grow with the market while managing margins in order to create sustainable and attractive returns on future capital investments" (Source: internal document of Unit-X.) For the purpose of introducing the idea of the core strategy to the reader, we have selected statements that present a single, rather straightforward idea. However, the wording of the core strategy is not always limited to a singular idea or expressed using a single statement. Some of the cases from our pool display higher complexity.

One way in which the core strategy statement could be more complex than the examples shown

above is in the number of ideas contained in the statement of the core strategy. Shell's example already hints at not one, but two closely connected ideas. A statement that also contains two ideas, but presents them worded as two separate sentences, is found in Chu's (2005) case about Zara: "**Zara**'s strategy is to provide unique and innovative fashion products at low prices. The retailer ensures that consumers quickly buy a product when they see it by creating and fostering scarcity." (Chu, 2005)

Another source of variation is the degree of explicitness of the core strategy. Above we have presented eleven instances, out of twenty one cases, in which the core strategy is presented in clean and unequivocal terms as being "the strategy". However, not always is the strategy presented in terms of an explicit core strategy: in some cases it is given in a less definite, more diluted way.

In some cases, the divergence from complete explicitness comes when the same strategy statement is presented under different names. Consider, for example, the following three statements regarding the strategy of GM, shown in the sequence in which they appear in the case study document: "**GM**'s business strategy is to have as much market share as possible." "The corporate vision is to be the 'world leader in transportation and automotive services'." "General Motors' company-wide business strategy is to be the 'world leader in transportation and automotive services.' This means having the most market share and providing a large selection of products on a global basis." (Braese, 2005.)

Two things are remarkable from this group of three statements. The first is that what is presented in the second statement as 'vision' is later called the 'company-wide business strategy' in the third statement. The second remarkable thing is that what is given as 'business strategy' in the first statement is later given the humbler role of a clarification to the company-wide business strategy in the third statement.

Taking the second and third statements together, it would seem that the author is suggesting that the vision and the strategy are either same thing, or at least identical. This could be disregarded as the unintended substitution of a careless author, if it were not for the fact that it is not unique. Consider the

following example: "**Amazon**'s annual report states that their mission is to offer 'Earth's biggest selection' and to be 'Earth's most customer-centric company, where customers can find and discover anything they want to buy'." "Amazon.com's goals through its vision statements are to be 'earth's most customer-centric company' while providing 'earth's biggest selection'." According to the author's perspective, mission and vision are either the same thing or identical things. The point here is that, when it comes to an articulated strategy, and despite the expectations that academics might have otherwise, different labels could actually be referring to the same thing.

Encouraged by the fact that explicit core strategies were found in many cases, we decided to conduct a comprehensive analysis of all twenty one cases, searching for potential central ideas behind the presented strategies. As we have shown above, twelve out of twenty one had an explicit, easily identifiable central statement articulating the strategy in the form of "X's strategy is such and such". Remarkably, in the remaining nine cases, where there was no single, explicit statement articulating a central idea presented under the name of "the strategy", but a central idea still existed implicit in the strategy description, and could be brought to light with little effort.

Categorical coding and discourse analysis were employed on the passages that described the strategy in the cases, searching for core strategies, e.g. a single central idea behind the articulated strategy of a firm.

In fourteen cases, there was a single core strategy clearly labeled as "the strategy" in the case. In six cases, a single core strategy was identified, but in a passage of the text where there was no reference calling it "the strategy". Finally, in one case (Metro C&C) we found not one but two core strategies, one explicit and one implicit. In fourteen out of twenty one cases, the core strategy was extracted in a form almost identical to the exact form it was given in the text. Six others were reworded for clarity. Only one of the core strategies had to be derived from a more diluted presentation in the text through the use of content analysis. The findings of our exercise are presented in Table 1.

Case	Core Strategy
Dell, by Roy	Be the highest value to price provider of computers and accessories.
Zara, by Chu	Provide unique and innovative fashion products at low prices, and entice consumers to buy quickly by fostering scarcity.
Wal-Mart, by Chiles and Dau	Provide everyday low prices to customers.
Amazon, by Chiles and Dau	Be the most customer-centric company, where customers can find and discover anything they want to buy.
IBM, by Roy	Be a diversified and value added provider of networked technology solutions to businesses around the world.
Rolls-Royce, by Tiwari	Maintain a strategic parity with other competitors in the industry.
P&G, by Rah	Be the leader of innovative branded products to the consumer markets
Gillette, by Rah	Build total brand value by innovating to deliver consumer value and customer leadership faster, better, and more completely than our competitors.
Elli Lilly, by Singh	Pursue products for unmet medical needs.
Cardinal, by Singh	Become essential to the delivery and improvement of patient care, extending our reach through collaborative relationships defined by customer needs.
Cisco, by Boasson	Be the leader end-to-end solution provider, retain dominant share in the networking market, and maintain high profit margins.
Lucent, by Boasson	Shape and dominate the telecommunication market.
ExxonMobil, by Santos	Focus on the segment offering the highest returns.
GM, by Braese	Be the world leader in automotive and transportation services by providing a wide variety of models.
Inbev, by Finkelstein	Establish ourselves in the top position in terms of beer volume.
Limited Brands, by Kumar	Become a large, powerful brand. [A transition strategy (1995-1998)]
Victoria's Secret, by Kumar	Be the dominant, young, sexy and sophisticated lingerie and beauty concept.
Metro C&C, by Schranz-Whitaker	Offer freshness and variety. Be the international market leader in self-service wholesale.
Metro AG, by Schranz-Whitaker	Lastingly increase the value of the company.
Shell, by Röthlisberger	Invest more in the upstream and use the downstream to finance this investment.
Unit-X, from internal document	Grow with the market while managing margins in order to create sustainable and attractive returns on future capital investments.

Table 1: Core strategies identified for each firm.

The 'strategic themes'

In the previous section, we presented a quotation from Chu (2005), which started with the phrase "Zara's strategy is…" This is the core of Zara's strategy. However, it is sufficient to describe it. To make sure that the reader of such a statement may not think that this is all there is to Zara's strategy, Chu continues saying as follows: "As a general statement, this describes Zara's overall strategy, but in addition to this statement there is more to Zara's overarching strategy and philosophy." Chu goes on then to present, in a much more extensive text passage, what he considers to be other relevant parts of

the strategy. In other words, what Chu presented before as “the strategy” is good as a general statement. However, there is more to the strategy than that single idea. This might strike some readers as a contradiction, but it is not unique.

In the previous section we presented a quotation from Tiwari (2005), which started with the title “Rolls-Royce’s Business Strategy.” Just like in the case of Zara, the reader would expect that what is presented under such a title would be sufficient to describe the business strategy. However, in a different section of the case study, the author presents a totally independent statement, that reads:

> “**Rolls-Royce** defines its strategy as follows:
> - Address four global markets.
> - Invest in technology, capability and infrastructure.
> - Develop a competitive portfolio of products and services.
> - Grow market share and installed base.
> - Capture substantial aftermarket service opportunities.”

Tiwari, thus, resorted to an enumeration of five different concepts. A careful reading of the thesis will reveal that these concepts reappear in other parts of the thesis, elaborated into more detail, and described as the logic behind some strategic decisions. In other words, these ‘tentacles’ that go beyond the central idea presented elsewhere are in reality patterns, recurring thematically throughout the discussion of the firm’s strategic decisions, functions and operations.

These are what we call “strategic themes.” The word emerged after an in-depth analysis of Dell’s case study, and was later lent credence when we found an illuminating passage in another case from our pool. Boasson (2005) reflects on how some of Cisco’s strategic behaviors seemed constant across time, as seen in two different books that described the firm, written in two different times. In this context, Boasson says that “themes delineated by the previously mentioned books are repeated in this book, withstanding the test of time.”

The two examples we have presented so far come both from the documents that were prepared by MIT in 2005. A third example comes from the internal strategy document of the firm that we included to

the case pool as a comparison. The previous section mentioned that an internal strategy document, entitled “The **Unit-X** Strategy,” presented a single statement describing the strategy. After that single statement, however, comes an enumeration of four strategic themes. This enumeration is presented in the document, and is considered by the members of the firm, to be at least as integral a part of the strategy as the previous statement. In the document they are called “key strategic objectives,” but in informal conversation they are referred to as “the four pillars.”

Unit-X is not alone in defining their strategy in terms of an enumeration of concepts they call “pillars”. For example, Schranz-Whitaker (2005) presents the following quotation from another source, referring to Metro AG’s strategy: “The major pillars of the strategy of profitable growth are the optimization of the distribution concepts, the optimization of the portfolio and the internationalization of the company.” These are the three strategic themes of Metro AG, which echo throughout the case study as recurring patterns in the implemented strategy.

Another example comes from Finkelstein (2005). Finkelstein states that “InBev’s business strategy can best be summarized” by a statement taken from their website in 2003, which he quotes verbatim in its entirety. Here we present the key highlights:

> “**InBev**'s strategy is based on four pillars:
> - First, winning with consumers via our winning brand portfolio....
> - Second, winning at the "point of connection"...
> - Third, developing world-class efficiency and operating productivity...
> - Fourth, we will ensure... that we can strengthen our positions in... markets...
> - Finally, supporting these four pillars is the way we differentiate through innovation....”

At this point a pattern starts to emerge: some firms use a number of key concepts, which we call strategic themes, to articulate their strategy. The last three firms called it their “pillars,” but these concepts also appear under other names, not always in the form of a neat enumeration.

For contrast, let us present here an example of a firm whose strategy is presented in terms an enumeration of three strategic themes that are not given a collective name. Discussing Amazon, Chiles

and Dau (2005) present this text, taken from a source, which comprises Amazon's strategy: "Specifically stated, their business strategy is to 'offer customers low prices, convenience, and a wide selection of merchandise'." The authors of the case go on to elaborate on these three "complementary" and "very important element[s] to their business strategy."

In yet other examples, such as Limited Brands, Victoria's Secret and Gillette, the multiple key concepts are given in the context of a longer description. For illustration purposes, here is what Rah (2005) says about Gillette's strategy. Since we already presented the first statement earlier, which we identified as the core strategy, the reader should focus on the second sentence onward:

> *"Gillette's business strategy is to 'build total brand value by innovating to deliver consumer value and customer leadership faster, better, and more completely' than its competition. They continue to work on securing its world leader position in male grooming, female grooming, alkaline batteries, and manual and power toothbrushes, while improving the supply chain to be more effective and responsive. They continue to improve brand image and consumer values by developing leading-edge products, and the company stays competitive with its significant amount of expenditure spent on research and development to keep the stream of new products going. In order to support the strategy, Gillette keeps close attention and continuous communication with its consumers, retailers, and suppliers to meet the strategic goals each year."*

Through content analysis, we obtained from it four strategic themes: (1) Secure a leadership position in key markets. (2) Develop a responsive and effective supply chain. (3) Sustain brand image by developing quality, innovative products. (4) Keep close contact with consumers.

The question, then, is whether such strategic themes are the exclusive province of a few, or a common feature of articulated strategies. To address it, we decided to conduct a comprehensive analysis of all twenty one cases, searching for potential strategic themes in the articulated strategies. As before, categorical coding and discourse analysis were employed on the passages that described the strategy in the cases.

In nine cases, the strategic themes were clearly presented as “the strategy”; they were what we call explicit strategic themes. In eight cases, the strategic themes were identified in passages where they were not called “the strategy”; these we call implicit strategic themes. In four cases, strategic themes were presented in a mixed fashion: some explicit and some implicit. Again, some of the themes were extracted verbatim, while others were reworded or 'distilled' via content analysis. The findings of our exercise are presented in Table 2.

Case	**Strategic Themes**
(1) Dell, by Roy	A. Reduce cost B. Improve efficiency C. Minimize inventory D. Reduce cash-to-cash cycle
(2) Zara, by Chu	A. Attain total control over product from design to store B. Offer high value at low cost C. Produce limited quantities of a high variety of fashion items D. Bring products to the store fast
(3) Wal-Mart, by Chiles and Dau	A. Open stores in small communities B. Carry a wide variety of products C. Keep products available in shelves
(4) Amazon, by Chiles and Dau	A. Offer customers low prices B. Offer customers convenience, C. Offer a wide selection of merchandise
(5) IBM, by Roy	A. Provide a single face to customers, B. Provide extensive pre-sales and post-sales support, C. Offer tailored-made servers and systems
(6) Rolls-Royce, by Tiwari	A. Address four global markets. B. Invest in technology, capability and infrastructure. C. Develop a competitive portfolio of products and services. D. Grow market share and installed base. E. Capture substantial aftermarket service opportunities
(7) P&G, by Rah	A. Build strong brand portfolios B. Introduce innovative products to the market faster than competitors C. Have products available on the shelf D. Offer quality that satisfies the consumer when the product is used
(8) Gillette, by Rah	A. Secure a leadership position in key markets B. Develop a responsive and effective supply chain C. Sustain brand image by developing quality, innovative products D. Keep close contact with consumers
(9) Elli Lilly, by Singh	A. Invest heavily in R&D, marketing and promotion B. Provide extensive customer support C. Assure high drug availability D. Assure high quality of drugs
(10) Cardinal, by Singh	A. Maintain flexibility B. Maintain high service levels C. Keep close relationship with suppliers and customers D. Provide our team what they need to act

(11) Cisco, by Boasson	A. Massively outsource hardware, to concentrate on software B. Mind the importance of standards ("platform leadership") C. Employ aggressive mergers and acquisitions tactics
(12) Lucent, by Boasson	A. Develop technology in-house B. Outsource manufacturing C. Have a single point of contact with the customer
(13) Exxon Mobil, by Santos	A. Growing by focusing on the upstream (geological exploration and production of hydrocarbons) and gas & power business units B. Improve the integration and efficiency of the downstream activities C. Increase our business presence in Asia, particularly in China D. Focus the Exxon brand on value and the Mobile brand on performance E. Use downstream activities as cash generators and sources of control
(14) GM, by Braese	A. Have as much market share as possible B. Produce and sell as many vehicles as possible. C. Make a significant number of models and options available for end consumers to choose from D. Have the correct specifications at the right time
(15) Inbev, by Finkelstein	A. Win consumers over via our brand portfolio B. Win through superior capabilities in sales, merchandising and distribution C. Develop world-class efficiency and operating productivity D. Strengthen our positions in developed and high-growth markets E. Differentiate through innovation
(16) Limited Brands (1995-1998), by Kumar	A. Develop a distinct brand identity and image B. Control our own retail distribution channels C. Seek a consistent repeatable business D. Narrow our portfolio, dropping all poor performers
(17) Victoria's Secret, by Kumar	A. Sell innovative, technologically advanced products B. Price for reasonably high profit margins C. Target young customers who appreciate the value of possessing innovative lingerie D. Offer a mixed assortment of fashion and basic goods E. Introduce new products every four to six weeks in order to generate interest in the brand
(18) Metro C&C, by Schranz-Whitaker	A. Sell only through our own retail stores B. Cater to local tastes C. Source locally D. Create trust and acceptance in new markets E. Deliver best value through product assortment
(19) Metro AG, by Schranz-Whitaker	A. Internationalize the company (Expansion) B. Optimization of the portfolio (Innovation) C. Optimize the distribution concepts (Operational Efficiency) D. Position each division in its individual market and make it sustainable in its own right
(20) Shell, by Röthlisberger	A. Remain a vertically integrated company, to stay one of the world leaders in energy and petrochemicals B. Broaden our upstream portfolio to include only select profitable markets and businesses C. Focus our downstream ventures more on "growth markets" D. Simplify the organizational structures, cut cost base and become more responsive E. Pursue a single-brand strategy

(21) Unit-X, from internal document	A. Rebalance market power and maximize the value of sales to the existing market B. Achieve lowest delivered costs position in all world areas C. Use focused innovation to create significant new, higher margin opportunities D. Anticipate and head-off long term threats to our industry's structure

Table 2: Core strategies and strategic themes of the articulated strategy, for each case.

The emergent theoretical model

We propose at this point an emergent theoretical model, based on the concepts of core strategy and strategic themes. Our emergent model postulates that an articulated strategy includes a core strategy and several strategic themes, playing different yet complementary roles.

The following five postulates describe our emergent theoretical model. Each one of them is grounded on the data and finds support in quotations that are presented on this document.

- Postulate 1: An articulated strategy includes a core strategy and several strategic themes.
- Postulate 2: The core strategy is the central idea behind the articulated strategy.
- Postulate 3: The firm tries to achieve the core strategy by means of the strategic themes.
- Postulate 4: The core strategy relies on the strategic themes.
- Postulate 5: The themes are elements of the articulated strategy that support, complement and enable the core strategy.

That both the core and the themes can be considered part of the articulated strategy is illustrated by Chu (2005), in a passage that we have cited above, but present here again for the benefit of the reader: "As a general statement, this" (e.g. what we identified as the core strategy) "describes Zara's overall strategy, but in addition to this statement there is more to Zara's overarching strategy and philosophy." Chu goes on to describe what we identified as the strategic themes.

In support of the centrality of the core strategy, the reader will find several quotations in a previous section. That the firm tries to achieve the core strategy by means of the strategic themes is illustrated by the following quotation from Schranz-Whitaker (2005) on Metro CC (emphasis added): "Metro CC wants

to be the international market leader in self-service wholesale; it tries to *achieve* this by delivering the best value to customers for the total package of products and services provided by Metro CC." The first idea presented by Schranz-Whitaker is what we identified as a core strategy of Metro CC. What is presented as a means to achieve it is one of the strategic themes we identified.

That the core strategy relies on the strategic themes is illustrated by the following quotation from Braese (2005) on GM (emphasis added): "The strategy heavily *relies* on two factors." By "the strategy" Braese is referring to a statement he presented earlier, which we identified as the core strategy. The "two factors" that Braese mentions are among the strategic themes we identified.

That themes are elements of the strategy is illustrated by the following quotations by Chiles and Dau (2005), on Wal-Mart (emphasis added): "Lastly, a very important *element* to their business strategy is product availability when products are demanded by customers." "Aside from *every day low prices*, a complementary *element* to their strategy is the variety of product offerings at Wal-Mart retail outlets."

Notice the reference in the second one to the complementary nature of the strategic themes. Another quotation suggesting that strategic themes complement the strategy is given by Boasson (2005), on Cisco (emphasis added): "The operating model to *complement* this strategy and enable it was presented […], and its three main elements are software, platform leadership and mergers and acquisitions (along with massive outsourcing […])."

In the quotation above, the point is also made that strategic themes enable the core strategy. That strategic themes support the core strategy is illustrated by the following quotation from Rah (2005) on Gillette (emphasis added): "In order to *support* the strategy, Gillette keeps close attention and continuous communication with its consumers" By "the strategy," Rah is referring to what we identified as the core strategy. Close communication is one of the strategic themes we identified for Gillette. Another quotation illustrating the idea of strategic themes supporting the core can be found in Rah's (2005) discussion of P&G (emphasis added): "In order to successfully *support* this business strategy,

P&G's operating model focuses on providing high on-shelf availability with guaranteed quality both when the consumer 'chooses and uses' the products." By "this business strategy," Rah is referring to what we identified as the core strategy. 'Shelf availability' was identified as a strategic theme of P&G.

These quotations were selected from the case pool to illustrate the five points above as they clearly express the relationship we have found to exist between core strategy and strategic themes in an articulated strategy. In the following section, we will assess the *analytical generalizability* (Yin, 2003) of this emergent theoretical model.

Assessing generalizability of the emergent model

In inductive, theory-building efforts, it is not representativeness but diversity that concerns us. So, the question to ask about the sample is not whether it is representative of the larger population, but whether it displays enough of the variability that the larger population might display. In other words, is this sample providing us with a rich enough cross-section of the phenomenon of interest (the articulated strategy) for us to build a worthy theory?

If the diversity displayed in the findings was found to be segmented along industry and authorship boundaries, the findings would be suspect of being heavily influenced by the industry to which the firm belongs or the author that prepared the case study. In such a case, further sampling would be required to better understand how industry and authorship are influencing (or 'biasing') our findings regarding the articulated strategy.

On the other hand, if the diversity displayed in our findings was found not to respond to industry or authorship lines, then we would be inclined to think that the industry to which the firm belongs and the author that prepared the case studies are not dominating factors 'biasing' our findings regarding the articulated strategy.

To analyze our findings so far in terms of industry affiliation, we resorted to the Industry Classification Benchmark (ICB). Table 3 lists the 21 industries to which the 21 firm described in the cases

belongs according to the ICB, categorized in terms of whether their cores and themes are implicitly or explicitly labeled as being "the strategy" in the cases.

	Explicit Themes	**Explicit/Implicit Themes**	**Implicit Themes**
Explicit Core	Industrials Consumer Goods Technology Oil & Gas Consumer Goods Basic Materials	Consumer Goods Health Care Oil & Gas	Technology Consumer Goods Consumer Services Technology Health Care Technology
Explicit/Implicit Core		Consumer Services	
Implicit Core	Consumer Services Consumer Goods Consumer Services		Consumer Goods Consumer Goods

Table 3: Firm industry, for each type of articulated strategy.

A total of seven industry categories are present. Due to the small sample, the goal is not to find frequencies or statistical properties, but patterns that could suggest that industry is a force strongly biasing our findings. Table 3 suggests that industry might not be a determinant force shaping whether the cores and themes of the articulated strategy are explicit or implicit.

	Explicit Themes	**Explicit/Implicit Themes**	**Implicit Themes**
Explicit Core	Tiwari, Rah, Boasson, Santos, Braese	Rah, Singh, Röthlisberger	Roy (twice), Chu, Chiles and Dau, Singh, Boasson
Explicit/Implicit Core	None	Schranz-Whitaker	None
Implicit Core	Chiles and Dau, Finkelstein, Schranz-Whitaker		Kumar (twice)

Table 4: Author of the case document, for each type of articulated strategy.

A similar analysis is conducted in terms of authorship of the case studies. Table 4 is similar to Table 3, but presenting instead of industries, it presents the names of the case authors. The fact that Kumar appears twice in the same cell could be explained as result of chance. Since only one out of seven repeated authors is suspected of having an influence over the way the strategy was articulated in the case, we are inclined to not consider case authorship a dominant factor shaping whether the cores and themes are presented as explicitly being part of the strategy.

Another consideration regarding the data that was used to derive the emergent theoretical model,

which must be analyzed before the model can be lent credibility, is whether the source of the passages we used to extract the cores and the themes was the author of the case or another source, most likely from the firm, describing the strategy. Table 8 categorizes the 21 cases according to whether the passages that were used as source for the cores and themes were given in the case as the author's voice (e.g. as part of the regular text of the case) or as coming from another source (e.g. with quotation marks and possibly an explicit reference to the source.) The source of the core is given first, and then – after the slash – the source of the themes.

	Explicit Themes	**Explicit/Implicit Themes**	**Implicit Themes**
Explicit Core	Author/Author Other/Author Author/Author Author/Other Other/Author Other/Other	Author/Author Other/Author Other/Other	Author/Author Other/Other Other/Author Author/Author Author/Author Author/Author
Explicit/Implicit Core		Author/Author	
Implicit Core	Other/Other Author/Other Other/Other		Other/Other Author/Author

Table 5: Source of core / source of themes, for each type of articulated strategy.

The absence of a clear pattern of sources falling along explicit and implicit lines suggests that the source is not the final determinant of the structure.

Summarizing the three analyses that we have performed on the sample, we have that there is no evidence that the findings depend on the industry to which the firm belongs, the author of the case study or the source of the passage used to extract the core strategies and the strategic themes has any determinant influence on the nature of the articulated strategy, in terms of explicitness.

Analyzing the structure of the concepts

Compare the complexity of the following two statements: (1) "Be the leader of innovative branded products to the consumer markets." (2) "Build total brand value by innovating to deliver consumer value and customer leadership faster, better, and more completely than our competitors." These are the core

strategies we identified for P&G and Gillette, respectively. It is apparent that the second core is more complex than the first one. The first core strategy is presenting a simpler concept, as compared to the second one, which has several qualifiers. The difference we have highlighted here between these two core strategies relates to what we have called the 'internal structure' of the core. An analysis of all the instances reveals three types of core strategies, in terms of their internal structure:

- simple: a single statement expressing a simple concept
- complex: a statement expressing either a complex concept, or multiple concepts
- double: two independent statements, where both are core yet independent

This classification is a bit of an oversimplification. Actually, the core strategies from our cases could be arranged in order of increasing complexity, forming a sort of spectrum. Among those core strategies that were deemed complex, the nature of their complexity was varied. Some cores were considered complex because they included several concepts, while other cores were considered complex because they included a modifiers, qualifiers or clarifications.

The case of Metro C&C is unique, as the only one for which two cores were identified. The two cores were considered independent as they were presented in different settings, separately and with no reference to each other, seemingly playing different roles: one as a statement of being and the other as a statement of doing.

Source of Core Strategy	Structure of the Core Strategy
Author of the case	Simple = 5 instances Complex = 5 instances Dual Core = 1 instance
Other source	Simple = 4 instances Complex = 6 instances

Table 6: Structure of the core strategy, for each type of source of core and themes.

The two statements we presented above, from P&G and Gillette, illustrating the two extremes of the complexity spectrum, come from cases written by the same author: Rah (2005). This suggests that the influence of the author is not shaping the internal strategy of the core. Table 6, which shows both

simple and complex structures in cores obtained from passages attributed to both the author and other sources, lends credibility to the point that the sample is good in this sense, as it does not seem to be biased by the author's personal style.

Table 7 makes a similar argument in terms of explicit versus implicit cores. Both simple and complex internal structures are found in both explicit and implicit cores. This suggests that the cores that were identified in passages where they were called explicitly "the strategy" are not radically different in terms of internal structure from those that came from implicit passages. This lends support to the soundness of our decision to consider core strategies even from passages where they were not explicitly identified as "the strategy" by the author of the case.

Is core explicit/implicit?	**Structure of the Core Strategy**
Explicit Core	Simple = 6 instances Complex = 9 instances
Explicit/Implicit Core	Dual Core = 1 instance
Implicit Core	Simple = 3 instances Complex = 3 instances

Table 7: Structure of the core strategy, for each type of articulated strategy.

A similar analysis of internal structure was performed on the over eighty strategic themes that were identified in the twenty one cases. We employed open coding, to let the categories emerge from the data. The following categories of strategic themes, in terms of their internal structure, emerged from the analysis:

- Simple themes: these express a single idea. An example from Dell: "Minimize inventory."
- Qualified themes: these express an idea, along with a modifier, qualifier or clarification. An example from Exxon Mobile: "Increase our business presence in Asia, particularly in China."
- One-two themes: these present an idea that applies to an enumeration of items. An example from Metro AG: "Create trust and acceptance in new markets."
- Multiple themes: these present multiple independent concepts in one statement. An example from Shell: "Simplify the organizational structures, cut cost base and become more responsive."

- Paired themes: these present two ideas that are closely related and interact together. An example from Zara: “Offer high value at low cost.”

Once these categories had emerged from the data through open coding, we applied categorical coding to label each theme with one of these five categories. Some articulated strategies, like those of Dell, Wal-Mart, Amazon and Lucent, present only simple strategic themes. All others present a mix of strategic themes of different types. For example, Exxon Mobile and GM have each five themes that fall in four different categories. Table 8 organizes the types of strategic themes of articulated strategies, depending on the source of the core and themes. It can be seen that most types of themes are found in four cells, with the exception of multiple concepts, which only appear in one cell.

Source of Strategic Themes	Strategic Themes source: Author	Strategic Themes source: Other
Core Idea source: Author	simple concept = 19 one-two concept = 8 qualified concept = 8 paired concepts = 1	simple concept = 1 one-two concept = 5 qualified concept = 3 paired concept = 1
Core Idea source: Other	simple concept = 8 one-two concept = 4 qualified concept = 3 paired concepts = 1	simple concept = 9 one-two concept = 3 qualified concept = 7 multiple concepts = 3 paired concepts = 1

Table 8: Structure of the strategic themes, for each type of source of core and themes.

Table 9 performs the same kind of analysis but now in terms of whether the cores and themes were explicitly labeled as being “the strategy” in the source documents.

	Explicit Themes	Explicit/Implicit Themes	Implicit Themes
Explicit Core	simple concept = 6 one-two concept = 9 qualified concept = 8 multiple concepts = 1 paired concepts = 3	simple concept = 6 one-two concept = 1 qualified concept = 5 multiple concepts = 1	simple concept = 15 one-two concept = 3 qualified concept = 2 paired concepts = 1
Explicit/Implicit Core		simple concept = 3 one-two concept = 1 qualified concept = 1	
Implicit Core	simple concept = 4 one-two concept = 3 qualified concept = 2 multiple concepts = 1		simple concept = 3 one-two concept = 3 qualified concept = 3

Table 9: Structure type of the strategic themes, for each type of articulated strategy.

Again, we see that the distribution of types is rather democratic. The wider variety of themes types in the articulated strategies that fall under the 'explicit core' categories can be explained in terms of the larger number of strategies in these categories.

Analyzing the wording of the core strategies

As we extracted the core strategies, we remarked that the wording of some of them seemed to be about 'being' and others about 'doing'. Moreover, most of them seemed to state a goal. So, we conducted a content analysis of the wording of the core strategies, in order to find what kind of statements they contained, what kind of points they were making.

Our analysis revealed several broad types of goals that are expressed by the core strategies. In general terms, the core strategies fell into two categories: the status goals and action goals. Some of them also seem to be in a sort of intermediate category, as they express action about status. Here we present the categories and subcategories that emerged for the content of core strategies, along with examples of each subcategory.

The first category we identified is that of 'Status' goals. These seemed to be expressed by means of 'Be' statements. The second category we identified is that of "Action" goals. This is a more lose category, which could be broadly described as being about executing an 'action' or activity.

It was found that both action and status statements appear both in passages by the author and in passages attributed to external sources. It was also found that both action and status statements are used in explicit and implicit core strategies.

A similar content analysis of the wording of strategic themes was attempted, but no clear pattern emerged. For the most part they seemed to be action-oriented, instead of status oriented. However, besides being about action, there are no easily identifiable categories of the wording, as the diversity of the statements is very wide.

Analyzing the ideas behind the concepts

What are core strategies and strategic themes talking about? Not the obvious superficial statement, but the idea behind the ideas. Both core strategies and strategic themes were analyzed, searching for the ideas behind the statements, using open coding and categorical coding. In the case of the strategic themes, a total of three rounds of categorical coding were conducted. Table 10 summarizes the categories and subcategories we found for the ideas behind the core strategies, as well as quotations of phrases that illustrate these categories and subcategories.

Category	***Subcategories* and quotes from core strategies**
Category 1: Market Orientation	*Strategic position:* 6) Maintain a strategic parity with other competitors in the industry 10) Become essential to the delivery and improvement of... 12) Shape... the telecommunication market. 10)... extending our reach through collaborative relationships defined by customer needs. *Low price* 1) Be the highest value to price provider... 2) Provide unique and innovative fashion products (e.g. value) at low prices. 3) Provide everyday low prices to customers. *Brand:* 7) Be the leader of innovative branded products... 8) Build total brand value by innovating to deliver... 14) Be the world leader in automotive and transportation services... 16) Become a large, powerful brand. 17) Be the dominant, young, sexy and sophisticated lingerie and beauty concept. *Market-share:* 11)...retain dominant share in the networking market... 12)... dominate the telecommunication market. 15) Establish ourselves in the top position in terms of beer volume 21) Grow with the market...
Category 2: "Product" Orientation	*Solutions:* 5) Be a... value added provider of... solutions... 8)...by innovating to deliver consumer value and customer leadership faster. 11) Be the leader end-to-end solution provider... *Products:* 4)... where customers can find and discover anything they want to buy. 5) Be a diversified... provider of... 14)...by providing a wide variety of models 18) Offer freshness and variety.
Category 3: Financial Orientation	*High margins* 11)...maintain high profit margins. 13) Focus on the segment offering the highest returns 20) Invest more in the upstream (~where it is more profitable) 21)...while managing margins in order to create sustainable and attractive returns on future capital investment

	Company value 19) Lastingly increase the value of the company
Category 4: Opportunity Orientation	9) Pursue products for unmet medical needs 20) (~take advantage of the opportunity to) use the downstream to finance this investment.
Category 5: Customer Orientation	4) Be the most customer-centric company...

Table 10: Categories and subcategories of core strategies.

Table 11 summarizes the categories and subcategories we found for the ideas behind the strategic themes, as well as quotations of phrases that illustrate them.

Categories	**Quotes**
Category 1: Market focus	*Tend to markets:* 6A) Address four global markets 19A) Internationalize the company *Secure position:* 8A) Secure a leadership position in key markets 13C) Increase our business presence in Asia, particularly in China 15D) Strengthen our positions in developed and high-growth markets 19D) Position each division in its individual market... 21A) Rebalance market power... *Hold market share:* 6D) Grow market share and installed base 14A) Have as much market share as possible 14B) Produce and sell as many vehicles as possible 20A)...to stay one of the world leaders in energy and petrochemicals *Pursue profitable markets:* 20B)... include only select profitable markets and businesses *Pursue growth markets:* 20C) Focus our downstream ventures more on "growth markets" *Create trust:* 18D) Create trust and acceptance in new markets *Anticipate threats:* 21D) Anticipate and head-off long term threats to the... industry structure *Develop your brand:* 7A) Build strong brand portfolios 8C) Sustain brand image... 16A) Develop a distinct brand identity and image 20E) Pursue a single-brand strategy 13D) Focus the Exxon brand on value and the Mobile brand on performance
Category 2: Customer focus	*Offer low prices:* 4A) Offer customers low prices 2B) Offer high value at low cost *Offer quality:* 7D) Offer quality that satisfies the consumer when the product is used 8C)...by developing quality... products 9D) Assure high quality of drugs *Build portfolio:*

	18E) Deliver best value through product assortment 7A) Build strong brand portfolios 15A) Win consumers over via our brand portfolio *Target niche:* 17C) Target young customers who appreciate the value of possessing innovative lingerie 18B) Cater to local tastes *Maintain service levels:* 10B) Maintain high service levels *Assure availability:* 3C) Keep products available in shelves 7C) Have products available on the shelf 9C) Assure high drug availability *Offer convenience:* 4B) Offer customers convenience *Keep close contact:* 5A) Provide a single face to customers 8D) Keep close contact with consumers 12C) Have a single point of contact with the customer *Provide support:* 5B) Provide extensive pre-sales and post-sales support 9B) Provide extensive customer support *Offer tailored solutions:* 5C) Offer tailored-made servers and systems *Seek sustainable customers:* 16C) Seek a consistent repeatable business *Pique interest:* 2C) Produce limited quantities of... (~to generate scarcity) 17E) Introduce new products every four to six weeks in order to generate interest in the brand
Category 3: Operations focus	*Improve efficiency:* 1B) Improve efficiency 13B) Improve the integration and efficiency of the downstream activities 15C) Develop world-class efficiency and operating productivity *Reduce cost:* 1A) Reduce cost 20D)...cut cost base... 21B) Achieve lowest delivered costs position in all world areas *Minimize working capital:* 1C) Minimize inventory 1D) Reduce cash-to-cash cycle *Reduce asset cost:* 3A) Open stores in small communities *Become responsive:* 20D)...and become more responsive 8B) Develop a responsive and effective supply chain 10A) Maintain flexibility *Control the supply chain:* 2A) Attain total control over product from design to store 10C) Keep close relationship with suppliers and customers 20A) Remain a vertically integrated company... 18C) Source locally 13E) Use downstream activities as... sources of control 16B) Control our own retail distribution channels

	18A) Sell only through our own retail stores 19C) Optimize the distribution concepts *Outsource non-core:* 12B) Outsource manufacturing 11A) Massively outsource hardware...
Category 4: Product focus	*Be fast to market:* 2D) Bring products to the store fast 7B) Introduce... products to the market faster than competitors *Innovate:* 7B) Introduce innovative products to the market... 8C)...by developing... innovative products 15E) Differentiate through innovation 17A) Sell innovative, technologically advanced products 21C) Use focused innovation... *Offer variety:* 2C) Produce... a high variety of fashion items 3B) Carry a wide variety of products 4C) Offer a wide selection of merchandise 14C) Make a significant number of models and options available for end consumers to choose from 17D) Offer a mixed assortment of fashion and basic goods 18E) Deliver best value through product assortment 6C) Develop a competitive portfolio of products and services *Be selective:* 16D) Narrow our portfolio, dropping all poor performers 19B) Optimization of the portfolio
Category 5: Internal focus	*Simplify:* 20D) Simplify the organizational structures... *Invest in capabilities:* 6B) Invest in technology, capability and infrastructure 9A) Invest heavily in R&D, marketing and promotion 10D) Provide our team what they need to act 12A) Develop technology in-house 15B) Win through superior capabilities in sales, merchandising and distribution 11C) Employ aggressive mergers and acquisitions tactics *Sustainability*: 19D)...make (~each business division) sustainable in its own right *Focus on core activities:* 11A) Massively outsource hardware, to concentrate on software 13A) Growing by focusing on the upstream
Category 6: Opportunity focus	*Price for profits:* 17B) Price for reasonably high profit margins 21C)...to create significant new, higher margin opportunities *Exploit existing opportunities:* 6E) Capture substantial aftermarket service opportunities 13E) Use downstream activities as cash generators... 11B) Mind the importance of standards *Create new opportunities* 21C)...to create significant new... opportunities 16D) Have the correct specifications at the right time 21A)...and maximize the value of sales to the existing market

Table 11: Categories and subcategories of strategic themes.

The resulting theoretical framework

The underlying premise of our research is that there is a need for a coherent framework for articulating strategy. To shape and further the discussion in this important area, we propose here a substantive theoretical framework for articulating strategy based on the thorough content analysis and discourse analysis of a sample of the twenty one cases, drawn from seven diverse industries. Admittedly, the resulting framework is not exhaustive, yet it emerged from the comprehensive treatment of an unyielding problem, and revealed a surprisingly cogent structure throughout the cases.

The model

An articulated strategy often includes a core strategy and a few strategic themes. The core strategy is the central idea behind the articulated strategy. The strategic themes are elements of the articulated strategy that give life to the core strategy by sharpening its meaning and relating it to the operating environment of the organization more objectively. The firm plans to achieve the objectives of the core strategy by focusing on well defined strategic themes that address key functions, trade-offs, capabilities, challenges or narrowly defined objectives. As a result, the success of the core strategy relies on the success of the strategic themes individually and collectively. A graphical representation of this conceptual model is shown in Figure 1.

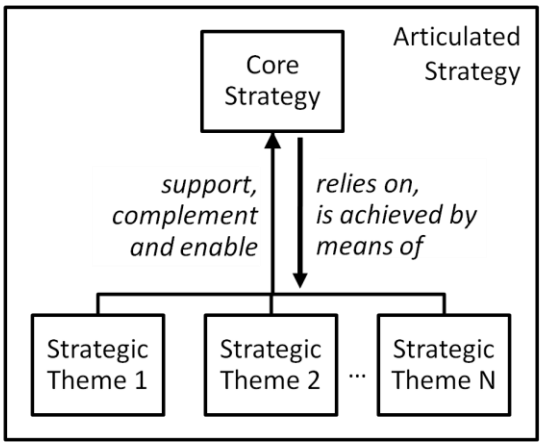


Figure 4: A graphical representation of our theoretical model.

Characterizing the strategy elements

As discussed in section 4, a closer evaluation of articulated **core strategies** reveals a varied internal structure that lacks consistency in its description. For instance, some of the core strategies are simple statements, and express a simple concept, while others are more complex statements that express either a more complex concept, or multiple concepts. More than one core may be present. Further, core strategies are worded to express a goal that could be about the status of the firm or about an action that is taken by the firm. A status goal deals with holding a leadership position, or achieving an ambitious goal expressed in terms of a superlative, whereas an action goal, a coarsely defined category, is about executing an 'action' or activity. Some actions define the offer made to customers as a value proposition, vow to change a key variable (like market share or firm value) to a more favorable position, point to the focus (i.e. market segment) that the firm will pursue. The ideas behind the core strategies deal with an assortment of areas as shown in Figure 2.

Strategic themes also display a varied internal structure. “Simple themes” express a single idea. “Qualified themes” express an idea, along with a modifier, qualifier or clarification. Others, that we dubbed “One-two themes”, present an idea that applies to an enumeration of items. “Multiple themes” present multiple independent concepts in one statement. “Paired themes” present two ideas that are closely related and interact together.

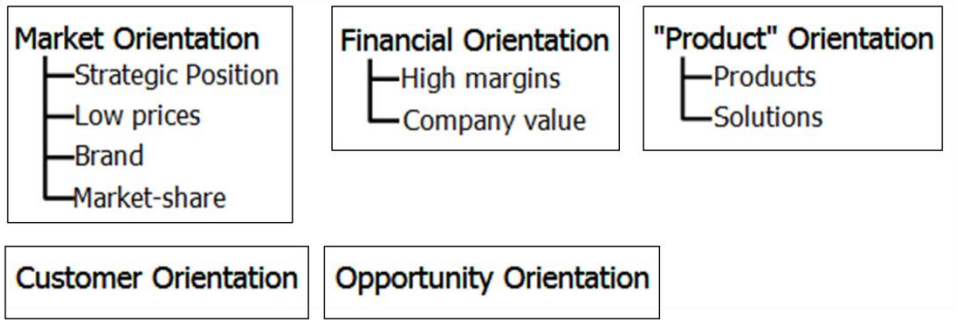


Figure 5: Categories and subcategories of ideas behind the core strategies.

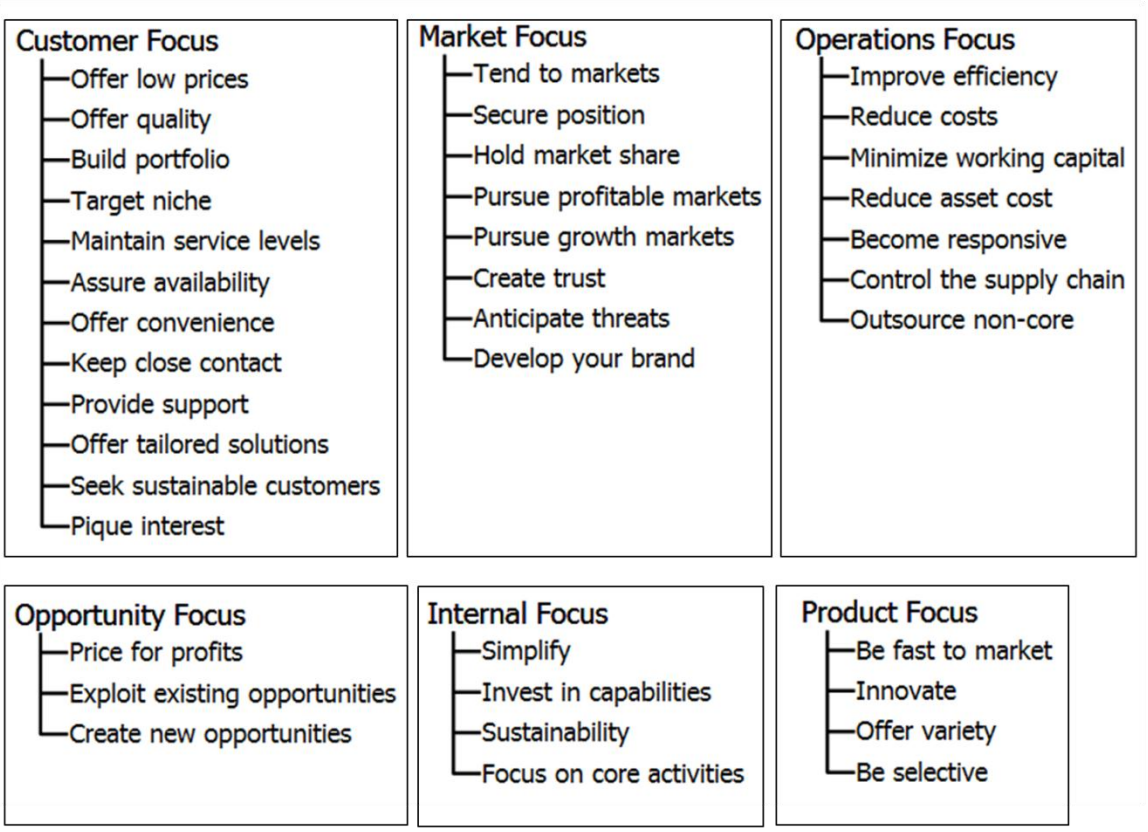


Figure 6: Categories and subcategories of ideas behind the strategic themes.

The ideas behind the core strategies deal with an even wider assortment of areas. Figure 3 presents the categories and subcategories we found to be applicable to the ideas behind the analyzed strategic themes.

We conducted several exercises to assess the *analytical generalizability* (Yin, 2003) of this theoretical model and found evidence in favor of the robustness of the sample employed. The variety of categories that emerged from different analyses of structure and content were manifest across boundaries of authorship, explicitness of the articulated strategies and industry etc. Since the purpose of this research is theory-building, we propose our model simply as a plausible framework for describing the articulated strategy of a firm. The proposed theoretical framework will have to be validated through theory-testing research in the future, which could enhance and enrich the model, and delimit the sphere of its applicability.

Connecting with extant literature

Eisenhardt (1989) states that an important part of theory building is to compare the emergent concepts with the extant literature, and that a broad range of literature should be considered. The most interesting similarity that we have found between our emergent theoretical framework and the existing literature are in Kaplan and Norton (2004), which we discovered after our theoretical framework had been articulated. Two points of coincidence exist. First, Kaplan and Norton state that "Strategy consists of simultaneous, complementary themes" (p12). This is not far from our statement above, namely that "articulated strategy includes a core strategy and several strategic themes, playing different yet complementary roles." Second, Kaplan and Norton propose the use of four "perspectives" to describe the strategy: financial perspective, customer perspective, internal perspective, and learning and growth perspective" (p8). On the other hand, our categories of ideas behind the core strategies include those called "financial orientation" and "customer orientation", while among our categories of ideas behind the strategic themes we identified those called "customer focus" and "internal focus". The similarity lies in the use of the labels "internal", "customer" and "financial" by both models, an inadvertent coincidence of which we became aware when we ran into Kaplan and Norton's framework, after our framework was already articulated.

Differences between the emergent theory and the extant literature should also be explored (Eisenhardt, 1989). Despite the few similarities we have found between our model and that of Kaplan and Norton's, we have identified multiple and significant differences. The first is the absence in their model of the core strategy, a crucial point given that we identified the core strategy as being "the central idea behind the articulated strategy." A second discrepancy is the philosophy behind the methods used to describe the strategy of a firm: Kaplan and Norton's depiction has the built-in assumption of causality between the concepts, while ours revolves around support among the concepts. A third difference is to be found in the approach: Kaplan and Norton, like Hambrick and Fredrickson

(2005), have proposed a framework to describe strategy based on their expert opinion, while our approach is built from the bottom up, based and grounded on empirical data analyzed through a rigorous and transparent process. A final difference is the fact that Kaplan and Norton focus on implementing strategy through the use of the Balanced Scorecard framework, whereas our effort is focused on developing knowledge based on empirical data and advancing the field.

Implications for research and practice

Since the purpose of this part of our research was to develop an understanding through theory-building, we do not make claims beyond assuming that our proposal is a plausible framework for describing the articulated strategy of a firm. Following Maxwell's (1992) recommendations on validity, we procured to produce valid descriptions, interpretations and hypothesis, and to assess the extent to which the data supports generalizing our findings. As steps towards reliability and validity respectively (Ahrens and Chapman, 2006), we remained attentive to the compatibility of between descriptions produced by separate researchers, and to the plausibility of the conclusions reached. Now that a theory has been constructed and presented, it is possible (and necessary) to test it (Snow, 1994). The proposed theoretical framework will have to be tested through further theory-testing research in the future, which could further validate and enrich it, and delimit the sphere of its applicability.

Contribution. Our findings could serve to derive insights and guidelines for strategy development. Knowledge about the core strategy and the strategic themes that represent the strategy of successful firms could serve either as a starting point or as a validation checklist for companies that are developing a strategy. This knowledge, however, should not become a constraining paradigm. In other words, the framework can directly assist in strategy formulation and articulation, in a non-obtrusive manner.

Interestingly, there is the debate on strategy articulation in the specialized literature, which usually boils down to argumentation for and against making strategy explicit, in terms of benefits and risks. The case against making strategy explicit is usually made by arguing that an explicit strategy promotes

rigidity and inertia (Mintzberg, 1990), while exposing the strategist to internal criticism and the firm to attacks by competitors that could get to know the strategy that was put into words (Quinn, 1977). On the other hand, the case in favor of making strategy explicit is made by arguing that the articulating strategy is necessary to clarify and assimilate it, and to communicate it to others in the organization (Andrews, 1982; Love, Priem, & Lumpkin, 2002). With different schools of thought on strategy strongly backing their position, the question on whether strategy should be articulated remains an open issue.

Summarizing, in this chapter we developed an understanding of how the business strategy of a firm is typically communicated to the supply chain function. We also proposed a framework for its articulation. In the next chapter we will develop a better understanding of supply chain strategy and its context. We will also expand upon the framework developed here, in order to include the concepts that will represent the supply chain strategy.

CHAPTER 4. UNDERSTANDING SUPPLY CHAIN STRATEGY

As stated in Chapter 1, both the literature and our own research suggest that managers often leave the supply chain strategy of the firm in a tacit form. Out of 20 case studies about supply chain excellence project prepared in 2005 for the SC 2020 Project, only two made explicit reference to the supply chain strategy. Yet, although it was not present explicitly, it was not totally absent either: a careful reading of the cases revealed an underlying collection of loosely connected, reappearing themes, whose purpose is to make the business strategy possible and successful.

Developing an emergent model through a secondary case study

Motivated by Porter's (1996) idea of mapping strategic activities graphically, we applied qualitative content analysis to a case study selected for its richness in detail. This helped us develop a preliminary conceptual framework of the supply chain strategy of a firm. In this chapter we present how this preliminary framework was developed and how it was later refined through an action research case study. Relevant literature is reviewed to validate and enrich the evolving framework. The resulting framework is used in following chapters as part of our methodology to capture, evaluate and reformulate a supply chain strategy.

The rationale for a focus on activities

As we looked to develop an approach to make explicit the supply chain strategy of a firm, there was one concern that we had very present: our exercise should tap the reality of what a firm is doing, while avoiding empty rhetoric about what managers would prefer it be doing instead ('social desirability').

Early interviews we had conducted with managers gave us reasons to believe that, when it comes to describing their supply chain strategy, there is a tendency on the part of managers to succumb to the

temptation of social desirability and 'acquiescence' (e.g. saying what they think the interviewer wants to hear). For example, in a series of interviews we conducted with supply chain managers, separate from the case studies, we noticed that questions regarding supply chain strategy often prompted answers that were either vague or misleading, possibly out of a desire to project towards the interviewer a favorable image of the firm.

To ensure we were tapping into the real *'as-is'* supply chain strategy that the firm has implemented, we decided to start at the bottom, looking at the firm's activities and operational choices, and work our way upwards, towards the ideas and principles underlying these activities and choices. For this, we used techniques such as qualitative content analysis and narrative inquiry. The understanding that results from this analysis was then translated into a series of conceptual diagrams.

Analyzing the activities described in the case study

One of the best case studies from our pool was chosen, due to the richness of its description of the supply chain activities of the firm in question. In the passages of the case study that dealt with the activities of functions, we identified both key concepts presented in the text and the relationships between them suggested by the narrative. Take the following passage, for example:

> *"The key philosophies of the procurement group are: a) Work with only a few selected suppliers. For [the company], the top 20 suppliers comprise of 75% of total dollar value of procurement. The rational for having very few suppliers are: (1) Strict quality requirements could only be managed by dealing with few suppliers. (2) Once a supplier is developed, it is of both parties interest to develop as much a deep relationship as possible. …"*

After identifying some key concepts in this passage, and understanding the relationship between them that the narrative is suggesting, we can express them in a conceptual diagram, shown in Figure 7. The idea of using conceptual diagrams to represent strategic activities was motivated by Porter (1996).

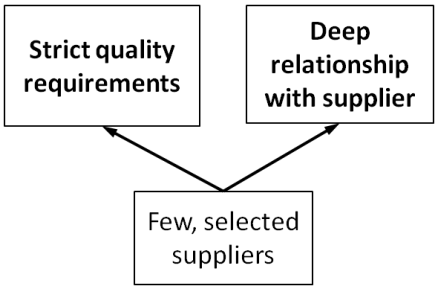


Figure 7: Translating some ideas of the passage into a conceptual diagram.

Let us illustrate the same process with another example, now with this new passage:

> *"If there is oversupply (forecast was too high), [the Company] may also cancel some of the orders. [...] In many cases [the Company] directly deals with Tier 2 suppliers. The main objective of [the Company] in doing so is to ensure continuity of supply and reduce procurement costs further. [The Company] negotiates on behalf of its tier-1 suppliers to aggregate volume and leverage its own buying power."*

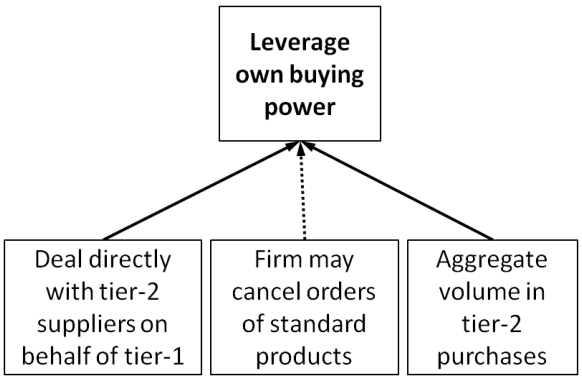


Figure 8: Translating another passage into a conceptual diagram.

Some key concepts in this passage were identified and the narrative was analyzed to understand the relationship between them. Figure 8 illustrates how our understanding of this passage is translated into a conceptual diagram.

The same analysis is conducted throughout the case study, on all passages relevant to the activities of the functions, and the rationale behind them. At the end, some clusters start to appear, some around functions (such as procurement and manufacturing), others around issues (such as the management of

inventory and transportation). For example, Figure 9 shows the aggregate conceptual diagram that groups all the smaller conceptual diagrams on the subject of procurement. Similar aggregate conceptual diagrams are constructed for other areas and functions.

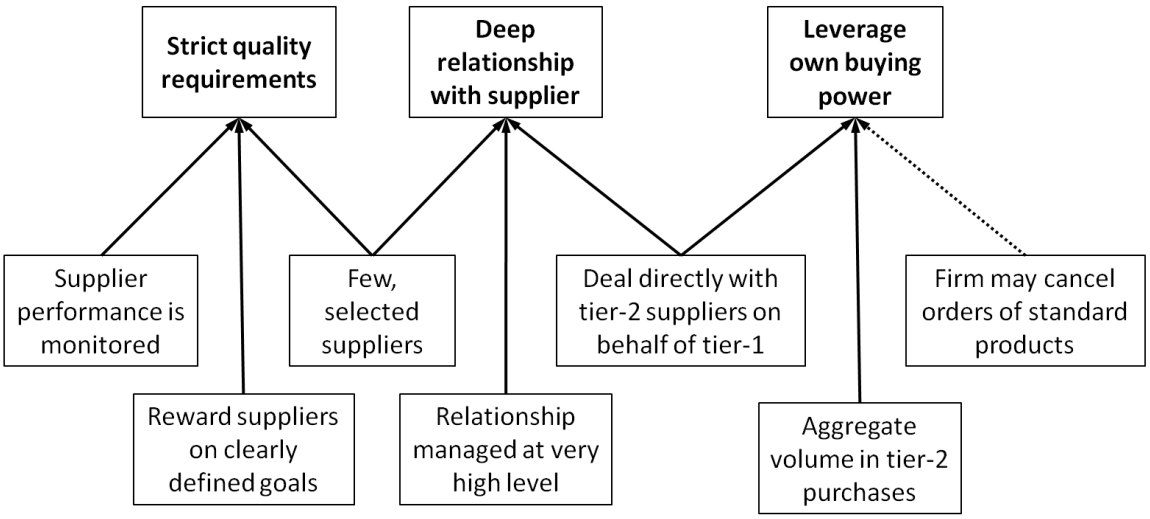


Figure 9: Aggregate conceptual diagram around the function of procurement.

The reader may notice that in Figure 8 and Figure 9, the concepts shown at the top of the figure were shown in bold typeface. These concepts are being supported or enabled by the lower level concepts. The concepts on the top level tend to display a higher level of abstraction and generality, towards the strategic, while the concepts on the bottom usually are more concrete and specific, tending towards the tactical. The literature provides support for this view: the implemented supply chain strategy has been described as a *"cascading strategy"* (Narasimhan *et al*., 2008). Thus, it is not surprising to find that the higher level concepts of the Figure 8 and Figure 9 diagrams are themselves serving even higher concepts. Because of this *hierarchical cascade*, later on it will become possible to merge all of the conceptual diagrams into an even larger conceptual diagram. The graphic representation of this *strategic cascade* is what we call a Functional Strategy Map (FSM). The one that we prepared from the case study in question is shown in Figure 10, result of aggregating all the smaller conceptual diagrams

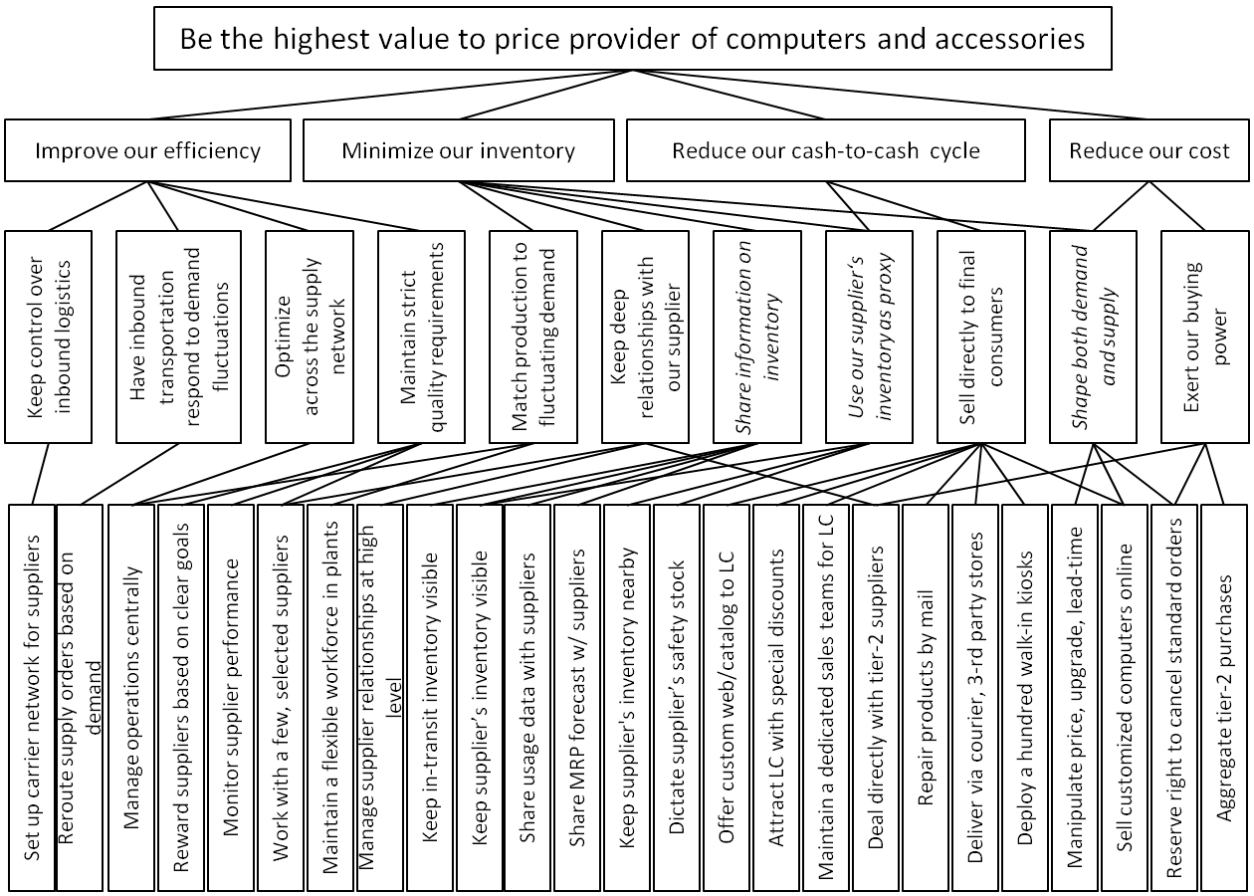


Figure 10: The first Functional Strategy Map we prepared, based on the case study.

The concepts shown in the two top-most levels of this map come from the following passages:

"[The Company's] business strategy is to be the 'highest value to price provider of computers and accessories to price-conscious customers'."

"[The Company's] operating model is aligned towards achieving cost reduction, efficiency improvement, inventory minimization and cash-to-cash cycle reduction."

As we mentioned in the previous chapter, we conducted a study of how business strategy is articulated, based on over twenty case studies. The present case was one of those. The concept shown in the first level in Figure 10, "*be the highest value to price provider of computers and accessories to price-conscious customers*", was identified in that study as the Core Strategy of this company. And the concepts in the second level in Figure 10, "*cost reduction, efficiency improvement, inventory*

minimization and cash-to-cash cycle reduction", were identified in that study as the Strategic Themes of this company. This means that, in the Functional Strategy Map, the first two levels correspond to the Core Strategy and the Strategic Themes, which are the components of the articulated business strategy. The bottom two levels correspond to strategic ideas for the functions, which we will call Functional Themes, and to ideas for implementation of this supply chain strategy, which we will call Operational Themes and Choices.

The emergent conceptual model

The in-depth analysis of this single case study helped us produce an emergent conceptual framework, shown in Figure 11, of how the business strategy 'trickles down' through the supply chain strategy into operational choices.

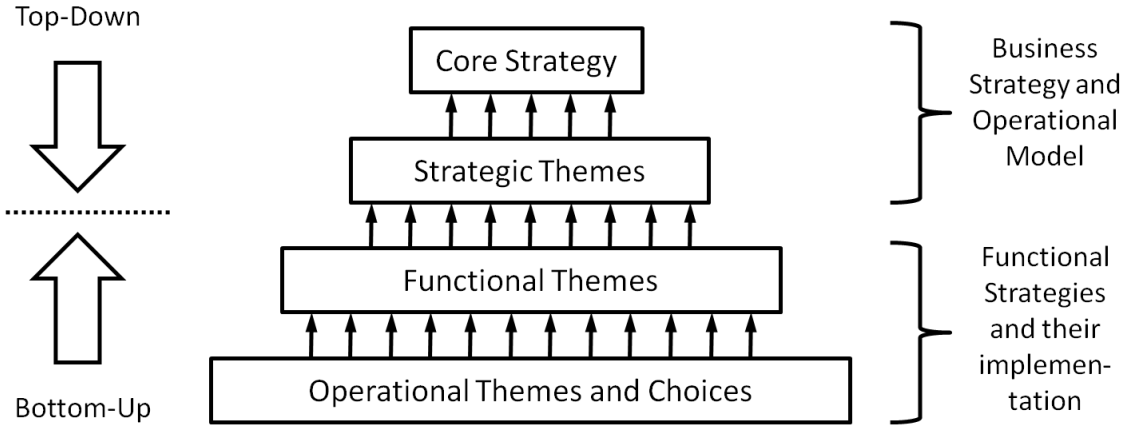


Figure 11: Emergent conceptual model of the supply chain strategy in its context.

This model, admittedly far from complete at this point, nevertheless attracted the attention of high-level supply chain decision makers. The VP of Supply Chain for an multinational company, that we have called Unit-X, commented the following on the Functional Strategy Map, shown in Figure 10:

> *"It has been hard so far to communicate the supply chain strategy. [...] This map can serve as a communications vehicle, to tie activities back to strategy. [...] This is a cleaner visualization tool. [...] This is actually a pretty powerful document. [...] We could benefit*

from a work like this."

The suggestion that this could be developed into a useful tool motivated us to find answers to the many questions that could not be answered yet. For example, the nature of the concepts that should be included in each level was the subject of debate, and particularly the distinction between operational themes and choices was not clear at this point.

Refining the model through action research

With the purpose of exploring the value of this approach, refining and validating our emergent model in a real case study, the SC 2020 team engaged the supply chain team of Unit-X in an action research project that spanned over two years. The first half year was dedicated to developing a custom, detailed Functional Strategy Map for Unit-X's supply chain strategy. The second half year was dedicated to evaluating the merits of this supply chain strategy, identifying areas of conflict and significant omissions in its coverage. Relevant for this chapter is the former, the effort conducted in the first half in order to capture the supply chain strategy of Unit-X 'as-is', based on the activities of the firm.

Top-Down: the received nominal strategy

Based on the emergent model shown in Figure 11, the business strategy of the firm is to be considered "top down", e.g. received nominally from the higher levels of management, as a given. We asked Unit-X to share with us their business strategy. They produced a document containing one main strategy statement:

"The Unit-X business will grow with the market while managing margins in order to create sustainable and attractive returns on future capital investments"

This statement was followed by four strategic objectives, familiarly referred to as 'Pillars', considered to be as much a part of the business strategy as the previous statement:

"(1) Better match customers with products and maximize our impact in current

markets, (2) Have the lowest cost of delivered product, (3) Pursue innovation on high margin niches, (4) Identify and prepare for long-term threats"

It is easy to identify in this articulated strategy the underlying structure discovered in the previous chapter: that is, a core strategy and several strategic themes. Discussion with the company revealed that Pillar 1 actually was composed of two concepts, so it was divided accordingly. After realizing that the exact wording of these statements was not a matter of concern to the firm, the wording of these statements was simplified and assembled in a conceptual map with one core strategy on top and five strategic themes under it, shown in Figure 12. These constitute the first two levels, the top-down part, of Unit-X's Functional Strategy Map.

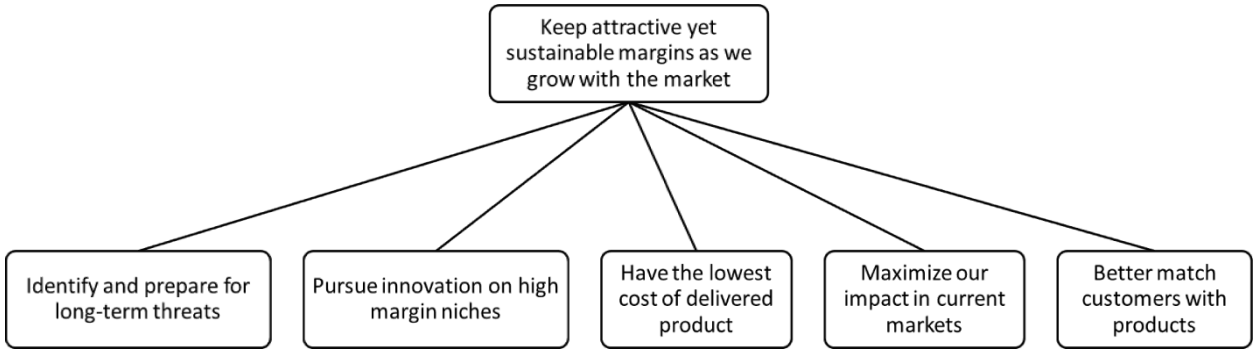


Figure 12: The top-down (nominal) part of the Unit-X Functional Strategy Map.

Bottom-Up: looking for strategy in the activities

Based on the emergent model shown in Figure 11, the supply chain strategy and their implementation through operational choices are to be revealed working from the "bottom up", e.g. they are to be derived from the activities of the firm, through the grounded analysis of information on these activities. The purpose of this approach is to define in explicit terms the current supply chain strategy of the firm, Unit-X in this case, not as presented in the documents of the company, but as it is reflected in the actual activities of the firm. The idea here is to help the supply chain team face the reality of the implemented supply chain strategy, which may or may not be identical with the nominal, espoused supply chain strategy that they think they have in place.

To collect information about the activities of the firm, we decided to conduct a series of open interviews. A list of 40 members of Unit-X was prepared jointly by Unit-X and the SC 2020 team, from diverse seniority, functional and geographical backgrounds. The list of respondents included both picks by Unit-X and picks by the SC 2020 team.

- In terms of *seniority*, the respondents covered a wide cross-section of the hierarchical spectrum. Respondents included representatives of senior management levels, including at least three vice presidents, all regional supply chain managers and several plant managers, all the way to middle and junior level managers, such as warehouse supervisors and customer service representatives.
- In terms of their *function*, respondents identified themselves as performing the following functions: Business Management, Sales, Supply Chain Management, Procurement, Manufacturing, Transportation Planning, Customer Service, Innovation, Human Resources, Customer Survey, Demand Planning, Finance, Market Technical Services and Information Technology.
- In terms of geographical *location*, the respondents also covered a wide cross-section, being located on three continents: Europe (Belgium, United Kingdom, France, Germany), the Americas (U.S., Brazil) and Asia (Singapore, China, Japan, India).

A total of 41 interviews were conducted with the 40 respondents. The VP of Supply Chain, being at the center of the effort and the senior sponsor for the project, was interviewed twice at the request of the SC 2020 team, as the first and also the last in the list. The interviews were conducted between January and May 2008, and ran between half an hour to one hour long, with a typical length of 50 minutes. Well over 30 hours of recording resulted from the interviews, conducted over the phone, and recorded digitally with the consent of the respondents. The recordings were encrypted right after completion, to ensure confidentiality.

The first 30 interviews followed an open format. They proceeded as an unscripted conversation

between the two parties, prompted by a single question: “What would you say are the key activities of your position?” As series of probing and follow-up questions were used to clarify certain points and pursue subjects that came up and seemed to be of interest with regards to the supply chain strategy. The last 10 interviews were equally open during the first half hour, while the second half hour would include a few specific probing questions about areas that had already been identified in the ongoing analysis as relevant to the project.

Analyzing the collected data

The interviewer took notes during the interview about prominent concepts that called his attention, and later listened to the interview recording again in order to transcribe certain key passages and to take more notes about concepts relevant to the ‘as-is’ supply chain strategy. From these transcripts and a list of over three hundred concepts were identified and classified by functional area and according to their level of abstraction. Concepts included phrases that described activities conducted by the functions of the firm, or the guiding ideas behind these activities. A panel discussion, conducted after the first 25 interviews, helped merge concepts that referred to the same idea and eliminate concepts that were unsubstantiated based on the practices (i.e. that resulted from a deficient reporting on the part of the respondent or a misinterpretation on the part of the analyst).

After multiple iterations, both internally within the SC 2020 Project and through panel discussions with the Unit-X supply chain team, a total of of 123 concepts remained, arranged in three levels of abstraction: 84 were categorized as “Operational Choices” (descriptions of concrete activities and choices that the firm has made), 31 were categorized as “Operational Themes” (being more abstract and general than the operational choices), and only 8 were deemed to be “Functional Themes” (which are of an even higher level of abstraction, and seemed to represent the main strategic ideas guiding the functions). They were arranged in eight clusters, one under each Functional Theme, in the manner shown in Figure 13.

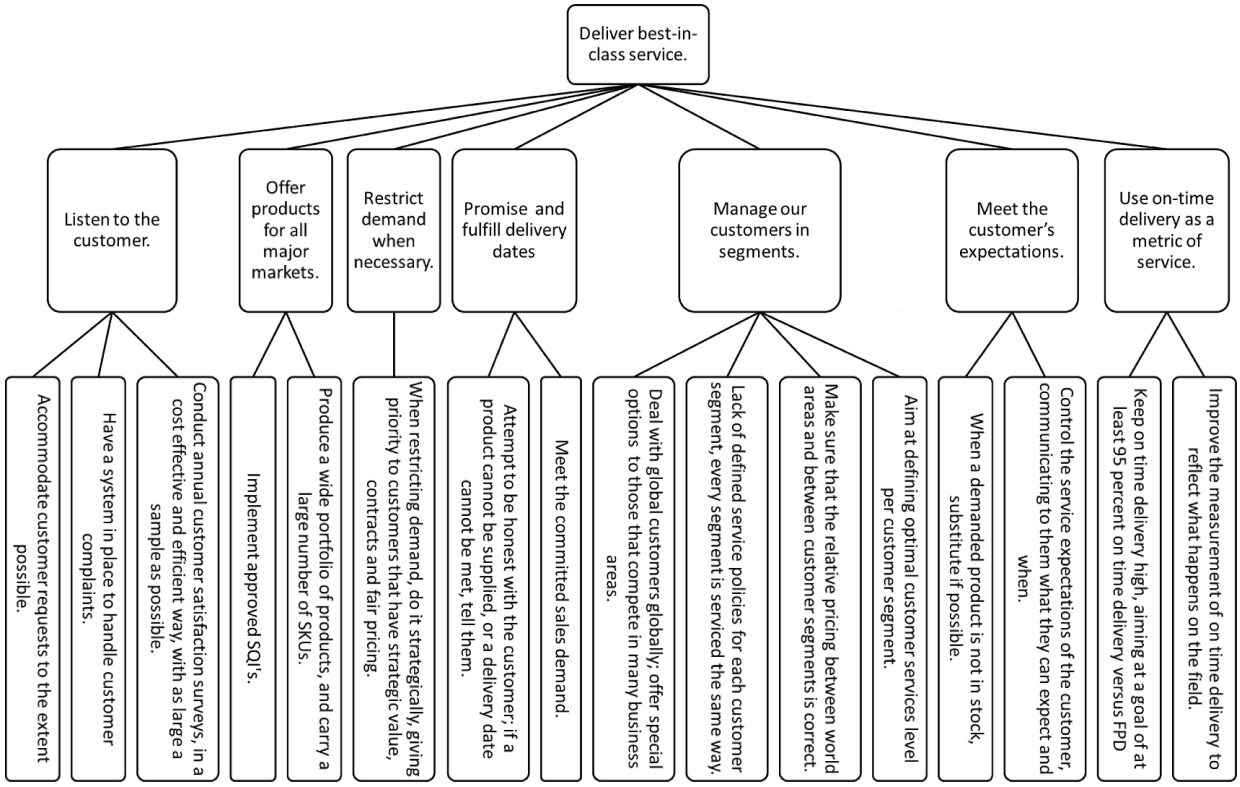


Figure 13: One of eight clusters, composed of a Functional Theme and its 'children'.

That is to say, under each single Functional Theme, a series of related Operational Themes were located, and under these, a larger number of Operational Choices were located. Ten members of the Unit-X's supply chain management team were shown a draft of the map, and provided feedback on its content and structure. The resulting diagrams were of such a size that it was decided to prepare shorter versions, without the Operational Choices.

Two panel discussions were conducted to review, validate and enrich modified versions of the map. In the third panel discussion, the Functional Strategy Map was deemed to be a valid and fair representation of Unit-X's 'as-is' supply chain strategy within its context.

The resulting Functional Strategy Map is shown in Figure 14, excluding the Operational Choices to make it easier to present (what we call the 'short form'). The first two levels in Figure 14 are a Core Strategy and five Strategic Themes, which together express the nominal business strategy of Unit-X. The lower two levels in Figure 14 are eight Functional Themes, followed by thirty one Operational Themes.

Together these two levels represent the supply chain strategy of Unit-X.

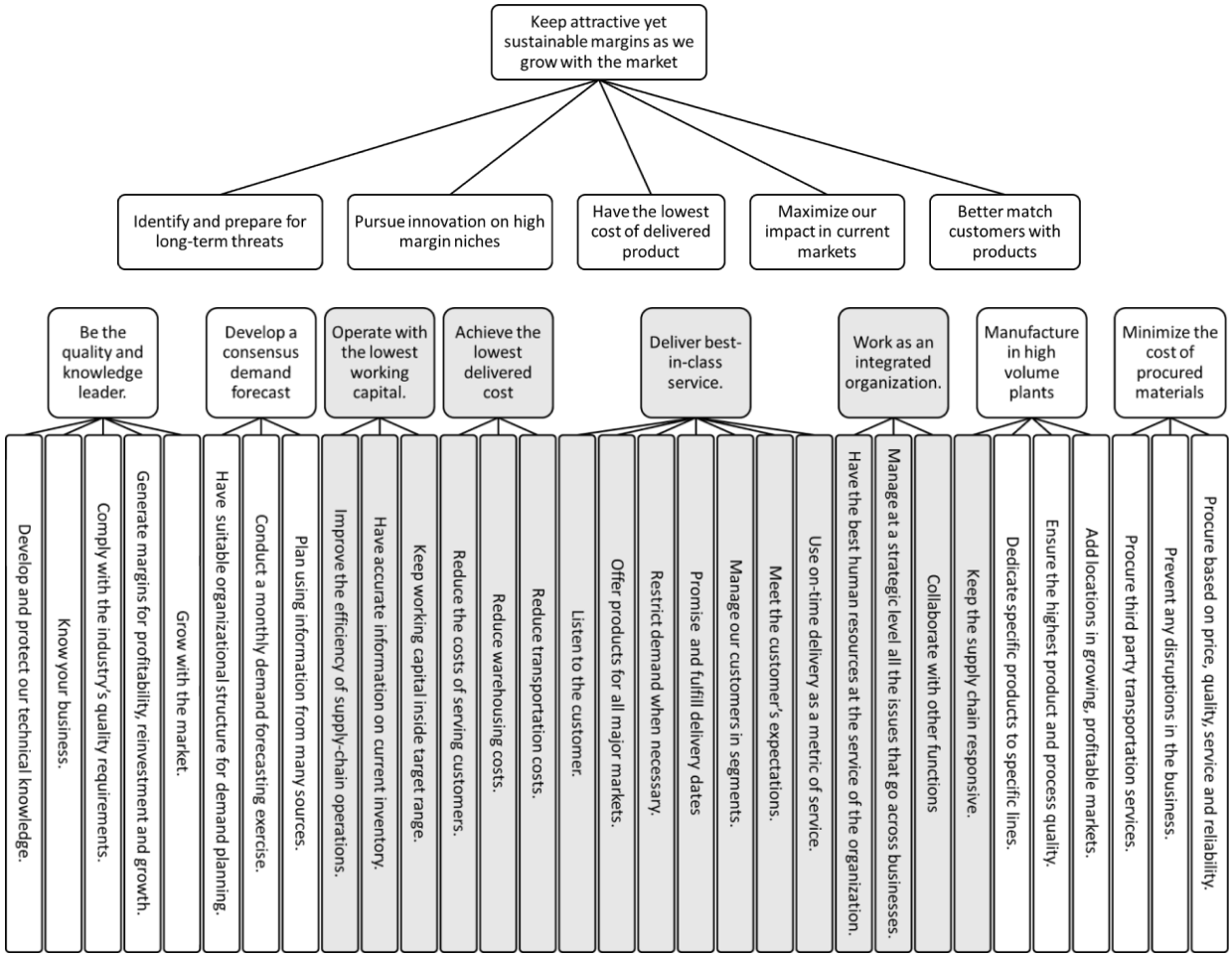


Figure 14: Unit-X's Functional Strategy Map (fifth level omitted).

The VP of Supply Chain of Unit-X describe the effort to capture the strategy as: *"discovering" the gap "between the actions the company takes versus its stated strategy."* Asked if he saw any value in the Functional Strategy Map we had prepared based on the interviews, he replied: *"Absolutely!"*

The revised conceptual model

Conducting this in-depth, action research case study with Unit-X helped us improve our conceptual model. Some questions that remained unanswered after the previous case study were clarified through the development of this new Functional Strategy Map with more granularity and through the discussion of the same in a panel with the supply chain team of Unit-X.

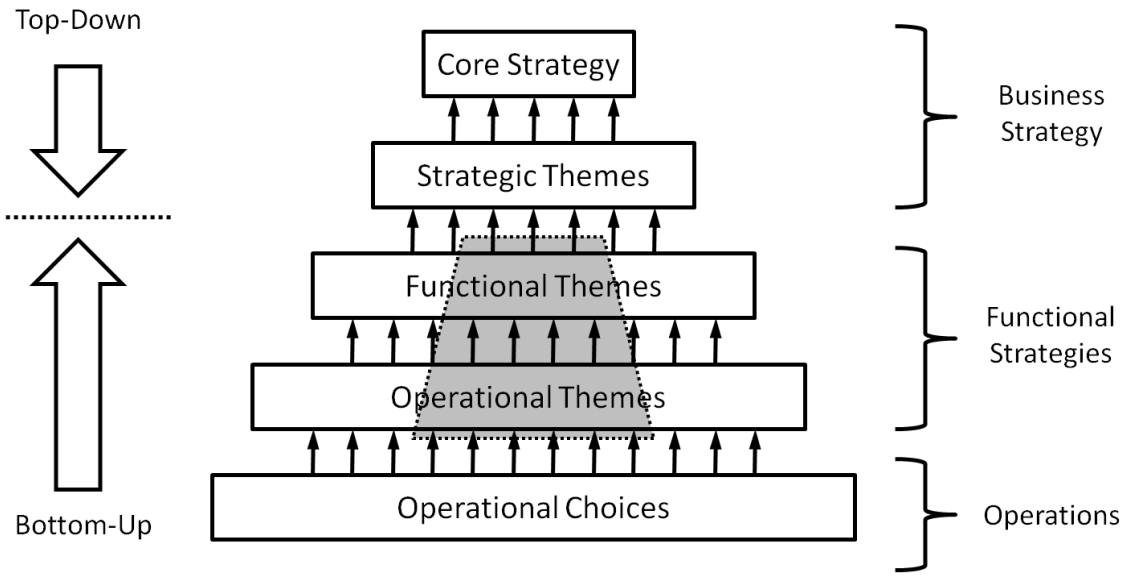


Figure 15: Revised conceptual model of the supply chain strategy in its context.

The experience provided validation for some ideas, such as the model for articulated strategy presented in the previous chapter. It also provided some evidence that, as we move conceptually from the statement of strategic goals into the description of operational activities, there is room, and in fact there is a need, to differentiate between operational concepts that are more abstract and general, which were called Operational Themes, and others which are more concrete and specific, which were called Operational Choices. This distinction is made clear in the revised conceptual model of the supply chain strategy (represented by the gray area) in its context, shown in Figure 15.

Summarizing, in this chapter we developed a better understanding of supply chain strategy in its context, and expanded the previous framework to include the conceptualized supply chain strategy. In the next chapter we will propose a methodology to make explicit the supply chain strategy of a firm.

CHAPTER 5. A METHODOLOGY TO CAPTURE THE SUPPLY CHAIN STRATEGY

"If you don't need a new technique, then what you're saying probably isn't new." Philip Glass

As we mentioned in page 23, we found no satisfactory answer in the literature to the problem of how to reveal and conceptualize a supply chain strategy. Encouraged by the results of the action research project with Unit-X (described in Chapter 4), we decided to use the Functional Strategy Map (FSM) as the starting point for a methodology to capture the *'as-is'* supply chain strategy of a firm.

Towards this goal, we conducted a new action research project, this time with Libica (a company we introduced in page 20). This project was also successful, e.g. we managed to make explicit the current supply chain strategy of Libica using the FSM. With the foundation of the theoretical framework we developed in Chapters 3 and 4, and with the experience accumulated during two successful action research projects, we proceeded to systematize our methodology to reveal and capture the existing supply chain strategy of a firm by means of a Functional Strategy Map.

Theoretical foundation

Three premises, grounded in the existing literature, provide theoretical foundation to our approach to reveal and capture an existing supply chain strategy.

First premise: activities and choices as the essence of strategy

The first premise is that, in order to know the actual strategy of a firm, we must know its activities and choices. This idea is well rooted in the literature:

- From the business strategy literature, Porter's "What is strategy?" (1996) states that *"the*

essence of strategies is in the activities – choosing to perform activities differently or to perform different activities than rivals."

- From the corporate strategy literature, Andrews's "The Concept of Corporate Strategy" (1987) opens its first section, "What Strategy Is," by stating plainly that *"strategy is the pattern of decisions in a company"* that *"reveals"* its goals.
- From the supply chain management literature, Cigolini *et al*. (2004) – after conducting an extensive meta-analysis of over a hundred case studies in supply chain management – conclude that *"what companies actually did, rather than what they claimed their strategic intent to be, is the best clue to reveal their very supply chain management strategies"* (p.12).

A similar idea is also at the core of a relatively recent school of thought in the strategy literature, known as *strategy as practice* school. This school analyzes *"what people do in relation to the development of strategy"* and warns that *"we cannot rely entirely on what managers have to say about their own practices,"* since *"it can happen that they do not know that they know or, more bluntly, that they just do not know… and so they invent"* (Baumard, 1999, p. 98). Here is where an understanding of how to elicit tacit knowledge becomes useful.

Second premise: tapping into tacit knowledge

The second premise is that tapping into the *tacit knowledge* of the organization is crucial in order to understand its actual practices. Tacit knowledge, a prominent concept in the organizational literature (i.e. Baumard, 1999; Harrison, 2004; Tsoukas, 2005), turns out to be of paramount importance to our problem. Actual practices, we are told, *"can diverge greatly from official descriptions of these practices. … Nonetheless, through careful investigation, managers can often find (the) gaps between official mandates"* and the actual practices (Harrison, 2004, p, 92).

While some authors, (i.e. Baumard, 1999, p. 98) advocate *"a long immersion in the organization being studied"* of over half a year as the method of choice for investigating tacit knowledge, other

authors (i.e. Harrison, 2004, p. 93) admit that *"intensive interviews"* are an equally valid means to access *"the richest data on emergent practices."* These interviews, to be useful, should be focused on specific activities: *"Open or semi-structured interviews elicit the most useful and valid data when respondents provide explicit descriptions of how they act in a range of work situations, rather than giving generalizations or expressing attitudes"* (ibid).

This tactic of asking individuals about specific activities, as opposed to generalizations, became a cornerstone in our new approach to the problem. Another recommendation that became part of our approach was to 'triangulate' our data gathering methods, by *"seeking information from people with divergent roles and viewpoints"* (ibid). It is important to remark here that our choice of research methodology fits the nature of the problem on both accounts, since – as we stated in Chapter 2 – action research helps *"make explicit the tacit knowledge that guides … practice"* (Somekh, 2008) and seeks to *"include all stakeholders actively in [the] processes"* (Docherty, 2006).

Third premise: supply chain strategy as a conceptual system

The third premise underpinning our approach is that a supply chain strategy can be represented as a conceptual system. A common definition for *system* is "*a set of interrelated components working together to accomplish a common purpose*" (cited in Oliver, Andary and Frisch, 2009, p. 1363). Recent literature in the systems engineering field has seen discussed the potential for *"engineering the enterprise as a system"* (i.e. Rouse, 2009). Rouse laments that, "*despite their prevalence, enterprises are seldom considered to be systems*" (p. 441).

It is our belief that the approach we present in this thesis to represent the firm's supply chain strategy as a system, may contribute towards the goal of engineering the enterprise as a system. Rouse is well aware of the relevance of functions taken as a whole, and of the importance of knowledge: he warns against managing functions within the enterprise independently of each other, arguing that we must look at the whole collection of functions, and emphasizes the role that knowledge plays as the

means by which enterprises increasingly address uncertainties and risks (p. 444).

Rouse includes the supply chain in his definition of enterprises, since it is "*a goal-directed organization of resources... and activities*", adding that "*supply chains can be viewed as extended enterprises linking upstream and downstream providers of raw materials, components, products, services and so on*" (2009, p. 441). The supply chain is frequently considered as a physical system. A physical system is one *"made up of real components occupying space"* (Blanchard, 2008, p. 5). However, we argue that when it comes to the supply chain strategy (or any other group of interrelated functional strategies), we can consider them as a conceptual system instead. A conceptual system is "*an organization of ideas, a set of specifications and plans, a series of abstract concepts*" (ibid).

Building upon the theoretical model

The possibility of representing the supply chain strategy as a conceptual system became evident during our work to develop a theoretical model of supply chain strategy following an inductive approach (Glaser and Strauss, 1967; Gummesson, 2000; Goulding, 2002; Charmaz, 2006).

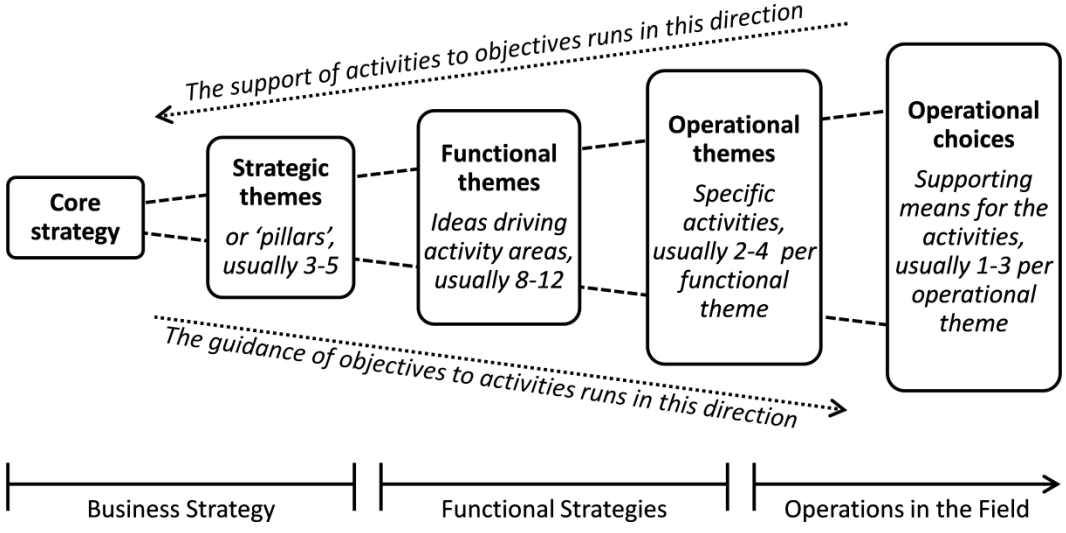


Figure 16: Conceptual model of functional strategies as bridge between strategy and operations.

The model, shown in Figure 16, includes five categories of concepts, along a spectrum that goes from the strategic to the operational. On the left end of Figure 16 we find the Core Strategy, the single

most central strategy statement of the firm, which along with the Strategic Themes (often called and the 'strategy pillars') represent what is called the 'Business Strategy'. On the right end we find the operations under the name of Operational Choices. Bridging these two extremes we have the Functional Themes and the Operational Themes, which together represent what is called the 'Functional Strategies' (including the supply chain strategy).

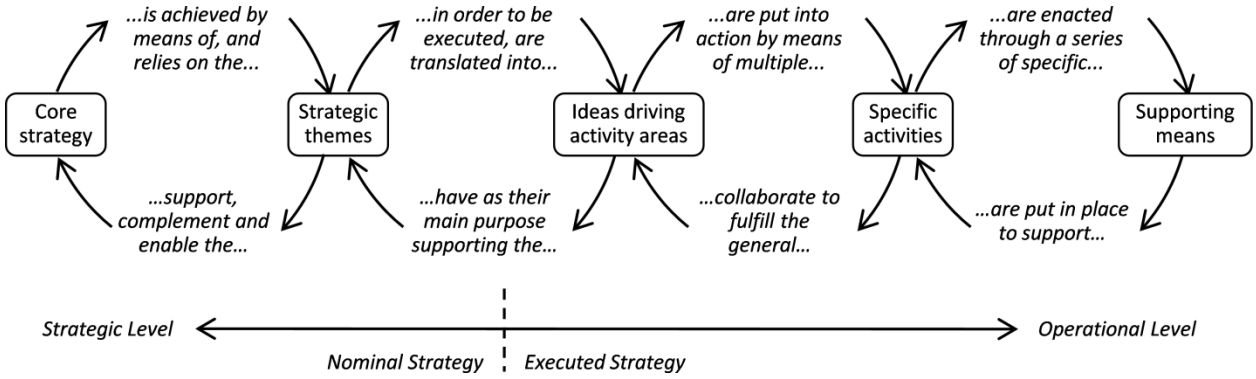


Figure 17: Tacit knowledge of activities connecting the board room and the field.

Despite its simple appearance, the conceptual model actually carries an important explanatory power. As shown in Figure 17, the model allows us to understand, for example, how the supply chain strategy, in the form of tacit knowledge about the supply chain strategic activities, serve as a link between the strategic imperatives that emanate from the boardroom and the operations that are taking place in the field.

Based on this conceptual model, we developed a means to represent graphically a supply chain strategy, that we call a Functional Strategy Map (FSM).

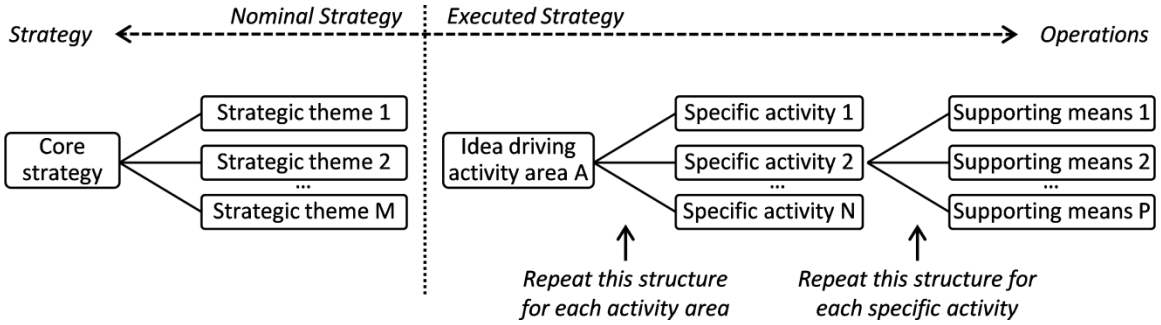


Figure 18: Template for building a 5-level Functional Strategy Map (FSM).

As can be seen in the template for its construction, shown in Figure 18, its structure is a reflection of the conceptual model: it has the same five categories, in roughly the ratios recommended by the model.

Refining and testing the methodology

The first action research project we conducted with Unit-X served to test for the first time with a real company the ideas we had developed with the secondary case study based on Dell. The 'capture' phase of the Unit-X project lasted 6 months, during which we tested the feasibility of the Functional Strategy Map in a real-world project.

A second action research project, conducted with Libica, served to test and refine the steps of our methodology to reveal and conceptualize the firm's supply chain strategy. The 'capture' phase of the Libica project required 4 months for the 'capture' part, and served to refine and, most importantly, to document in full detail the 'capture' methodology. The methodology was then successfully tested with students in a Masters class on supply chain strategy, where students were asked to create Functional Strategy Maps of their own based on data we provided them. Finally, a consulting project with a firm in Colombia, conducted by a third party, is currently applying the 'capture' methodology.

Steps of Phase 1: the 'capture' methodology

The methodology we propose for making explicit the tacit supply chain strategy of a firm is referred to as Phase 1. It encompasses ten steps, which can be broadly outlined as follows: Step 1 is about scoping the project; Steps 2 through 7 deal with making explicit the supply chain strategy, as it is executed in the activities of the firm; Step 8 brings the nominal business strategy into the picture, to provide context; Step 9 joins nominal and executed strategies in a single document, side by side; Step 10 validates this Functional Strategy Map. The following is a list of the ten steps:

- *Step 1 - Scope the project and choose the respondents*
- *Step 2 - Conduct a few dozen qualitative interviews*
- *Step 3 - Identify tacit areas of activity*

- *Step 4 – Translate each hierarchical summary into a partial map*
- *Step 5 - Validate the partial maps through group discussion*
- *Step 6 - Combine the partial maps of strongly related areas*
- *Step 7 - Add a layer of subareas when needed for simplicity*
- *Step 8 - Create an abstract of the nominal business strategy*
- *Step 9 – Assemble the Functional Strategy Map*
- *Step 10 - Validate final map through group discussion*

The rest of this chapter will present each one of these steps in full detail. Since read on their own the steps may come across as a bit abstract, the reader is encouraged to refer to the Appendix of this chapter, which illustrates these steps with examples taken from our in-depth projects with Libica and Unit-X.

Step 1 - Scope the project and choose the respondents

The first step is to scope the project, e.g. to decide which functions and areas will be included. We also select, from these functions and areas, a group of people to be interviewed.

Scoping: Selecting Areas

The first level of scoping consists of defining what part of the firm will be addressed by the project. The scope of the project is agreed, in terms of areas within the firm to be explored. A short list of relevant functional areas is prepared. Notice that this list is not meant to be exhaustive or final, since the facilitator should remain open to adding new areas as needed: once some interviews have been conducted, the facilitator may realize the need to add new areas to this list.

Sampling: Selecting respondents

Once the list of relevant areas is prepared, the facilitator proceeds to identify individuals within these areas to be interviewed. In particular, there are three levels of the organizational hierarchy from which respondents should be chosen. These we call levels 1, 2 and 3, and they are defined as follows:

1. Level 1 is composed of individuals at the lowest hierarchical level involved in the process of crafting the business strategy of the firm. For example, let's say that in a given firm the C-suite and the senior VPs are in charge of crafting the business strategy. Thus, Level 1 will be composed of individuals in the senior VP level (not the C-suite), since we want the *lowest* level involved in the crafting of the business strategy.
2. Level 2 is composed of individuals that report to Level 1 individuals. This is to say, by definition, they do not participate directly in crafting the strategy, although they might provide input to the strategy through their supervisors.
3. Level 3 is composed of individuals that report to Level 2 individuals.

For each area in the list, the facilitator wants to interview personnel from these three hierarchical levels.

Some rules of thumb for sampling

Number of interviews: The number of interviews to be conducted will depend on the number of areas of interest and the level of detail desired, but as a rule of thumb we recommend keeping it at about two to three dozen qualitative interviews.

Representation of levels: Out of the final number of respondents, we recommend that no more than 1/3 of the respondents come from Level 1, with the rest coming at roughly equal parts from Levels 2 and 3 respondents.

Allowing for snowball sampling: Only half the respondents should be chosen in the initial selection of respondents, with the other half spots left to be filled with respondents chosen through *'snowball sampling'* (Patton, 2001) of individuals or areas (e.g. chosen on the go, based on what is being heard in the interviews).

Step 2 - Conduct a few dozen qualitative interviews

The interviews required by our method are qualitative interviews. For a thorough understanding of

the art of qualitative interviewing, the reader is invited to consult the rich literature on qualitative interviewing; we recommend the following references: *"Qualitative Interviewing: The Art of Hearing Data,"* by Rubin and Rubin (2004); and "Learning From Strangers: The Art and Method of Qualitative Interview Studies," by Weiss (1995).

In this section we provide specific comments on the interviews as required for our methodology:

Length of the interview. A one hour time slot is to be reserved for each interview, scheduled before hand. During the course of the interview, the interviewer can decide to cut it short if the respondent does not seem to be collaborating, but preferably to not less than 30 minutes.

On privacy. It is important that the respondent and the interviewer be the only two people participating in, and with access to, the interview. The presence, or even the prospect, of a third party listening to the interview can be detrimental to the openness of the respondent.

About recording. It is recommended that the interview be recorded with permission, to facilitate its analysis afterward. Notes should also be taken during the interview. Depending on the style of the interviewer, these notes can be used only to remember interesting points to be brought up later, or as a parallel record of the interview.

About confidentiality. Often the interviewer is asked to sign a confidentiality agreement with the firm. The interviewer is advised to manage the recorded interviews and the data extracted from them with the utmost respect for confidentiality for both the individual and the firm. Particularly, the recordings should be guarded by the interviewer, and no piece of information from it should be linked to the name of a specific respondent.

Structure of the interview

The recommended structure for the interviews is given below:

- Introduction (~4 min)
- Placement questions (~3 min)

- Open questions (~35 min)
- Semi-open questions (~15 mins)
- Wrap-up (~3 min)

The times given above are just suggestions: the judgment of the interviewer should prevail, depending on what data has been collected so far, on the richness of a given interview and on the inclination of the respondent.

Open and semi-open questions are allotted the bulk of the time, 50 minutes. The relative division of time into open vs. semi-open questions may vary depending on how early the interview falls into the process of data collection. The middle interviews may require all of the time to go into open questions, whereas interviews near the beginning and the end of the data collection process may see equal time being allotted to each types of questions. It will also depend on the quality of the answers the interviewer is receiving.

Introduction

During the introduction, the interviewer will greet the respondent, introduce himself/herself and explain in general terms the purpose of the interview and the reason for the selection of the respondent, as well as the expected length of the interview. An example of an introduction is as follows:

"Good afternoon, [his/her name]. This is [your name], calling from [institution or firm]. Thanks for agreeing to talk with me, and thanks for your time. The purpose of this interview is to ask you some questions about the key practices of your position and your department. This interview is part of a research project we are conducting with [sponsor's name]. Think of it as an open conversation, rather free flowing, about the things you do as part of your responsibilities. It won't take more than an hour."

During the introduction, the interviewer will also inform the respondent of his/her rights, request permission to record the interview and clarify any doubts the respondent may have. This can be done along the following lines: *"All the information you give me today will be treated confidentially. I have*

signed a confidentiality agreement with your company. Your name will not be linked to any answer. The interview is voluntary, which means you have the right to decline to answer any given question, and you can stop the interview at any time. I now request your permission to record the interview, if that's OK with you. You have the right to revoke this permission at any time. The recording will be kept in an encrypted digital file, guarded by me personally. All copies will be deleted once our research project is complete. Do you have any questions?"

Placement questions

The interviewer then proceeds to present a series of three placement questions.

1. The first one is *"What is the name of your current position?"* If from the respondent's answer it is not immediately clear, the interviewer should ask specifically for the department within which this person operates, and for clarification of any term in the position name that is not immediately intelligible. If the respondent extends in the explanation, let him/her speak freely, taking notes. Use some clarifying questions until the respondent's position is clear.
2. A second placement question, *"Who do you report directly to?,"* is necessary only if this information has not been provided in the previous answer. From the names and positions of the respondents' direct supervisors, the interviewer will in time be able to place each respondent within the hierarchical structure of the firm.
3. The third placement question is *"Do you participate directly in crafting the business strategy of your firm?"* In case the firm calls their business strategy document by any other name (such as 'strategic management agenda', etc.), the interviewer would ask the question using that term instead.

The answer to this third question will help the interviewer place the respondent in one of the three levels we defined above. Placing the respondent in a level will determine some of the questions that will be asked during the interview.

Open Questions

The purpose of the open questions segment is to find out about the tacit supply chain strategy of the firm. For obvious reasons, the questions cannot be framed in these terms. Instead they inquire about the activities that an individual perform. Thus, the individual serves as a proxy to tap into the firm. Similarly, the specific activities serve as proxy to the tacit knowledge of the supply chain strategy. This means that, even though the conversation starts by asking about the activities of an individual, it should be steered as soon as possible towards the tacit supply chain strategy of the firm.

Some research has indicated that those involved in crafting a strategy tend to have a different perception of it than those that were not involved (Collier, Fishwick and Floyd, 2004). Thus, during our interviews, respondents that participate directly in crafting the business strategy (namely, Level 1 respondent) will be presented with a slightly different set of questions than those who do not (namely, Level 2 and 3 respondents).

When we are interviewing a Level 2 or 3 individual, the open question section starts with the following question: "*What would you say are the main activities of your position?*" Some respondents will begin answering this question right away. Others may ask for clarification: "*What do you mean?*". The interviewer can then expand: "*Think of a typical week or month. What are the things that take most of your time and attention?*"

On the other hand, when we interview a Level 1 individual, we will frame the question under different terms: instead of asking the individual to report his/her own activities, we will ask him/her to report on the activities of those individuals under his/her supervision. This recommendation is based on our experience interviewing people involved in crafting the strategy: they tend to mix stated business objectives with their factual execution, and even when asked to discuss specific activities they easily drift into expressing desired results as opposed to actual facts.

Thus, when we are interviewing a Level 1 individual, we use the following strategy: find out first who

reports directly to him/her: *"Could you tell me which positions report directly to you?"* We care more about the positions of these subordinates than their actual names. As the respondent lists these positions, we write them down. Then, for each one of them, we will ask: *"What would you say are the key activities of such-and-such position?"*"

Below we would like to provide some recommendations for conducting the open questions of any level.

Stay factual. The open questions segment of the interview is the most important. Rich and grounded answers here will provide superior data for later analysis. As we try to move the discussion from the individuals to the firm, and from action to tacit knowledge, we have to make a conscious effort to keep the conversation anchored on concrete activities ('*what*'). As a way to validate the factuality of each specific activity, we should ask for the means or details of its execution ('*how*'). To understand its purpose whenever it is not evident, we also ask for clarification on the ideas behind these activities ('*why*'). These "what, how and why" will be our main source of information during the stage of data analysis. The interviewer should remember, every time he hears about a '*what*', to ask about its corresponding '*how*'s, namely the supporting means or the details of its execution.

Find the sweet spot. We want to keep the discussion focused on the tacit knowledge on the supply chain strategy, which – in terms of the narrative of the conversation – lie in a 'sweet spot' between strategy and activities. The interviewer should pay close attention to what the respondent says, and pursue interesting areas that emerge during the conversation, always pondering: *"Is what I'm listening right now helping me understand the tacit ideas that underpin the way they do things ?"* Every time the answer is "no", a course correction is needed.

- If the discussion is becoming too strategic, we act to make it more factual by asking about the execution aspect of things. Probe questions that can be used to correct the course here are: *"How do you implement this? How is this actually done? How do you ensure this happens?"*, etc.

- If the discussion is getting bogged down into too much operational detail, we need to move it to a higher level of abstraction. Probes that are useful here include: *"What is the idea behind this? What is the purpose of this? What results have you achieved through this?"*, etc.

Explore further. The interviewer should listen carefully to the answer, taking notes of the activities that are mentioned. For each one of these, the interviewer will ask for further details. Every time the respondent mentions something of interest, the interviewer should make a note of it and, at the first opportunity, ask for further details: *"You mentioned before something that caught my attention. (Mention it here). Can you tell me more about this?"* To keep the conversation clear, the interviewer should move to clarify things every time the respondent becomes too vague in his / her answers, by asking: *"What do you mean by this? Can you give me an example?"*, etc.

The interviewer should allow the open question conversation to run for as long as it has momentum, even if it consumes the rest of the hour. Particularly among the early interviews, when the facilitator is just learning about the firm's activities, letting the open question discussion run its own course is a practical way to collect good qualitative data on the firm's tacit knowledge of its supply chain strategy.

However, there comes a time when the interviewer wants to present the respondent with some more structured questions, either because the open discussion has lost steam or because it is just treading territory that has already been covered in previous interviews to the point of repetition. In these cases, the interviewer is advised to move to the next section: using semi-open questions.

Semi-open questions

Semi-open questions can serve two purposes. One is to rekindle a dwindling discussion. The other is to explore a particular area of interest about which the interviewer has heard previously and which he feels deserves further exploration. The interviewer should be careful, however, not to mention the name of any previous respondent.

The interviewer should keep at hand a short list of general purpose semi-structured questions. Each one of them should be considered optional, in the sense that the interviewer should only ask those questions that seem relevant to the respondent and that have not been answered before during the course of the present interview. Semi-structured questions that we have used recently include the following: (1) *"What would you say is the biggest opportunity facing you today?"* (2) *"What would you say is the biggest challenge facing your function today?"* (3) *"What would you say is your business?"* Sometimes this question requires clarification: *"In other words, what is it that you sell? What do you provide the customer? What is your value proposition?"* (4) *"Who is your customer?"* (5) *"What are the needs of these customers? And how do you satisfy these needs?"*

Wrap-up

Some minutes before the hour is over, or when the interviewer judges the interview has come to an end, the interviewer will wrap-up the interview, thanking the respondent and leaving the door open for further contact if necessary: *"That's pretty much what I had to ask you. Thank you very much for your time. I really appreciate your answers and your time. I hope I can contact you with follow up questions after I have analyzed our conversation. Thanks again!"*

Step 3 – Identify tacit areas of activity

For extracting the activity data from the interviews, the facilitator will listen to all the interviews, one by one. As he listens to the interviews, he will conduct the following six tasks: (1) Identify tentative areas of activity, (2) Identify activities within each area, (3) Look for means that support each activity, (4) Check validity and wording of activities, (5) Check validity and wording of areas, and (6) Prepare a hierarchical summary of each area. Each one of these tasks is explained and illustrated with examples in the text below.

Task 1: Identify tentative areas of activity

Listening to the interviews, the facilitator will look for references to broad areas of activity, as they are described by the respondents. An area of activity, in general terms, is a '*kind of things*' the firm does. Once identified, the facilitator should write it down, in the form of an imperative statement.

Task 2: Identify activities within each area

Right after it has been identified, a tentative area is like an almost empty category. As we continue listening to the interviews, we will try to find specific activities that we can 'put' under each area. If the interview was conducted attentively, the interviewer should have probed further every time the respondent mentioned a new area of activity. Obviously, not all activities in an area will be captured, but at least the most salient ones should be listed, by writing them down under the respective area. Again, we recommend these activities be written in the form of an imperative statement.

Task 3: Look for means that support each activity

We want to make sure that each specific activity that we write down is grounded in actual practices of the firm. For this, we examine which means, if any, the firm has in place to support each activity we listed. We also look for additional details that may indicate the activity is actually taking place. For this, we listen to the interviews and ask ourselves, *"How is this activity being implemented? How is it being achieved in the field? What is being done to make it happen?"* The activity and its supporting means may or may not be found in a single interview. Remember we are dealing with tacit knowledge, which has not been well articulated yet. We should remain attentive when analyzing the data of additional interviews, so that we can add new means to activities we have previously identified; and add new activities to the areas we have previously identified.

Task 4: Check validity and wording of activities

For an activity to be considered valid, we must find enough evidence of supporting means or details

about it in the interviews. This means that whenever we cannot find supporting means or details for a given activity, we should distrust its validity and consider discard it from further consideration. Only activities for which we find supporting means and details should remain in our list. Their original wording, however, may change. As we add supporting means and additional details for a given activity, we may want to review the wording of its description.

Task 5: Check validity and wording of areas

Our confidence in the validity of a tacit area of activity is increased when we find in the interviews specific activities that fall under it. If by the time we are done analyzing the interviews we have found no activities that can be categorized under an area, we should doubt its validity and discard it. Areas for which we do find specific activities are retained, but the specific wording of their description may be revised. As we add new activities to an existing area, we should revise the wording used to describe the area, rewriting it as necessary. A second coder, with fresh eyes, may help check the validity and wording.

Task 6: Prepare a hierarchical summary for each area

For each tacit area of activity, we want to prepare a summary. By the time all the interviews are analyzed, each area of activity should have its own summary. We recommend building each summary using a hierarchical structure.

Other concepts the facilitator should capture

In addition to that related to activities, there is other type of information the facilitator should look for while listening to the interviews.

Grievances. One type is information on what we call 'grievances,' which are comments made about things that are not working well with the *status quo*. These comments could refer to complaints made by customers, or suppliers, or by internal members of the firm. The facilitator should write them down, as they will serve as valuable input to our evaluation efforts in Phase 2, particularly to evaluate the

sufficiency of the supply chain strategy, as it stands today.

To-do. The other kind of information that should catch the facilitator's attention, and be promptly written down whenever it is found, is that on things that could be done better, on new things that could be tried, or things the respondent believes should be in place but are not. These we call 'to-do' items, and they will serve as input during the reformulation effort in Phase 3, when we try to improve the existing supply chain strategy.

More information on 'grievances' and 'to-do' items is provided in following chapters.

Step 4 – Translate each hierarchical summary into a partial map

Partial maps are a graphical representation of each hierarchical summary we prepared in the previous step. For each area, the hierarchical summary is translated into a pyramidal conceptual map. This map is a diagram composed of text located inside boxes, which are then connected through lines showing the relationship between them. Given the hierarchical structure of the summary we prepared in the previous step, its translation into a partial map is a very straightforward process. In fact, copy-pasting the hierarchical summary into one of PowerPoint 2007's Smart Art, specifically the one called 'Horizontal Hierarchy,' has worked neatly for us in the past.

Step 5 - Validate the partial maps through group discussion

The partial maps we have prepared are based on what we heard from individuals during the interviews. We want to confirm that the information we received in the interviews about areas, activities and means - which we used to build the partial maps - is an accurate representation of what the firm's tacit knowledge of its supply chain strategy. For this, we will gather a team from the firm in a room and presented to them all the partial maps, one at a time, and will ask them to provide feedback as a group on whether what is articulated by the maps corresponds to what they do. Based on what we hear from the group, we will revise the partial maps to make it more valid. Representatives from the

relevant areas should be present. Overlap between this group and those that were interviewed is actually encouraged. The scheduled time for the meeting should allow for enough time for discussion.

Advise for the facilitator

It is very important to manage the group discussion towards the stated goal of validating the factual nature of the areas, activities and means. Throughout the discussion, the facilitator should remind the group to stay focused on the question of whether the content presented in the partial map is factual. Those purported areas, activities or means that are found not to be factual should be either rewritten until they are an accurate representation of what takes place, or dropped altogether. Areas, activities or means that are found to be missing should be added to the maps.

To assuage concerns regarding whether the emerging picture is flattering as a portrait of the firm's activities, it is useful to remind participants that the map is for internal use only, and that it is in the best interest of the firm to have an accurate and factual map, warts and all, as opposed to a pretty one based on wishful thinking. The facilitator should resist any eventual pressure to drop from the map reference to areas, activities or means that, although unflattering, are grounded on facts. If it is real, it belongs in the map. Thus, it helps if the person facilitating the discussion is the one who conducted and analyzed the interviews. By the same token, the facilitator should not consent to adding to the map areas, activities or means that, albeit desirable, are not factual.

Types of changes

- As a result of the group's discussion, some of the partial maps will need extensive revision. If the work of interviewing and analyzing the data was done carefully, most will require only modest revision, or none at all.
- For some partial maps, the group may request no modifications.
- For most partial maps, the group may request small changes in wording of activities or means.

- Some of the activities or means within a partial map may be challenged in terms of their factual standing. Since we are dealing with tacit knowledge, it is a common occurrence that what one person thinks is a fact, another may think is just a goal for the future. In these cases, the facilitator should take the time to explore with the group whether the activity is grounded on fact. When a purported activity or mean has been rejected by the group as not factual, it should be dropped from the map.
- The group may find that there are missing activities or means in the partial map of a particular area of activity. In this case, the facilitator will try to elicit from the group a consensus wording for this missing activities, and will add them to the respective partial maps once they have been vetted as factual by the group.
- Something we have not experienced yet, but which is nevertheless possible, is that the group may find that a whole area of interest is missing from the exercise. In this case, provided that the activities under this area are considered factual by the group, the facilitator should include the newly identified area of activity, with its respective activities and means. This, however, should not be done lightly. Failing to submit the newly identified activities to the same level of scrutiny that others received would compromise the validity of the resulting map.

Listen for 'grievances' and 'to-do' items

The validation exercise is a useful source of data for the facilitator on the areas of 'grievances' and 'to-do' items, which we mentioned previously in Step 3. Comments made during the group discussion, will have a tendency to include not only factual information on activities, which is useful for Phase 1, but also information on grievances, useful for Phase 2, and on to-do items, useful for Phase 3. All these should be written down, to the best of the facilitator's ability, to be preserved for later use.

Step 6 - Combine the partial maps of strongly related areas

At this point we advise examining the partial maps to find whether some of them address closely related areas. Every time multiple partial maps are found to be addressing closely related areas, we recommend exploring whether it is desirable to combine them into a single partial map. The objective of this merging of partial maps is to reduce the complexity of the final output of our effort: the final strategy map will be easier to use if closely related areas are grouped under common headings.

How aggressive we are in our efforts to combine tacit areas of activity will depend, to some extent, on how many areas we have to begin with. As a rule of thumb, we try to end up with no more than a dozen areas of activity.

Step 7 - Add a layer of subareas when needed for simplicity

If we were to put all the partial maps one next to the other, three distinct layers can be identified: the first one is the layer of areas of activity, the second is the layer of activities *per se*, and the third is the layer of supporting means. For the final strategy map, the facilitator may chose to display only the two higher layers, to keep the map's size manageable.

Based on our experience, it pays off to balance diversity and simplicity: we recommend keeping the number of items in these two layers within a reasonable range. As a rule of thumb, we recommend keeping no more than a dozen items in the first layer, and roughly three times that number in the second layer. This means that each item in the first layer should have under it between two and four 'children'. These figures, of course, are just a recommendation.

In some cases there is no need to do anything special to keep the number of items in the first and second layer within the recommended ranges. Yet this is not always the case, and action is necessary in order to keep the number of items in the second layer within the desired range.

Step 8 - Create an abstract of the nominal business strategy

In order to provide context to the tacit supply chain strategy, we now move our attention to the nominal high-level strategy of the firm. In this text, by nominal strategy we mean the strategy that the firm officially espouses. In this step, we want to identify both the central strategy statement of the firm (the 'core strategy') and its supporting high-level strategic objectives (the 'strategic themes') and map them in a conceptual map along the lines of the model shown in Figure 4.

Through the sponsor of the project, the facilitator negotiates access to written documents stating the firm's core strategy and its espoused strategic themes. *"Documents and declarations about the firm that are meant for broad distribution"*, even internally, *"can provide useful insights into the image of the firm that the authors seek to project"* (Harrison, 2004:93) to their audience, in these case the employees of the firm. In these documents, the core strategy and the strategic themes are usually easy to identify: they tend to feature prominently in the firm's stated strategy. The core strategy, a single statement that summarizes the firm's central objective, may be found under various labels, including those of overall strategy, mission, vision, etc. The strategic themes, a series of more specific yet still high-level statements that support and enable the core strategy, are also found under labels such as strategy pillars or objectives.

Step 9 - Assemble the Functional Strategy Map

The full-blown Functional Strategy Map (FSM) spans over the five conceptual categories shown in Figure 16, and is built upon the template provided in Figure 18. However, since the fifth layer will typically contain a large number of items, displaying all five layers of the FSM in a single sheet of paper is difficult. Thus, we recommend omitting the fifth layer and displaying only the first 4 layers, as suggested by the template shown in Figure 19. (In this template, the term "executed strategy" refers to the strategy as it was actually executed.)

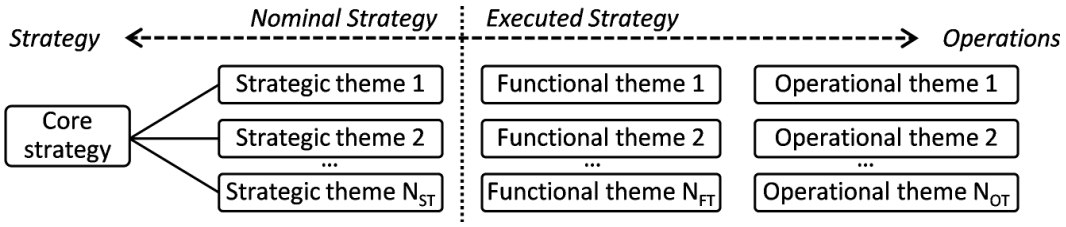


Figure 19: Suggested template for a briefer, 4 level Functional Strategy Map

Assembling a 4-level Functional Strategy Map out of the elements we have prepared so far is rather straightforward. Following the template shown in Figure 19, we just place on the left hand the nominal map prepared in Step 8, and on the right the first two layers of the partial maps prepared in Steps 2 through 7.

The resulting Functional Strategy Map features two distinct halves. The left half of the map shows a conceptualization of the nominal strategy of the firm. The right half of the map shows a conceptualization of the executed strategy. The boundary between the nominal and the implemented halves of the map is denoted by a dotted line.

Each one of these two halves includes two layers. For the nominal half of the map, the first layer includes only the core strategy, and the second layer includes all the strategic themes. For the implemented half of the map, the first layer is that of the areas of activity, and the second layer is that of the sub-areas of activity, or – if no sub-areas were created – that of the specific activities that were identified.

Step 10 - Validate final map through group discussion

The validation of the Functional Strategy Map takes place in two steps: one of individual feedback, and one of collective feedback. In our experience, these can be conducted effectively through discussion with members of the team either over the Internet or in a physical meeting.

First round: Individual feedback ('nominal group')

In the first round, the Functional Strategy Map that we assembled in Step 9 will be individually

presented to each member of the target firm that was interviewed, along with the question: *'In your opinion, is this abstraction an accurate representation of what the firm does, in general terms?'* Individuals are asked to send their feedback directly to the facilitator.

By now, the facilitator will have sufficient knowledge of the firm's activities, both from the interviews and the validation session, to judge the merits of the feedback. The facilitator should retain, on a tentative basis, feedback that seems based on fact, for further discussion with the group. The facilitator should, nevertheless, disregard pressure to embellish the map by removing unflattering features that are grounded on fact.

Second round: Collective feedback ('real group')

A session is then scheduled for discussion of the individual feedback with the group. Typically, a 2 hours time slot will suffice. All members of the group are provided a copy of the revised strategy map, showing whatever tentative modifications were made on the map based on the individual feedback. A practice that has worked for us is to read one by one all the concepts in the map, allowing for the participating members to voice any recommendations on changes to the wording or concerns of any other nature.

It is the facilitator's task to balance two factors: keeping the map faithful to the activities on the ground, and allowing the team to express the ideas in terms that are familiar to them. It is important, after all, that the team members identify the map as an accurate representation of what they actually do, according to the tacit knowledge they posses.

After this collective feedback session has concluded, and all the recommended changes have been done to the map, the final version of the map is distributed to the members of the team, for their use.

Listen for ‘grievances’ and ‘to-do’ items

Both rounds of the final validation exercise present the facilitator with a chance to collect more

information on ‘grievances’ and ‘to-do’ items. Both the individual answers provided by members of the team during the individual feedback round, and comments made during the group discussion, should be scrutinized with the purpose of writing down information on these areas to be preserved for later use.

Summarizing, in this chapter we presented the methodology we propose to make explicit (e.g. to ‘capture’) the supply chain strategy of a firm. We discussed the ideas behind the methodology, its theoretical foundation and the specific steps that should be followed to apply it. What follows next is a companion Appendix that will provide real-life examples to the steps of the ‘capture’ methodology.

APPENDIX TO CHAPTER 5. EXAMPLES OF THE CAPTURE PROCESS

Chapter 5 presented the ten steps of our methodology to capture a supply chain strategy. The purpose of this Appendix is to illustrate these steps with real examples of the 'capture' process. Most examples are taken from our action research project with Libica, while a few other come from the project with Unit-X. In both cases, all sensitive information has been duly disguised to protect the confidentiality of these firms.

Who is 'we'? To keep the language of the examples simple, throughout this Appendix, the first person plural refers to the facilitator of the process, except where noted otherwise.

First contact. MIT's SC 2020 Project was approached by the Executive Vice President of Operations of Libica. He described to our team how changes in the firm's business model that had taken place a few years ago were forcing them to rethink their strategic approach to the supply chain. After becoming acquainted with our supply chain strategy process, he decided it would be interesting to engage us in applying this strategy evaluation and reformulation process to his business unit's supply chain. For this, first we would have to capture the tacit supply chain strategy of Libica. Having agreed on this, we then proceeded to scope the project.

Examples for Step 1: Scope the project and choose the respondents

Example of Scoping the Project

In the case of Libica, it was decided the project would focus on the 'distribution' business unit only, particularly on its supply chain strategy. We looked at the functional areas relevant to the supply chain activities: including operations, marketing, sales, strategy, procurement, and others. Some areas were added later to the list: customer service and customer surveys/feedback.

Example of Sampling Respondents

In the case of Libica, the first respondent selection was prepared by their VP of Supply Chain and Operations, and is shown in Table 12.

C-Suite *(1 individual)*	**Level 1** *(5 individuals)*	**Level 2** *(5 individuals)*	**Level 3** *(1 individual)*
CEO	Executive VP of Strategic Sourcing Senior VP of Marketing / Retail Sales Senior VP of Operational Excellence Senior VP of Customer Service Senior VP of Strategy & Business Devel.	VP of Operations - West VP of Operations - East VP of Operations - Central VP of Specialty Sales VP of IT	Director of Inventory Optimization

Table 12: Initial list of respondents from Libica, suggested by their VP of SC.

The VP described this sample as *"definitely a cross section of the business,"* albeit admittedly *"pretty top heavy."* The facilitator asked the VP to *"balance the sample ... by adding to the list some people that report to the ones listed."* One potential respondent was dropped from the list: the CEO, who belongs to the C-suite and thus is above all the three levels in which we wanted to focus our interviewing.

After a few revisions to the list, including suggestions done early and later additions done during the interview process through snowball sampling, the final list of respondents looked as shown in Table 13.

Level 1 *(7 individuals)*	**Level 2** *(7 individuals)*	**Level 3** *(8 individuals)*
Executive VP of Strategic Sourcing Senior VP of Marketing / Retail Sales Senior VP of Operational Excellence Senior VP of Customer Service Senior VP of Strategy & Business Devel. Executive VP of Operations & SC Senior VP of National Chain Accounts	VP of Operations - West Region VP of Operations - East Region VP of Operations - Central Region VP of Specialty Sales VP of IT VP of Strategic Planning / Execution VP of Operational Excellence	Director of Inventory Optimization Director of Operations Director of Operations Director of Retail Sales Director of Consumer Products Director of Retail Sales Manager of Performance Consulting Director of Marketing & Prod. Devel.

Table 13: Final list of respondents from Libica, after our modifications.

Both Senior and Executive VPs in Libica report directly to the CEO and participate in crafting the strategy, which makes them Level 1.

A total of 29 days passed between the first and the last of these 22 interviews. Comparing the initial and the final lists, it is clear the rules of thumb were followed: (a) the initial sample was half of the final

sample, (b) Level 1 had no more than one third of all respondents, and (c) the rest of the sample was roughly equally distributed between Levels 2 and 3.

Examples for Step 3: Identify tacit areas of activity

Example for Task 1: Identify tentative areas of activity

During interview #1 with Libica, we were told by the respondent that the firm offers its customers both products and services. Among the services he described were some targeted at a particular segment of their customer base, that they call the retail independent customers. These small retailers were very interested, he said, in "*retailer solutions*." Thus, Libica's service offer to them was about "*how do we make their store more efficient, how do we make them as efficient as a big chain. (...) When we leverage that over five thousand retail independent customers, we can make (these solutions) affordable for them*."

This statement suggests that a tentative tacit area of activity for Libica is to *Help independent retailers be more efficient*, which we write down as a temporary label for this potential area. The validity of this as an area of activity will be tested as we work our way through the interviews, and the wording of its description may be revised.

Example for Task 2: Identify activities within each area

Here is an example of how a specific activity is identified. The facilitator asks himself: *"What evidence do I have that the firm is actually doing things in this tacit area, i.e. help independent retailers be more competitive?"* What concrete examples are there in the interviews of activities that fall under this area? The respondent of interview #1 provided several examples of activities focused on making independents more competitive. What follows is a verbatim quotation regarding the first one: "*Here's a good example: we have a solution called LIW (Libica Inventory Wizard), where, you know... A large national chain retailer can invest literally hundreds of millions of dollars they have on their inventory*

management system, because they have five thousand stores that they are trying to manage. As you can imagine, a retail independent who only has three million (dollars) in revenue, certainly can't spend hundreds of millions of dollars on a state-of-the-art inventory system. So what we did is that we went and made that investment for them, so that... what it allows is that, instead of them saying 'Oops! I'm out of this product, I better order it today,' we provide them the technology to actually predict when they will be out and it automatically does the ordering for them. So, you know, we take a big headache off of their hands, called inventory management, which could be something as eight to ten hours a week for a (specialist working for the retailer), that have to do that themselves, and the system does it for them. And, oh, by the way, it does it so much better, (it) typically put(s) anywhere from a hundred to two hundred thousand dollars back in your pocket, because you're carrying too much inventory to begin with."

So, the facilitator writes down *'Giving independent retailers access to an inventory management system'* as a specific activity that falls under the tentative tacit area we mentioned above, namely *'Helping independent retailers be more efficient'*.

Example for Task 3: Look for means that support each activity

What follows is an example of finding the means that support an activity. The activity is that one identified above, namely "giving independent retailers access to an inventory management system". The supporting means for this activity were found in several subsequent interviews, whose respondents provided us with additional details on the capabilities of the inventory solution. Notice that these respondents were unaware of the answers of any previous respondent.

During interview #17 with Libica, a respondent said that in LIW "*the order base, or the reorder point as you put it, will be dynamically adjusted daily based on what that retailer dispenses*." This provides a mean that supports the activity. The facilitator writes this means down as *'Based on sales, our software adjusts the replenishment levels every day'.*

During interview #21, another respondent provided more details on the means by which the inventory management system helps independent retailers. Asked to elaborate about the differences between LIW and other alternatives available in the market, the respondent mentioned three: "*Well, the biggest is that grouping logic*"; "*It has seasonal logic built in*"; and "*It's based on dispensing level data, (...) point of sale data*." This corroborates the use of sales data as a means, but also provides us with two new means that support the activity mentioned above: '*Our software replenishes using a grouping logic'*, and '*Our software takes seasonality in consideration for replenishment'.*

Example for Task 4: Check validity and wording of activities

The following illustrates the rewording of an activity. Previously the facilitator had identified an activity that was described as '*Giving independent retailers access to an inventory management system'.* However, in the lapse between when this activity was first described and when the interviews were completed, additional details became available that suggested the activity would be more accurately described using stronger terms. During interview #17, a respondent said that Libica's Inventory Wizard takes reordering "*to a much, much more sophisticated level*." Further details along similar lines are found in interview #21: "*Most companies have an auto-replenishment system. LIW is more of a living, breathing type of inventory management system, you know, that groups different products together. (...) I would say LIW is our biggest competitive differentiator in retail independents. By the way, we have proven results for all this things we're talking about. (...) We have results to back all this up*." He goes on to state how they have been able to quantify in terms of savings to the independent retailers how much LIW is superior to all the other alternatives currently available in the market. Based on this additional information, we rewrite the description of the activity as follows: *Give independent retailers access to a state-of-the-art inventory management system.*

Example for Task 5: Check validity and wording of areas

What follows is an example of rewriting the description of a tacit area of activity. In the case of the area mentioned above, we found additional evidence in later interviews in favor of its validity. The respondent of interview #21 said: "*We are known today as the wholesaler that has the strongest value added services. So, by value added services I mean the programs and services that help retail independents be more efficient, improve their reimbursements, those kinds of things. (...) We want to be great at four things. OK? When it comes to retail independents, we want to help them improve their reimbursements, we want to help them streamline their operations, we want to help them create alternate revenue streams (...), and the last would be, how do we help them increase their market share*."

The picture that emerges is that the firm indeed tries to help independent retailers not only be more efficient, but also be more competitive in general. Since we found sufficient evidence in favor of this area, we decide to keep it. We revise its wording to go beyond efficiency, as follows: '*Help independent retailers be more competitive.'*

Example for Task 6: Prepare a hierarchical summary for each area

We present below the hierarchical summary for the area of *'Helping independent retailers be more competitive'*. Within this area, we identified a total of nine specific activities. Each activity, in turn, has between one and three supporting means or details. The first activity in the summary ('*Give independents access to state-of-the-art inventory management'*) will be familiar to the reader from our examples above. The rest were obtained through similar analysis of the interviews.

In the case of Libica, we identified nineteen areas of activity, each one with its own specific activities, and each of these activities with its own supporting means and/or details attesting to their factuality. For each one of these areas of activity, a hierarchical summary, like that of Table 14, was prepared.

Examples for Step 4 – Translate each hierarchical summary into a partial map

For an illustration of this step, compare the hierarchical summary shown in Table 14 against the partial map shown in Figure 20. We built one such partial map for each one of the areas of interest.

- Give independent retailers access to state-of-the-art inventory management
  - Our software replenishes using a grouping logic
  - Based on sales, our software adjusts the replenishment levels every day
  - Our software takes seasonality in consideration for replenishment
- Help independent retailers sell the most profitable products
  - Help independents find missed opportunities in previous orders and learn from them
  - Help independents place orders for the most profitable commodity products
- Help independent retailers get reimbursed
  - Help them sell the right products to get reimbursed most
  - Speed up the payment, as they get a direct deposit instead of check
  - Double check that they are getting reimbursed the right amount
- Help independent retailers create alternate revenue streams
  - Launch programs to help independents develop businesses beyond baseline products
  - Help independents get reimbursed for providing products to subsidized customers
- Let independent retailers tap into the advantages of our size and capabilities
  - Negotiate and contract reimbursement rates on their behalf
  - Offer private label products under the Libica Label for independent stores
  - Offer advisers familiar with their regions to coach them on being more profitable
- Help independent retailers improve their market share
  - Help them market and advertise their stores to local communities
- Help independent retailers focus on serving their customers
  - Hire a team of business consultants to help independents use our services
  - Offer front-store services to them, to maximize sales of non-specialty products, etc.
  - Take care of resolving any claim of wrong or late reimbursement
- Offer independent retailers capital management services
  - Offer them aggregate pricing
  - Finance their operations
- Help independent stores transition between owners
  - Help find a buyer for the store when current owner wants to retire

Table 14: Hierarchical summary for area *"Help independent retailers be more competitive"*

Examples for Step 5 - Validate the partial maps through group discussion

In the case of Libica, two facilitators from our research group met with about 20 members of Libica's functions in their headquarter offices. Most of those present were related to functions directly involved with supply chain activities, while a few others were invited to provide the insight of other functions into

the discussion.

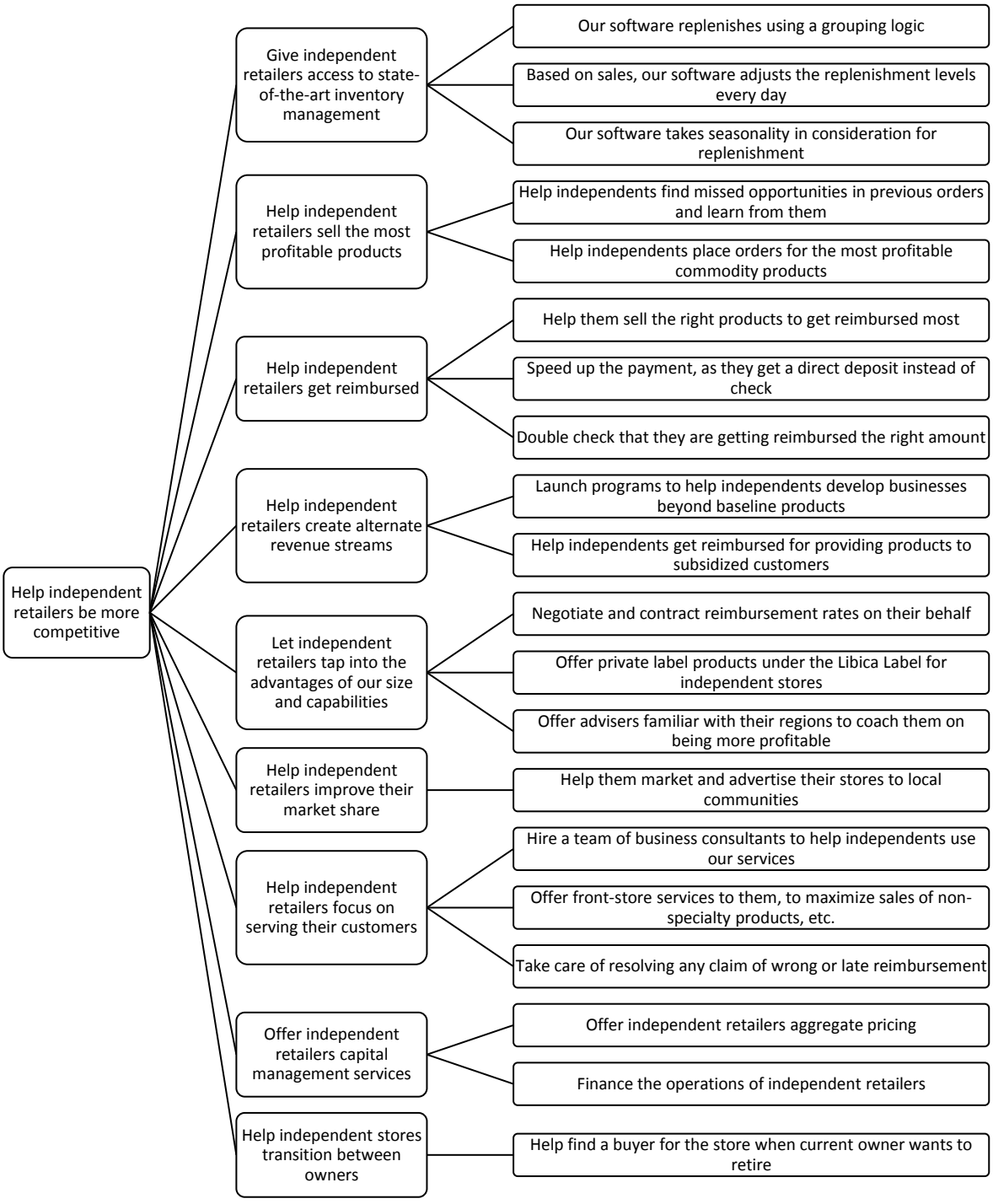


Figure 20: Initial partial map for area *"Help independent retailers be more competitive"*

In the case of Libica, a block of three hours was reserved for the discussion of nineteen partial maps. One by one, the partial maps were projected on the wall, and the group was asked to consider whether

the partial map was fairly summarizing the activities the firm performs in that given area of interest. Extensive notes were taken on the group's feedback.

Examples of changes made to the partial maps:

- For some partial maps, the group may request no modifications. For example, in our validation exercise with Libica, three areas of interest were accepted by the group right as they were, with no changes requested.
- For most partial maps, the group may request small changes in wording of activities or means. For example, in our validation exercise with Libica, we were requested that we modify the wording of one of the activities (*'Let independents tap into the advantages of our size'*) to include the words *'and capabilities.'* Thus, the revised wording read: *'Let independents tap into the advantages of our size and capabilities.'*
- Some of the activities or means within a partial map may be challenged in terms of their factual standing. For example, in our validation exercise with Libica, the group found that a purported means, namely *'Double check the products before shipping using scanners and barcodes,'* was not factual, since no such thing is done in practice (despite the fact that it was described as such in an interview). Thus, this means was dropped from the respective partial map.
- The group may find that there are missing activities or means in the partial map of a particular area of activity. For example, in our validation exercise with Libica, we found that our partial map for a particular area of interest, namely *'Address the needs of workshops through value added solutions,'* was missing several activities and means. Before the validation exercise, the partial map of this area listed only three activities with their respective means. However, during the discussion, the group pointed out that other activities were conducted in that area that deserved being listed. The revised partial map included a total of eight activities, more than twice the number before the validation exercise.

Examples for Step 6 - Combine the partial maps of strongly related areas

Among the areas of activity we had identified during the Libica exercise were the following two: (a) *'Keep our workforce engaged'*, (b) *'Keep our workforce well trained.'* We decided to combine the contents of these two areas of activity into a new single area of activity. We labeled the new area *'Work to improve the impact of our workforce,'* a statement that reflects the main idea behind the multiple activities and means encompassed under the previously separated two areas. Notice that when two areas are merged, it is their ideas, not necessarily their wording, that remains.

Here is another example, also from the Libica exercise. Among the areas of activity we had identified were the following two: (a) *'Deliver exactly what was ordered, within committed volumes'*, (b) *'Deliver daily, fast, reliably and predictably.'* We decided to combine the contents of these two areas of activity into a single new area, given their focus on delivery logistics. To these we also added some activities dealing with *'Increase the speed of our delivery to the market'* that had been misplaced in another area. Analyzing the activities and means of all these three sources, we decided that the resulting single area of activity would be labeled *'Deliver fast, accurately and reliably,'* since this statement seemed to reflect the idea behind all the activities and means that were now encompassed under this new area.

As a rule of thumb, we try to end up with no more than a dozen areas of activity.

- In the Unit-X exercise, for example, we had identified from the data eight rather distinct tacit areas of activity. Thus, we felt no strong need to try to merge any of them, since: (a) their number was not large, and (b) their features were distinct enough to warrant remaining as separate areas.
- On the other hand, in the Libica exercise we had identified nineteen areas of activity, most of them so closely related to other areas that they gravitated towards each other. Thus, in Libica's case we were more aggressive in the aggregation, and combined almost every area with some other closely related area of activity. Only three areas of activity, among them

the familiar *'Help independent retailers be more competitive,'* were not combined with other areas. After the merging, the number of areas of activity for Libica had been decreased from nineteen to eleven.

Examples for Step 7 - Add a layer of subareas when needed for simplicity

In some cases action is necessary in order to keep the number of items in the second layer within the desired range. In our exercise with Unit-X, for example, we had eight areas of activity and thirty one activities under them. In other words, for Unit-X the number of items in the first and second layers fell within the recommended ranges without the need of any action on our part.

For Libica, for example, action was needed to keep the item count inside the recommended ranges. We mentioned above how we merged related areas of activity, effectively decreasing the number of first layer items from nineteen to eleven (within the recommended range). Now we will describe the action we took in order to have the desired number of items in the second layer.

Since a total of ninety activities were identified, using the activities as our second layer would not be advisable: the count would exceed by a factor of three the recommended range. Our solution was to add a new layer to help us connect the eleven areas and the ninety activities. This new layer, which could be equally described as one of sub-areas or of meta-activities, would include approximately three items per area, to help us stay on target.

In practice, this is done by taking all the activities within an area, grouping them in thematic clusters of 3 (plus-or-minus 2) and giving each cluster a name based on the idea behind the activities it covers. To illustrate how this was done, let us resort again to the example from Libica we have been using, namely the area *'Help independent retailers be more competitive'*. Figure 21 clearly shows the new layer that was added between the area and the activities. Notice that, to keep the figure simple, we do not show the layer of supporting means.

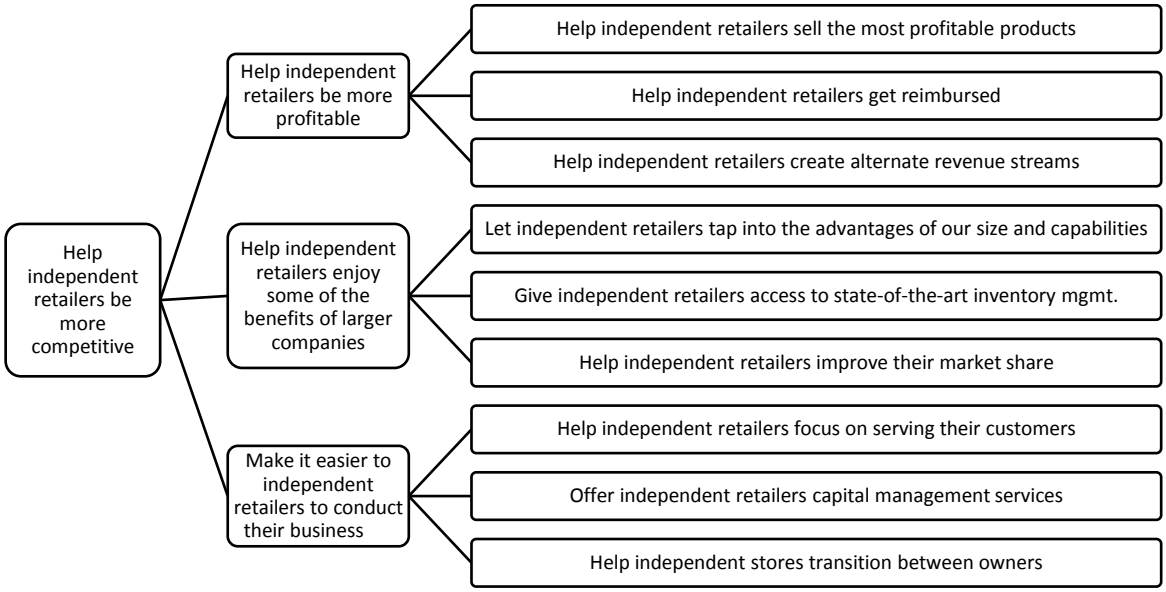


Figure 21: Revised partial map for area *"Help independent retailers be more competitive"*

Examples for Step 8 - Create an abstract of the nominal business strategy

Unit-X. As an illustration, let us present here how we identified the core strategy and the strategic themes in the case of Unit-X. Asked for documents about their stated strategy, our sponsor in the company, the VP of Supply Chain for the Business Unit, gave us access to a slide from a presentation.

The slide, entitled 'The Unit-X Strategy', contained two elements: an unlabeled general statement and four strategic objectives. The general statement read along the lines of *'Keep attractive yet sustainable margins as we grow with the market.'* This we took to be the core strategy. The four strategic objectives, which the firm also calls its four pillars, actually contained five ideas: (1) '*Better match customers with products*', (2) *'Maximize our impact in current markets'*, (3) *'Have the lowest cost of delivered product'*, (4) *'Pursue innovation on high margin niches'*, and (5) *'Identify and prepare for long-term threats'*. These five ideas we took to be the strategic themes of the firm's business strategy.

We asked our sponsor to confirm whether what we had identified as core strategy and strategic themes could be fairly described as a high-level abstraction of his firm's business strategy. He agreed. After his validation, we build a small conceptual map, shown in Figure 22.

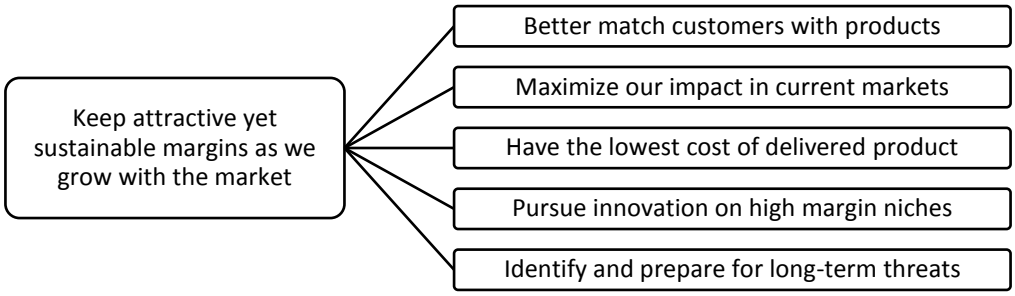


Figure 22: Mapped nominal strategy of Unit-X.

Libica. Another illustration is provided by our exercise with Libica. Asked about their stated strategy, our sponsor - Libica's VP of Operations and Supply Chain - provided us with two documents, each one with several slides in it. One of them, titled 'Operations Strategic Themes,' included a list of ideas that we deemed to be just what the title suggested: the strategic themes of the firm, from the perspective of operations. These were: (1) *'Deliver exceptional customer service'*, (2) *'Develop air-tight supply-chain integrity'*, (3) *'Operate with a lean supply chain network'*, (4) *'Compete through vision and know-how'*, (5) *'Develop our employees to their full potential.'* Our sponsor validated our identification of these imperatives as the business unit's strategic themes.

We could not, however, identify the core strategy in the documents. Asked about this, the sponsor provided it to us directly, via email, as a single statement: *'Make our customer's business less complex and more cost effective'*.

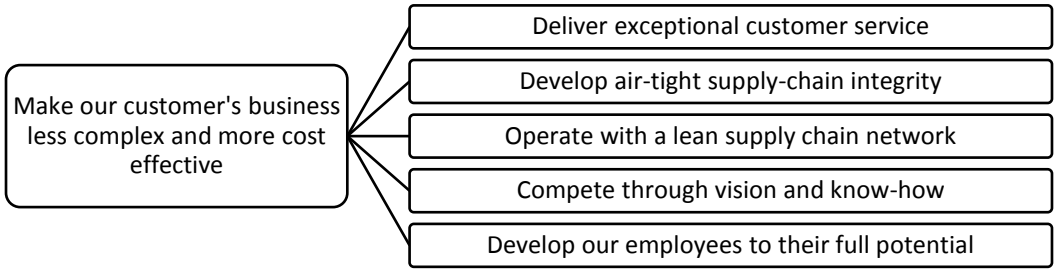


Figure 23: Mapped nominal strategy of Libica.

Having all the necessary elements, we proceeded to make the conceptual map for Libica's nominal strategy. The resulting conceptual map is shown in Figure 23.

Examples for Steps 9 and 10 – Functional Strategy Map

The Functional Strategy Maps for Libica and Unit-X are shown in Figure 24and Figure 25 respectively.

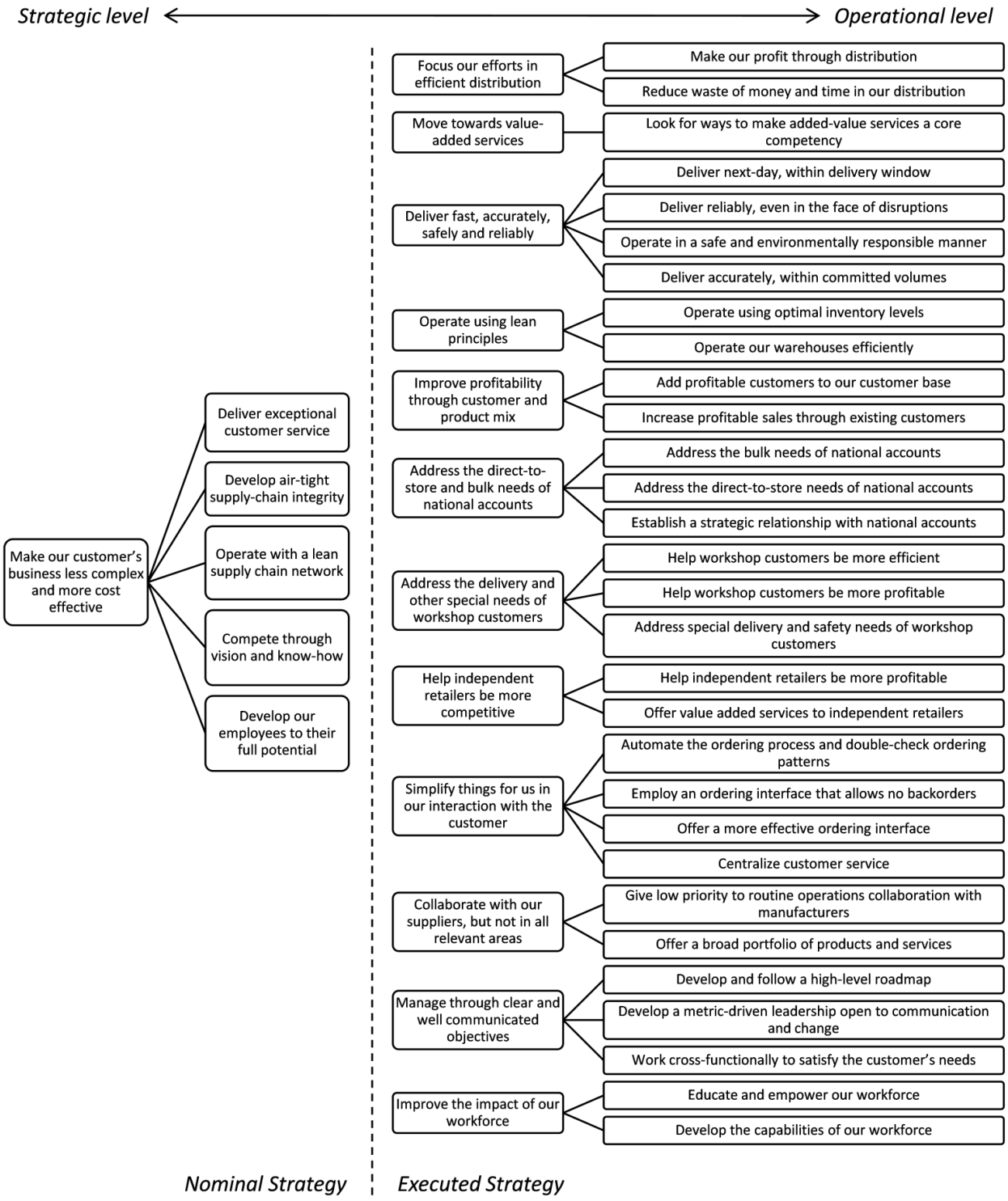


Figure 24: Validated 4-level Functional Strategy Map for Libica.

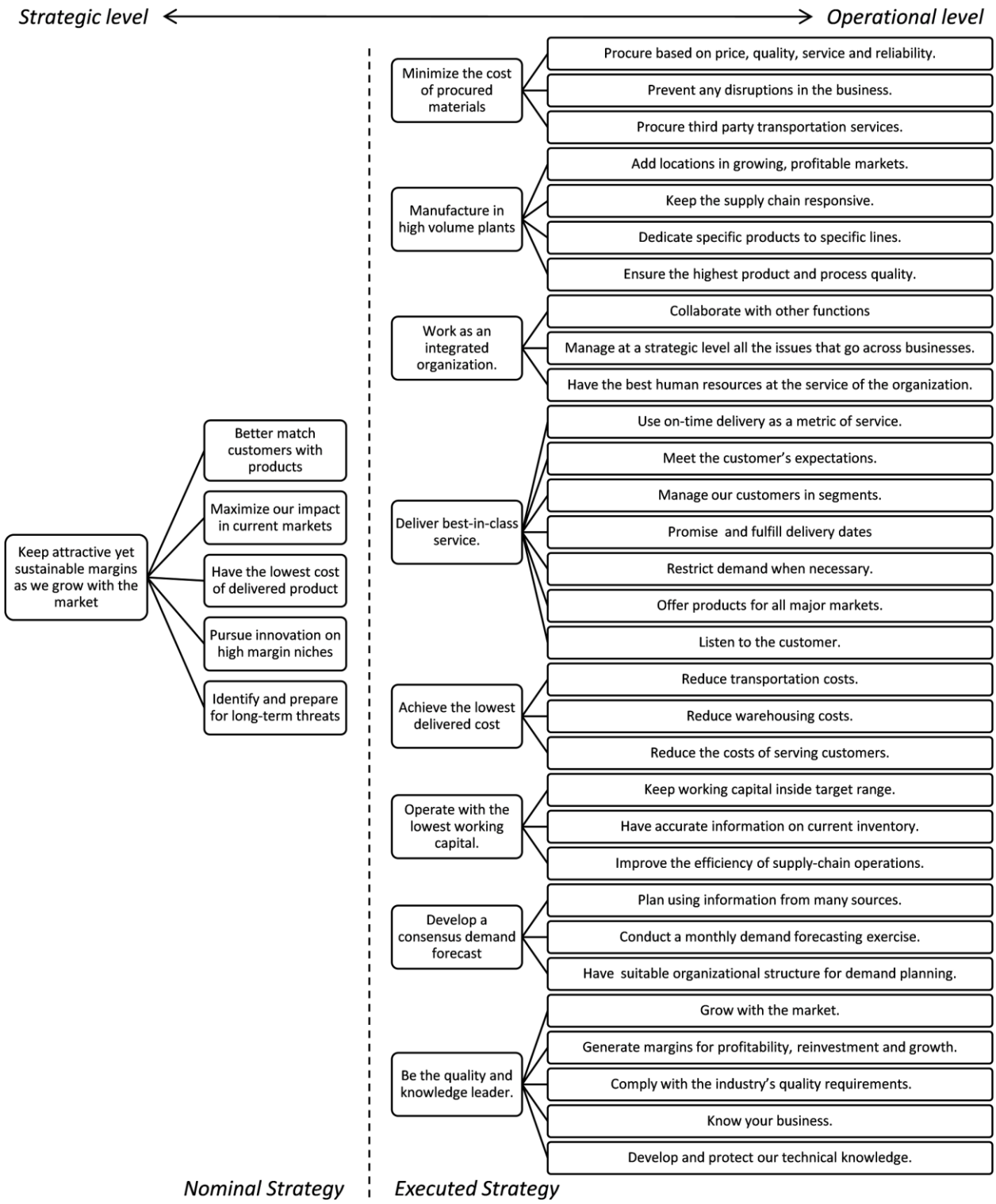


Figure 25: Validated 4-level Functional Strategy Map for Unit-X.

Summarizing, in this Appendix – a companion to Chapter 5 – we provided real-life examples to illustrate the steps of our methodology to capture a supply chain strategy. In the next chapter we will propose a methodology to evaluate a supply chain strategy. We will also present the ideas behind this evaluation methodology, its theoretical foundation and the specific steps to be followed to apply it.

CHAPTER 6. A METHODOLOGY TO EVALUATE THE SUPPLY CHAIN STRATEGY

As we mentioned in page 25, we found no satisfactory answer in the literature to the problem of how to evaluate a supply chain strategy. We decided to develop our own methodology for evaluation.

An interesting and important assumption we discovered managers in functional areas make is that supporting the business strategy will help the firm achieve its strategic goals. Also, we noticed that in our discussions, managers of the supply chain and other functions would consider the business strategy as a given, as *the* starting point for the supply chain strategy, not as something open to modification.

Something else that became clear was that, when managers talked about a shortcoming or negative aspect of their supply chain strategies, they would typically refer to one of three things: (a) conflicts between components of the supply chain strategy, (b) failure of the supply chain strategy to address an area of interest, and (c) lack of support from the supply chain strategy for the business strategy.

What makes a supply chain strategy good

Pondering the problem of evaluation, the first questions that came to mind was: *What makes a supply chain strategy good?* The concept of evaluation entails finding what is right or wrong: the ability to differentiating the desirable from the undesirable is *sine qua non* to be able to conduct an evaluation. We decided to define a set of criteria for the merit of a supply chain strategy that was in line with how managers perceived it, and with the way managers discussed it. The three criteria we postulate are:

1) It is desirable to have internal consistency among the components of a supply chain strategy. This we call '**alignment**.'
2) It is desirable for a supply chain strategy to explicitly address each one of the areas of interest that matter to the organization. This we call **'coverage**.'
3) A supply chain strategy, once executed, should help fulfill the strategic imperative of the

organization. This we call **'sufficiency**'.

We tried out these three criteria of the merit of a supply chain strategy during our action research projects. As the projects progressed, we became more confident of their ability to help us differentiate between desirable and undesirable, their ability to trigger discussions about the supply chain strategy that would yield useful, actionable insights. Through interaction with managers, we became aware that these criteria appealed, almost at an instinctive level, to managers on the field and the board alike.

A mechanism for the evaluation

Having defined the criteria we would use to evaluate the merits of a supply chain strategy, the next question we faced to develop an evaluation methodology was that of the actual mechanism driving the exercise: *How would we conduct the evaluation?* Awareness of a technique for engineering design, known as Pugh Controlled Convergence or PuCC (Frey *et al*., 2007) suggested a solution: using 'evaluation matrices'. PuCC, a method developed by Stuart Pugh and refined over a decade of field work with industry (Pugh, 1990), is most frequently applied in engineering design, especially in the early stages for conceptual design. At the heart of PuCC is the iterative use of 'evaluation matrices,' which in this context is a matrix that has: (a) as vertical headers a list of criteria that will be used to judge the merits of a given design, (b) as horizontal headers a series of concepts to be evaluated, and (c) on each cell of the matrix an assessment of the ability of a given design to satisfy a given criteria.

Building upon PuCC's evaluation matrices, we produced a different version of the evaluation matrix, tailored to the problem of supply chain strategy alignment. We then explored using a series of matrices to evaluate the relationships of compatibility and support that exist between the components of an articulated supply chain strategy as it was captured in the FSM. Consistent with the cyclical nature of action research, multiple versions of the evaluation matrices were tested internally before we arrived at the current form that was used in in-depth supply chain strategy reformulation projects with Unit-X and Libica, and which we will describe in the present chapter.

Theoretical foundation

The power of evaluation matrices as a mechanism for improving conceptual designs has been tested during decades of use in engineering design, in applications from mechanical parts to software. Frey *et al*. (2007) quantitatively verified the ability of PuCC (and its evaluation matrices) to converge on superior designs, when the evaluations are made by a group of experts on the subject at hand.

As discussed below, we propose the use of a series of interrelated evaluation matrices. Such a use of interconnected evaluation matrices is a standard component of the widely used methodology known as the Enhanced Quality Function Deployment or EQFD (Pugh and Clausing, 1996).

Back in Chapter 5, we made the case for treating the supply chain strategy as a conceptual system (page 98). Having defined the supply chain strategy as a *'system'*, the use of a matrix to evaluate it comes as no surprise: a tool widely used for analyzing systems is precisely a matrix. Known as the Design Structure Matrix or DSM (Eppinger, Whitney, Smith, & Gebala, 1994), the tool consists of a matrix representation of a system, that lists its components and the dependency relationships between them. DSM is often used for system analysis. Bartolomei (2007) proposed an expansion of DSM for the discussion of socio-technical systems, which he called the Engineering Systems Matrix (ESM).

Our capture methodology helped us express the supply chain strategy as a *system*. As we discuss later, there exists an equivalence between the FSM (and the evaluation matrices we will employ in our evaluation method) and the DSM and ESM matrices. Both DSM and ESM have the form of a matrix that has, along both its horizontal and vertical axes, a list of the same elements. If we take the *n* concepts included within a given level of the FSM, say the functional themes level, and lay them along both axes of an empty *n x n* matrix, we are in fact creating an empty DSM. And if we group these concepts by area, according to Bartolomei's categories, we would be creating an empty ESM. An example of this equivalency is discussed in page 228; with a graphical representation in Figure 74 (page 229).

Additionally, since the FSM is a conceptualization of a *supply chain strategy,* its contents can also be

easily expressed in terms of the "techniques-tools matrix" (Cigolini, *et al*., 2004). After all, the "techniques-tools matrix" is another *supply chain strategy* modeling framework. To build a techniques-tools matrix out of a Functional Strategy Map, all we have to do is to use the *m* Functional Themes from the FSM as row headers, and use the *n* Operational Themes from the FSM as column headers, of an *m x n* matrix: this would produce an equivalent of the techniques-tools matrix. An example of this equivalency is also discussed in page 228; with a graphical representation in Figure 76 (page 229).

Building upon Phase 1

For evaluation of coverage and alignment, we make extensive use of the Functional Strategy Map:

- Since the FSM makes explicit which areas of interest are being addressed by a supply chain strategy, it is possible to detect which areas of interest are *not* being explicitly addressed, e.g. which areas are being ignored, harming the 'coverage' of the supply chain strategy.
- To explore alignment, the FSM serves as the starting point to prepare questions about compatibility and support relationships among the concepts that compose the supply chain strategy, particularly those in the three middle layers of the FSM (shown in Figure 26).

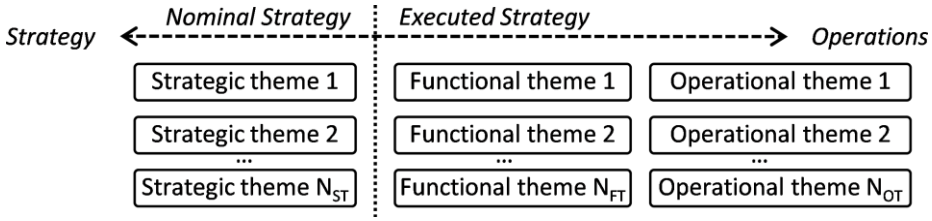


Figure 26: The three middle layers of a Functional Strategy Map.

To explore the interplay between the concepts in these three layers, we ask a group of experts questions about the interactions that take place in four particular 'zones' of the map. These are:

- Zone 1. *Compatibility among the strategic themes*. The question here is: are the different strategic themes compatible with each other? Do they support or detract from each other?

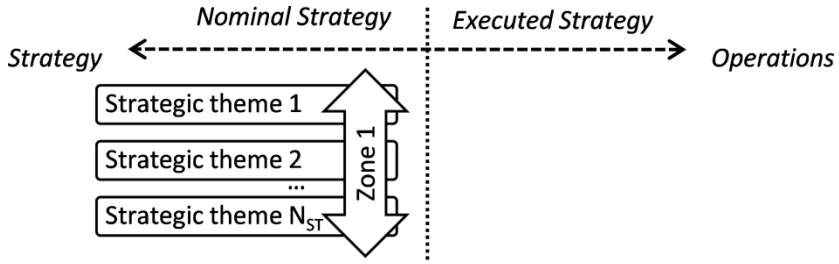


Figure 27: Zone 1 explores the compatibility among strategic themes.

- Zone 2. *Support of the functional themes to the strategic themes*. The question here is: are the different functional themes providing support to the strategic themes? Which functional themes are helping more? Which functional themes are actually having a detrimental effect?

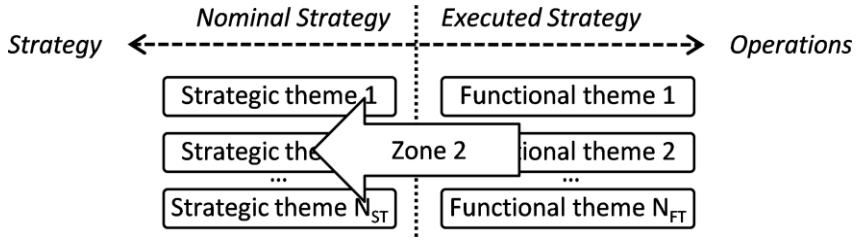


Figure 28: Zone 2 explores the support of functional themes to strategic themes.

- Zone 3. *Compatibility among the functional themes*. The question here is: are the different functional themes compatible with each other? If not, where are the incompatibilities

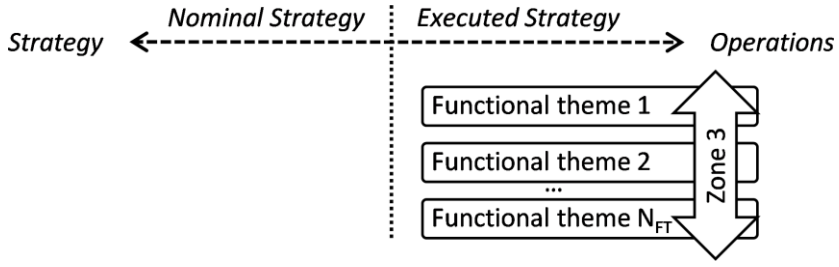


Figure 29: Zone 3 explores the compatibility among functional themes.

- Zone 4. *Support of the operational themes to the functional themes*. The question here is: are the different operational themes providing support to the strategic themes, in particular to the ones they are related to? Which operational themes help more, and which are detrimental?

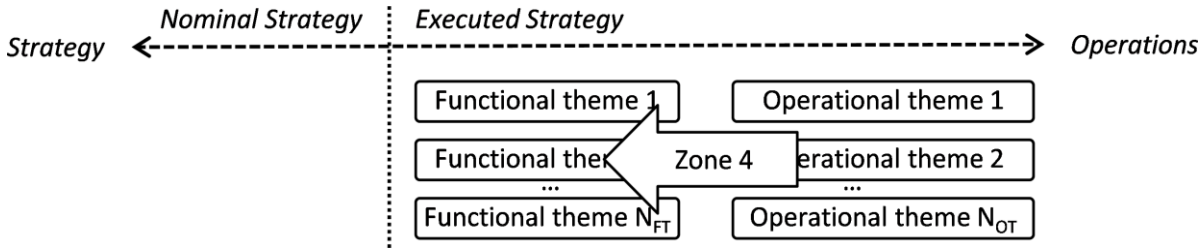


Figure 30: Zone 4 explores the support of functional themes to strategic themes.

The reason we are interested in these four *zones of interaction* among concepts is that we believe they serve as a bridge to convey the support exerted at the operational end of things all the way up to the achievement of strategic goals.

Testing and refining through action research

After a desk-run using a secondary case study to test the feasibility of the evaluation matrices and other techniques, we deployed them in the two action research projects we were conducting with Unit-X and Libica. The 'evaluation' phase with Unit-X, our first action research project, lasted 3 months, during which we tested and refined the methodology. For Libica, our second action research project, the evaluation phase required one month, and served to further refine and, most importantly, to document in detail the methodology in a form that is useful to third parties that want to apply this tool. The resulting methodology then was tested with students in a Masters class in supply chain strategy. It will soon be tested with a consulting project with a firm in Colombia, conducted by a third party.

Steps of Phase 2: the 'evaluation' methodology

The methodology we propose for evaluating the supply chain strategy of a firm is referred to as Phase 2. It encompasses ten steps, which can be broadly outlined as follows: Steps 1 through 7 help us make explicit the interrelations between components of the supply chain strategy, and evaluate 'alignment,' which we understand as the internal consistency of the supply chain strategy. Steps 8 helps us evaluate 'sufficiency', namely whether the results from the supply chain strategy, once implemented,

fulfill the expectations of the organization. Step 9 helps us evaluate 'coverage', that is to say, whether the supply chain strategy explicitly addresses all the areas of interest. Step 10 seeks to discuss the findings and the root causes of any problems found. The following is a list of the ten steps:

- Step 1 - Prepare empty matrices based on the FSM
- Step 2 – Create a questionnaire based on the matrices
- Step 3 – Administer the questionnaires to respondents
- Step 4 - Code the answers into a spreadsheet
- Step 5 – Aggregate the individual answers into answer matrices
- Step 6 - Identify the top quartile values in each matrix
- Step 7 – Derive insights from the analyzed matrices
- Step 8 – Compile the shortcomings in sufficiency
- Step 9 – Compile the shortcomings in coverage
- Step 10 - Discuss with the group all deficiencies found

The rest of this chapter will present each one of these steps in full detail. Since read on their own the steps may come across as a bit abstract, the reader is encouraged to refer to the Appendix of this chapter, which illustrates the steps with examples from our in-depth projects with Libica and Unit-X.

Step 1 - Prepare empty matrices based on the FSM

In Chapter 3, we mentioned how the Functional Strategy Map can serve as starting point for building matrices. This is precisely what we will do in this step: we will use the FSM as starting point to create four empty evaluation matrices, which will then in turn serve as the template for the alignment evaluation exercise. As we will discuss below, each one of these matrices corresponds to one of the zones of interaction we identified in Chapter 2. The purpose of these empty matrices is twofold: first, they will provide us with a guide on what questions to ask for the evaluation, and second, they will provide us with a template to consolidate the answers to these questions that we receive from the team's members, to facilitate our analysis.

A quick observation: In all of our matrices, the concepts on the horizontal headings are considered

active (e.g. providing the action), and those on the vertical heading are considered passive (receiving the effect). This observation may seem rather obscure now, but it will become clear soon, when we illustrate with examples how the matrices serve as the basis for writing our questions.

Prepare empty Matrix 1

The first matrix we will put together addresses Zone of Interaction 1 (see Figure 27), and thus its purpose is to explore the interaction between the strategic themes, in particular their compatibility with each other. The individual strategic themes serve as both rows headings and columns headings of the matrix. If we define N_{ST} as the number of strategic themes we have in the Functional Strategy Map, then Matrix 1 will be a N_{ST} x N_{ST} matrix. A template for an empty Matrix 1 is shown in Figure 31.

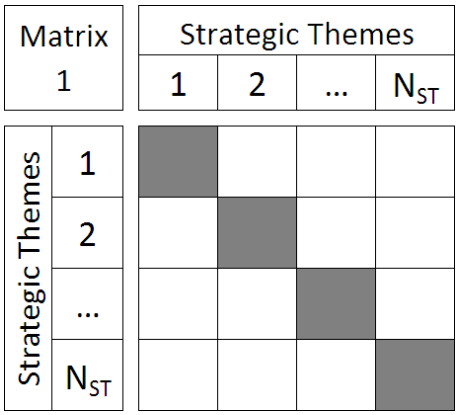


Figure 31: Matrix 1 is built to explore Zone of Interaction 1

Similarity with DSM and ESM. Notice that the main diagonal in this matrix template is grayed-out. This is to indicate that the cells along this diagonal will be left empty, since we will not explore a concept's interaction with itself. This gives Matrix 1 a certain structural similarity with the Design Structure Matrix (DSM) (Eppinger, Whitney, Smith, & Gebala, 1994) and the Engineering Systems Matrix (ESM) (Bartolomei, 2007). An example of this correspondence is discussed in page 228 and represented graphically in Figure 74, page 229.

Prepare empty Matrix 2

The second matrix we build is to address Zone of Interaction 2 (see Figure 28), and has the purpose of exploring the support that functional themes provide to the strategic themes.

Matrix 2		Functional Themes			
		1	2	...	N_{FT}
Strategic Themes	1				
	2				
	...				
	N_{ST}				

Figure 32: Matrix 2 is built to explore Zone of Interaction 2

The individual functional themes serve as columns headings of the matrix, while the strategic themes are used as rows headings. If we define N_{ST} as the number of strategic themes and N_{FT} as the number of functional themes we have in the FSM, then Matrix 2 will be a N_{ST} x N_{FT} matrix. A template for empty Matrix 2 is shown in Figure 32.

Notice that, since Zone 2 cuts across the nominal-executed divide, it is precisely this Matrix 2 that will best evaluate the 'alignment' of the executed strategy with the nominal strategy.

Prepare empty Matrix 3

The third matrix we assemble will address Zone of Interaction 3 (see Figure 29). Its purpose, then, is to explore the interaction between the functional themes, particularly in terms of compatibility. The individual functional themes serve as both rows headings and columns headings of the matrix. If we define N_{FT} as the number of functional themes we have in the FSM, then Matrix 3 will be a N_{FT} x N_{FT} matrix. A template for an empty Matrix 3 is shown in Figure 33. Notice that, as in Matrix 1, the main diagonal of Matrix 3 is grayed-out, to indicate that the cells along the diagonal will be left empty, again making it structurally similar to DSM and ESM.

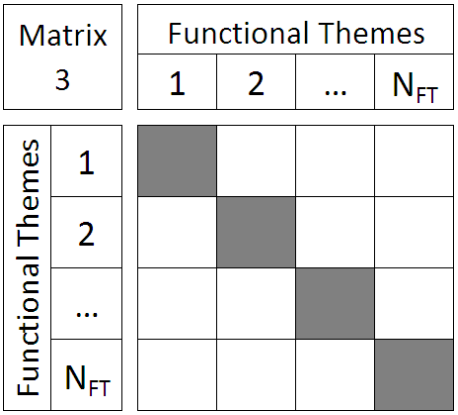


Figure 33: Matrix 3 is built to explore Zone of Interaction 3

Prepare empty Matrix 4

The fourth and last matrix we build corresponds to Zone of Interaction 4 (see Figure 30), and has the purpose of exploring the support that operational themes provide to the functional themes.

The individual operational themes serve as columns headings of the matrix, while the functional themes are used as rows headings. If we define N_{FT} as the number of functional themes and N_{OT} as the number of operational themes we have in the FSM, then Matrix 2 will be a N_{FT} x N_{OT} matrix. A template for an empty Matrix 4 is shown in Figure 34.

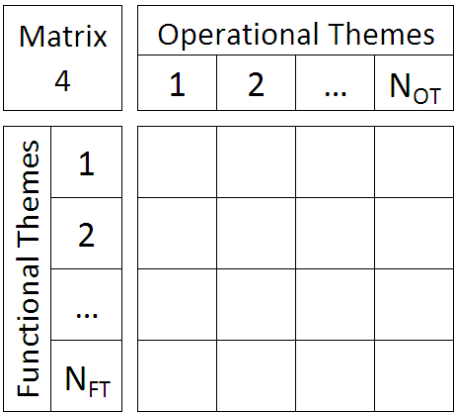


Figure 34: Matrix 4 is built to explore Zone of Interaction 4

Similarity with the 'techniques-tools' matrix. Notice the similarity between Matrix 4 and the 'techniques-tools' matrix (Cigolini, Cozzi, & Perona, 2004), both in terms of their structure and their

purpose. Since the 'techniques-tools' matrix is narrower in its scope (being limited to techniques and tools in the interface between firms), it could be said that the 'techniques-tools' matrix is a specific case of a Matrix 2, or conversely that a Matrix 2 is a more general form of the 'techniques-tools' matrix. Both explore how execution ideas are made operational. An example of this 'equivalence' is shown in Figure 76, in page 229.

Step 2 – Create a questionnaire based on the matrices

The four empty matrices will guide our collection of data on the interaction between concepts. A questionnaire with four parts will be prepared, one part for each empty matrix, which is to say, one for each zone of interaction. Each empty matrix serves as basis for generating one part of the questionnaire. For each one of the cells in a given matrix that are not grayed out, we will write a question for the questionnaire. We say that this question corresponds to that cell, namely, to that combination of row and column in the matrix.

Defining a notation. Let us define a notation to identify each questions: Qa(b,c) identifies to the question that corresponds to column *b* and row *c* in matrix *a*. As an example, Q1(2,1) identifies to the question that corresponds to column 2 and row 1 in Matrix 1; while Q2(1,2) identifies the question that corresponds to column 1 and row 2 in Matrix 2. This notation will become clearer as we apply it below.

Create Part 1 of the questionnaire based on Matrix 1

If there are X strategic themes in the map, then N_{ST} = X and Matrix 1 will be an X-by-X matrix, with a total of X^2 cells in it. Out of these, we gray out those in the long diagonal, a total of X cells, since the relationship of a concept with itself, in terms of compatibility, is meaningless. The remainder, e.g. the non-gray cells, amount to a total of X^2-X cells. Now, for each one of these X^2-X non-gray cells in Matrix 1 we will prepare a question.

Figure 35 illustrates how the matrix location determines a question's identification, i.e. Q1(2,1),

Q2(1,2), etc. The identification, in turn, will determine the question's content. When it comes to Zone 1, which is what Matrix 1 addresses, our interest is to find out about the compatibility among concepts at the strategic theme level, whether they are helpful, detrimental or neutral to each other.

Quest. Part 1	Strategic Themes			
	1	2	...	X
Strategic Themes 1		$Q1_{21}$	...	$Q1_{X1}$
Strategic Themes 2	$Q1_{12}$		...	$Q1_{X2}$
Strategic Themes ...	...	...		...
Strategic Themes X	$Q1_{1X}$	$Q1_{2X}$	...	

Figure 35: A question is prepared for each non-gray cell of Matrix 1.

Each question built from Matrix 1 will be formulated to inquire about the relationship, mostly in terms of compatibility, between the two concepts involved, the one in the row header and the one in the column header for that respective position in the matrix. A question for position (1,2), for example, would be designed to explore whether Strategic Theme 1 is compatible with Strategic Theme 2. When it comes to the exact wording of the question, we recommend one of the following two approaches: the direction-specific approach, and the bidirectional approach. which we describe in the next two sections.

Direction-specific approach for Part 1

The direction-specific approach works as follows: question $Q1_{ij}$ (for $i=1…N_{ST}$, $j=1…N_{ST}$ and $i≠j$) will be worded in the form: *"[Strategic theme i] helps us to [Strategic theme j]"*. The respondent is asked to ponder the statement and choose the best answer from among a list of options, such as the following:

- *Yes! It is crucial*
- *Yes, it helps significantly*
- *It might help a little*
- *It has no effect*
- *It might hurt a little*
- *No, it hurts significantly*
- *No! It is terrible*
- *I am not sure about this one*

This approach is called direction-specific because asking how STi helps STj, which is clearly not the

same as asking how STj helps STi. The advantage of using this direction-specific wording in formulating our questions is that we get to explore the relationship between two concepts in more detail: how the first affects the second, and how the second affects the first. The disadvantage, however, is that the number of questions is larger, and - since the questionnaire is composed of multiple parts that add up - it also becomes more tiresome for the respondent to go through all of the questions, which in turn threatens to diminish their attention and deteriorate the quality of their answers.

Bidirectional approach for Part 1

An alternative approach to question wording that cuts the number of questions in half is to formulate the questions using a wording that works in both directions and asking only those questions that fall on one side of the matrix's gray diagonal (see Figure 36).

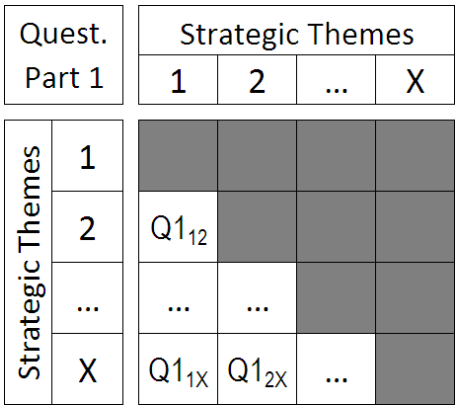


Figure 36: Bidirectional wording cuts the number of questions in half.

Using this bidirectional wording, a question $Q1_{ij}$ (for $i=1…N_{ST}$, $j=1…N_{ST}$ and $i<j$) consists of a statement of the form: *"[Strategic theme i] is compatible with [Strategic theme j]"*. The reader is asked to ponder this statement and choose an answer from among the following options:

- *Yes, it is totally compatible*
- *It is somewhat compatible*
- *It is somewhat incompatible*
- *No, it is totally incompatible*
- *I'm not sure about this one*

A word on wording. We recommend keeping the wording in the FSM as simple as possible. But even if a concept from the FSM has an elaborate, rich wording, they should be put in the simplest terms possible when they are to be combined to create a question.

Create Part 2 of the questionnaire based on Matrix 2

If there are X strategic themes and Y functional themes in the map, then N_{ST} = X, N_{FT} = Y and Matrix 2 will be an X-by-Y matrix, with a total of XY cells in it. Now, for each one of these cells we will prepare a question. Figure 37 illustrates how the matrix location determines a question's identification, which in turn will determine the question's content.

Quest. Part 2		Functional Themes			
		1	2	...	Y
Strategic Themes	1	$Q2_{11}$	$Q2_{21}$	...	$Q2_{Y1}$
	2	$Q2_{12}$	$Q2_{22}$	...	$Q2_{Y2}$
	...	...	...	...	...
	X	$Q2_{1X}$	$Q2_{2X}$	...	$Q2_{YX}$

Figure 37: A question is prepared for each cell of Matrix 2.

When it comes to Zone 2, which is what Matrix 2 addresses, our interest is to find out about the support that functional themes are providing to strategic themes, to find whether they are helping, hurting, or making no difference. Each question built from Matrix 2 will be formulated to inquire about the support provided by the action concept, on the column header, and received by the passive concept, on the row header, for that respective position in the matrix. A question for position (1,2), for example, would be designed to explore whether Functional Theme 1 is supporting Strategic Theme 2.

The total number of questions is N_{FT} x N_{ST}. A wording that can be used for the questions from Matrix 2 is as follows: question $Q2_{ij}$ (for i=1…N_{FT} and j=1…N_{ST}) consists of a statement of the form: "[Functional theme i] helps us to [Strategic theme j]". A somewhat stronger wording can also be used: *"[Functional*

theme i] is necessary for [Strategic theme j]." The respondent is offered the following answer choices:

- *Yes, it is necessary*
- *It may help a little*
- *It makes no difference*
- *It may hurt a little*
- *No, it is detrimental*

Respondents are presented with the following reminder at the beginning of Part 2 of the questionnaire: *"Remember: When a question doesn't seem to make sense, it may be because the concepts in it are unrelated. If that is the case, please answer 'It makes no difference' (the third option)."*

Create Part 3 based on Matrix 3: direction-specific approach

If there are Y functional themes in the map, then N_{FT} = Y and Matrix 3 will be an Y-by-Y matrix, with a total of Y^2 cells in it. Out of these, we gray out those in the long diagonal, a total of Y cells, since the relationship of a concept with itself, in terms of compatibility, is meaningless. The remainder, e.g. the non-gray cells, amount to a total of Y^2-Y cells; for each one of these we will prepare a question.

Figure 38 illustrates how the matrix location determines a question's identification, which in turn will determine the question's content.

Quest. Part 3		Functional Themes			
		1	2	...	Y
Functional Themes	1		$Q3_{21}$	...	$Q3_{Y1}$
	2	$Q3_{12}$		...	$Q3_{Y2}$
	...	...	...		...
	Y	$Q3_{1Y}$	$Q3_{2Y}$	...	

Figure 38: Location of questions in Matrix 3, for the direction-specific approach.

When it comes to Zone 3, which is the subject of Matrix 3, our interest is to find out about the compatibility among concepts at the functional theme level, whether they are helpful, detrimental or

neutral to each other. A question for position (1,2), for example, would be designed to explore the relationship between Functional Theme 1 and Functional Theme 2, particularly whether they are compatible.

As in Matrix 1, for Matrix 3 we have the option of two wording approaches. The direction specific wording is as follows: a question $Q3_{ij}$ (for $i=1…N_{FT}$, $j=1…N_{FT}$ and $i≠j$) consists of a statement of the form: *"[Functional theme i] helps us to [Functional theme j]"*. The total number of questions is $(N_{FT})^2 – N_{FT}$. Direction-specific wording allows us to explore both directions of the relationship between the concepts, but at the cost of a larger number of questions.

Create Part 3 based on Matrix 3: bidirectional approach

The disadvantage of the larger number of questions becomes more of an issue with Functional Themes, since they are relatively more abundant than Strategic Themes. An alternative is to apply a bidirectional approach, asking only those questions that fall on one side of the matrix's gray diagonal (see Figure 39).

Quest. Part 3	Functional Themes			
	1	2	...	Y
Functional Themes 1				
2	$Q3_{12}$			
...	...	...		
Y	$Q3_{1Y}$	$Q3_{2Y}$	$Q3_{3Y}$	

Figure 39: Questions for Matrix 3 following the bidirectional approach.

Thus a question $Q3_{ij}$ (for $i=1…N_{FT}$, $j=1…N_{FT}$ and $i<j$) consists of a statement of the form: *"[Functional theme i] is compatible with [Functional theme j]"*. Respondent are asked to ponder the statement. Anticipating that some unrelated concepts may produce nonsensical questions, we remind the respondent that: "*If there's no conflict between two concepts, then they are compatible.*" The same

answer options offered for Part 1 can be used here.

Create Part 4 based on Matrix 4: full matrix approach

If there are Y functional themes and Z operational themes in the map, then N_{FT} = Y, N_{OT} = Z and Matrix 4 will be an Y-by-Z matrix, with a total of Y Z cells in it. Figure 40 provides the template for a question's identification in Matrix 4, which in turn will determine the question's content. We call this the 'full matrix' approach, because there is a question for each single cell in the matrix.

Quest. Part 4		Operational Themes			
		1	2	...	Z
Functional Themes	1	$Q4_{11}$	$Q4_{21}$	...	$Q4_{Z1}$
	2	$Q4_{12}$	$Q4_{22}$	...	$Q4_{Z2}$
	...	...	...	...	...
	Y	$Q4_{1Y}$	$Q4_{2Y}$	...	$Q4_{ZY}$

Figure 40: Questions for Matrix 4 following the 'full matrix' approach.

For Zone 4, the subject of Matrix 4, our interest is to find out about the support that operational themes are providing to functional, to find whether they are helping, hurting, or making no difference. Each question built from Matrix 4 will be formulated to inquire about the support provided by the action concept, on the column header, and received by the passive concept, on the row header, for that respective position in the matrix. A question for position (1,2), for example, would be designed to explore whether Operational Theme 1 is supporting Functional Theme 2.

Wording for the questions from Matrix 4 is as follows: a question $Q4_{ij}$ (for i=1…N_{OT} and j=1…N_{FT}) consists of a statement of the form: "[Operational theme i] helps us to [Functional theme j]". The total number of questions is N_{OT} x N_{FT}. The same answer choices offered in Part 1 can be presented here.

An alternative in Part 4: the 'parent-child' approach

An alternative to the 'full matrix' approach in Part 4 is what we call the 'parent-child' approach. In it, the only relationship that we explore for an Operational Theme is that with its respective 'parent' Functional Theme, according to the FSM hierarchical structure. Figure 41 illustrates how this approach produces a total number of questions equal to N_{OT}, dramatically reducing the number of questions by a factor of N_{FT} (since we had N_{OT} x N_{FT} questions in the 'full matrix' approach).

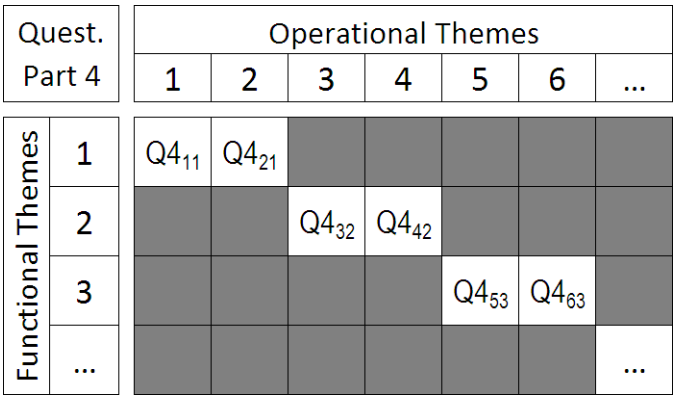


Figure 41: A sample of questions for Matrix 4 in the 'parent-child' approach.

For a question $Q4_{ij}$ (for i=1…N_{OT}, and j the parent of i), the wording consists of a statement of the form:: *"[Operational theme i] is necessary if we are [Functional theme j]."* The reader asked to select from among the following answer options.

- *Yes, it is necessary*
- *It helps, but it is not necessary*
- *It makes no difference*
- *It may actually hurt*
- *No, it is clearly detrimental*

Step 3 – Administer the questionnaires to respondents

The four parts of the questionnaire, which we have assembled in Step 2, are now administered to the respondents. These may be the same members of the team that were involved in the development and validation of the Functional Strategy Map, but it does not necessarily have to be so.

The reason the questions were administering through questionnaires intended to be completed individually (what is called a *nominal group*), as opposed to being discussed by all the team gathered around a table (what is called a *real group*) is that we wanted to ensure anonymity in the answers and prevent dominant members of the team from imposing their assessment of these relationships.

Step 4 - Code the answers into a spreadsheet

Let us enrich our nomenclature further, so that we can refer to specific answers from respondents.

- R refers to the number of individuals that were presented a given question. For example, RX_{ij} is the number of respondents to which question QX_{ij} was posed.
- A refers to the answer of an individual to a given question. For example, AX_{ijk} refers to the answer that individual *k* provided to question QX_{ij}.

Select a numerical scale for coding each part

To render the answers accessible to some quantitative analysis, it is useful to translate them from the categorical answers provided by the respondents into corresponding numerical values. To achieve this, we define a numerical scale, that is a table that matches each answer choice to a numerical value, thus helping us code phrases such as “Yes, it is crucial” into values we can manipulate numerically.

A word of warning is necessary here: a scale is not supposed to represent an absolute magnitude. Scales will be used to produce values that have meaning only relative to other answers from the same group, and only in light of the scale that was use to code the answers.

During our exercises with Unit-X and Libica, we had the opportunity to explore several *ad hoc* numerical scales to code the answers. A scale can be compared to a filter that an astronomer puts in a telescope: through different filters we see different aspects of the object of our study.

When exploring the data we collected in the answers, there is no need to restrict ourselves to one single scale, since under given circumstances one scale may be better suited than another to provide us

with useful insight. We now introduce the reader to four *ad hoc* scales.

Answer choice	Numerical code	
"Yes! It is crucial"	will be coded as	+4
"Yes, it helps significantly"	will be coded as	+2
"It might help a little"	will be coded as	+1
"It has no effect"	will be coded as	0
"It might hurt a little"	will be coded as	-1
"No, it hurts significantly"	will be coded as	-2
"No! It is terrible"	will be coded as	-4
"I am not sure"	will be coded as	?**

Table 15: The '*full spectrum*' scale

The 'full spectrum' scale, shown in Table 15, aims at capturing both the direction (e.g. "help" is positive, "hurt" is negative) and the intensity (e.g. "significantly" is larger than "a little") of the relationship between concepts.

Answer choice	Numerical code	
"Yes, it is totally compatible"	will be coded as	0
"It is somewhat compatible"	will be coded as	0
"It is somewhat incompatible"	will be coded as	1
"No, it is totally incompatible"	will be coded as	1
"I'm not sure about this one"	will be coded as	0

Table 16: The '*incompatibility headcount*' scale

The 'incompatibility headcount' scale, shown in Table 16, counts how many respondents think an incompatibility exists between concepts.

Answer choice	Numerical code	
"Yes, it is necessary"	will be coded as	0
"It may help a little"	will be coded as	0
"It makes no difference"	will be coded as	0
"It may hurt a little"	will be coded as	1
"No, it is detrimental"	will be coded as	1

Table 17: The '*detrimental headcount*' scale

The 'detrimental headcount' scale, shown in Table 17, counts how many respondents think a concept is hurting another, to some extent.

** The sign "?," the only non-number in the scale, is used as a placeholder for ***"I am not sure"*** answers.

Answer choice	Numerical code	
"Yes, it is necessary"	will be coded as	0
"It may help a little"	will be coded as	0
"It makes no difference"	will be coded as	1
"It may hurt a little"	will be coded as	1
"No, it is detrimental"	will be coded as	1

Table 18: The '*lack of support*' scale

Finally, ***the 'lack of support' scale***, shown in Table 18, counts how many respondents think a concept is not providing support to another.

The use of different scales allows the facilitator to obtain different insights from the answers. Thus, we recommend trying different scales on the answers, to explore what insight they yield.

Coding the answers for each part of the questionnaire

Once a scale has been chosen for each part of the questionnaire, we proceed to code the answers from it. For each part of the questionnaire, this coding can be done in four straightforward steps:

- Create an empty table with as many columns as questions are in this part of the questionnaire, and as many rows as respondents you have for this part of the questionnaire.
- As headers for each column use the name of each question. For example, for Part 3 these would be $Q3_{11}$ (the first question), $Q3_{12}$ (the second question), $Q3_{13}$ (the third question), and so on.
- As headers for each row use an ID for each respondent. For example, Individual 1 for the first respondent, Individual 2 for the second, and so on.
- Convert each answer using the scale, and place the resulting number (or code) in the cell that corresponds to that specific respondent and question.

We would like to emphasize that the resulting coded answers should be understood only in the light of the scale that was used to code them. In other words, given the *ad hoc* nature of the scales, the numeric value of an answer has no meaning independent of the scale that was used to obtain it, and the context provided by the other answers to the same questionnaire and from the same group.

Step 5 – Aggregate the individual answers into answer matrices

As we mentioned, the idea behind coding the individual answers into numerical values is that this will allow us to aggregate them and conduct some quantitative analysis to find insights.

Aggregate all the individual answers given to each question

We start by aggregating into a single value for each question all the individual answers provided to that question. This aggregation can be done by calculating the arithmetic mean of all the numerical values, that is to say, the average of the answers given to this question by all respondents, excluding those that were coded as "?". For each question in Part 1 of the questionnaire, this is done as follows:

$$A1_{ij} = \overline{A1}_{ijk}$$

for i=1…N_{ST}, j=1…N_{ST}, i≠j, and k=1…$R1_{ij}$. The reader will remember that N_{ST} refers to the number of strategic themes we have, and $R1_{ij}$ refers to the number of respondents that answered question $Q1_{ij}$. For each question in Part 2 of the questionnaire, the aggregate is calculated as follows:

$$A2_{ij} = \overline{A2}_{ijk}$$

for i=1…N_{FT}, j=1…N_{ST}, and k=1…$R2_{ij}$. The reader will remember that N_{FT} refers to the number of functional themes we have. For each question in Part 3 of the questionnaire, the aggregate is given by:

$$A3_{ij} = \overline{A3}_{ijk}$$

for i=1…N_{FT}, j=1…N_{FT}, i≠j, and k=1…$R3_{ij}$. And for each question in Part 4, the aggregate is given by:

$$A4_{ij} = \overline{A4}_{ijk}$$

for i=1…N_{OT}, j=1…N_{FT}, and k=1…$R4_{ij}$. Remember that any "?" codes should be excluded from the calculation of the average. This kind of aggregation is easy to do in a spreadsheet.

Trimmed averages. For data that was coded using the 'full spectrum' scale, an alternative to aggregation using the 'simple average' approach that we have discussed above is what we call the 'trimmed average' aggregation. This is an average calculated after excluding the extreme outliers. An

extreme outliner here is defined as a single number that is largest, or smallest, than any other number in the group.

The 'trimmed average' is similar to the grading score used in some Olympic competitions, where the highest and lowest scores from the group of judges are dropped before calculating the average. In our case, however, we only eliminate the extreme values from the trimmed average if they are unique.

Notice that the 'trimmed averages' aggregation is only an option in the 'full spectrum' scale, since it does not make sense to speak of extreme values in the other three scales, that only contain 0's and 1's.

Arrange the aggregate answers into 'answer matrices'

After aggregation has been conducted for the answers to all questions, it helps it helps to arrange them in the form of 'answer matrices.' We arrange the aggregated answers in the form of a matrix, with columns that correspond to the acting concept and rows that correspond to the passive concept.

This will help us identify patterns in the data more easily. Assembling these 'answer matrices' is easy, because they are structurally identical to the matrices used to prepare each part of the questionnaire.

The aggregate answers from Part 1 will be arranged in a matrix, that we call Answer Matrix 1. If it was prepared using the direction specific approach, the answers will have the pattern shown in Figure 42.

Answer Matrix 1		Strategic Themes			
		1	2	...	X
Strategic Themes	1		$A1_{21}$	...	$A1_{X1}$
	2	$A1_{12}$		...	$A1_{X2}$
	...	...	...		...
	X	$A1_{1X}$	$A1_{2X}$	...	

Figure 42: Template for Answer Matrix 1 (direction-specific).

If, on the other hand, the questionnaire was prepared using the bidirectional approach, the answers

in Answer Matrix 1 will be arranged in the pattern shown in Figure 43.

Answer Matrix 1		Strategic Themes			
		1	2	...	X
Strategic Themes	1				
	2	$A1_{12}$			
	...	...	...		
	X	$A1_{1X}$	$A1_{2X}$	...	

Figure 43: Template for Answer Matrix 1 (bidirectional).

The aggregate answers from Part 2 will be arranged in Answer Matrix 2, as shown in Figure 44.

Answer Matrix 2		Functional Themes			
		1	2	...	Y
Strategic Themes	1	$A2_{11}$	$A2_{21}$	...	$A2_{Y1}$
	2	$A2_{12}$	$A2_{22}$	...	$A2_{Y2}$
	...	...	...	...	...
	X	$A2_{1X}$	$A2_{2X}$	...	$A2_{YX}$

Figure 44: Template for Answer Matrix 2.

The aggregate answers from Part 3 will be arranged in Answer Matrix 3 according to the pattern shown in Figure 45 if the questionnaire was direction-specific.

Answer Matrix 3		Functional Themes			
		1	2	...	Y
Functional Themes	1		$A3_{21}$	...	$A3_{Y1}$
	2	$A3_{12}$		...	$A3_{Y2}$
	...	...	...		...
	Y	$A3_{1Y}$	$A3_{2Y}$	...	

Figure 45: Template for Answer Matrix 3 (direction-specific).

If, on the other hand, the questionnaire was built following the bidirectional approach, the answers will be arranged as shown in Figure 46.

Answer Matrix 3	Functional Themes			
	1	2	...	Y
Functional Themes 1				
2	$A3_{12}$			
...	...	...		
Y	$A3_{1Y}$	$A3_{2Y}$	...	

Figure 46: Template for Answer Matrix 3 (bidirectional).

Matrix Answer 4 will display the pattern shown in Figure 47 if we used a 'full matrix' questionnaire.

Answer Matrix 4	Operational Themes			
	1	2	...	Z
Functional Themes 1	$A4_{11}$	$A4_{21}$	...	$A4_{Z1}$
2	$A4_{12}$	$A4_{22}$	...	$A4_{Z2}$
...	...	...	...	...
Y	$A4_{1Y}$	$A4_{2Y}$	...	$A4_{ZY}$

Figure 47: Template for Answer Matrix 4 ('full matrix').

For a 'parent-child' approach, Answer Matrix 4 will display the pattern shown in Figure 48.

Answer Matrix 4	Operational Themes						
	1	2	3	4	5	6	...
Functional Themes 1	$A4_{11}$	$A4_{21}$					
2			$A4_{32}$	$A4_{42}$			
3					$A4_{53}$	$A4_{63}$	
...							...

Figure 48: Template for Answer Matrix 4 ('parent child').

Step 6 - Identify the top quartile values in each matrix

An approach that has proven useful for deriving insights from answer matrices is to identify the top quartile values in each answer matrix. The mechanism to do this will vary depending on whether the scale that was used to code the data into the answer matrix in the first place is a 'full spectrum' scale.

Steps for a matrix coded with the 'full spectrum' scale

The ***'full spectrum'*** scale allows for both positive and negative values. Thus, we advise that the exercise of identifying the top quartile values be done separately for positive and negative values. Below are the steps to do this.

1. Start with the positive values: remove all the non-positive values from the matrix.
2. Identify the values in the top quartile. Since we are currently working with positive values, "top" here means "most positive".
3. List the top quartile positive values.
4. We move now to the negative values. We return to the original matrix and remove all the non-negative values from it.
5. Identify the values in the top quartile. Since we are now working with negative values, "top" here means "most negative".
6. List the top quartile negative values.

Steps for a matrix coded with a binary scale

Answer matrices coded with the 'incompatibility headcount', the 'detrimental headcount', or the 'lack of support' scales will contain only values between 0 and 1. This makes identifying top quartile values a straightforward exercise: just apply steps (2) and (3) from the previous section.

Step 7 – Derive insights from the analyzed matrices

There are several ways to derive insights from the matrices, some as straightforward as directly inspecting their values, others a bit more sophisticated. Below we discuss two of these approaches.

The 'threshold and ranking' approach

One approach to look for insights in a matrix is to consider both the values in the answer matrix (from Step 5) and the ranking of these values (from Step 6). The idea is to identify which values are both

substantial in terms of the scales used to code, and prominent when compared to other values in that matrix. For this, we identify which values in fulfill both of the following requisites: (1) The value is larger, in absolute terms, than a given threshold, and (2) The ranking of the value puts it in the top quartile.

As threshold values for 'binary scale' matrices we recommend using 25%; whereas for 'full spectrum' matrices we recommend using 1½ as threshold for the positive values and -¾ as threshold for the negative values. These values worked well in our experience, yet this is a soft recommendation: different values may be chosen if they produce better insight.

As we derive insights from the matrices, it may be useful to express what we find verbally and to also represent it graphically.

The 'reciprocal values' approach

Another approach we have found useful is to look for symmetries in the location of values in matrices that explore direction-specific relationships between concepts from the same level. The negative values found in Matrices 1 and 3, when built following the direction-specific approach, yield particularly interesting insights about reciprocally detrimental relationships between concepts.

A graphical representation of these reciprocally detrimental relationships between concepts can be a useful tool for communicating the idea to the firm.

Step 8 – Compile the shortcomings in sufficiency

The seven steps we have covered so far for Phase 2 have focused exclusively on evaluating alignment. Step 8, on the other hand, deals exclusively with evaluating sufficiency. Sufficiency is defined as the ability of a supply chain strategy, once it has been deployed, to fulfill the expectations that the organization has for them. In short, what we want to do now is to identify shortcomings in sufficiency, namely to identify ways in which the current supply chain strategy is falling short of the expectations that the organization has for them. The evaluation of sufficiency is done through a relatively

straightforward process, which involves three simple tasks, described below in detail.

Task 1: Search the data for 'grievances'

The first task is to try to identify complains, or 'grievances', about areas in which what the firm has currently in place is falling short of expectations. As we mentioned in the previous chapter, we look for these grievances in: (a) The interviews, (b) Comments in made during the validation session for the partial maps, and (c) Comments in made during the validation session for the final map.

We recommend that the same person that conducted all the interviews, and that facilitated the validation sessions, be the person that also analyzes the data collected in them looking for 'grievances'.

To be able to quickly identify the notes on grievances from among all the other codes for activities, etc., we label each one of them with the word "(Grievance)" at the beginning. Once all the interviews have been analyzed and the notes from both validation sessions have also been analyzed, these labels will make the next task much easier: to bring all these grievances together into a single list.

Task 2: Consolidate all grievances in a list

Task 2 is to consolidate all the grievances we have identified in a single list. Since the process of identifying the grievances in the interviews is done in parallel with the capturing of other types of data (e.g. activity-related data and 'to-do' data), the notes about the grievances may end up scattered in several places in the facilitator's project files.

As we bring them all together and consolidate them into a single list, we also try to rewrite them in a way that is both clear and intelligible without much need for context. Given that they are being removed from their original location and brought to a single list, they need to be as self-explanatory as possible.

Task 3: Organize the grievances thematically

Once we have gathered all the 'grievances' into a single list, it is time then to organize them thematically, summarizing common ideas whenever possible, but retaining the original ideas under

header of the summary. As before, we recommend that this task be conducted by the same facilitator who conducted the previous steps, since this person will be able to refer back to the interviews better, and give context to the grievances that were identified.

Step 9 – Compile the shortcomings in coverage

Shortcomings in coverage are inferred from: (a) comments that members of the team make about things the firm could be doing and is not, and (b) from questions about areas that seem relevant but for which the firm has no clear established policy. These comments and questions from which we will infer the shortcomings in coverage have two sources: (a) the interviews and (b) the comments made during validation sessions. An example of this step is provided in the companion Appendix (in page 188).

Step 10 - Discuss with the group all deficiencies found

Once we have identified alignment, coverage and sufficiency issues, we prepare a written report and distribute it to the team members. A sample report is shown in the companion Appendix (page 190). The members of the team that receive this report, being involved in the strategy evaluation effort, are then invited to a meeting to validate and discuss these findings. During the meeting we will conduct a panel discussion with the purpose of discussing whether the issues that were found 'ring true' to the members of the team, and also to exploring the underlying reasons, the root causes, of these issues.

Summarizing, in this chapter we presented the methodology we propose to evaluate the supply chain strategy of a firm, using the criteria of alignment, coverage and sufficiency. We discussed the ideas behind this proposed methodology and its ties to the theory, and detailed the steps that should be followed to apply it. What follows next is a companion Appendix that will provide real-life examples to the steps of the 'evaluation' methodology.

APPENDIX TO CHAPTER 6. EXAMPLES OF THE EVALUATION PROCESS

Chapter 6 presented the ten steps of our methodology to evaluate a supply chain strategy. The purpose of this Appendix is to illustrate these steps with real examples of the evaluation process. Examples are taken from our action research projects with Libica and Unit-X. Again, all sensitive information has been duly disguised to protect the confidentiality of these firms. As before, throughout this Appendix, 'we', 'us', etc. refers to the facilitator of the process, except where noted otherwise.

Examples for Step 2 – Create a questionnaire based on the matrices

Example of 'direction-specific' wording for Part 1 of the questionnaire

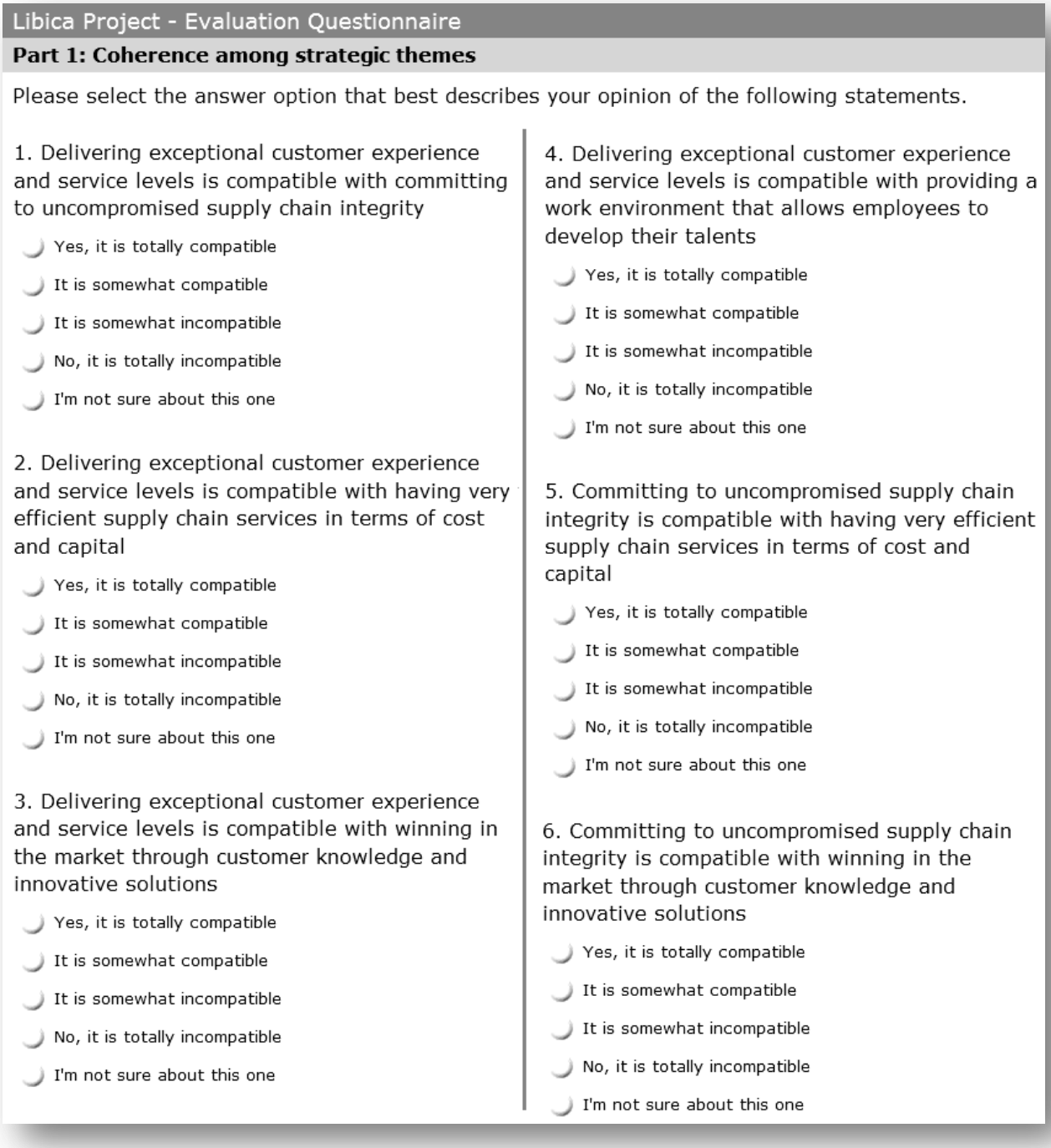
An example from Unit-X's Matrix 1. Question $Q1_{45}$ inquires about the support Strategic Theme 4 (ST_4) provides to Strategic Theme 5 (ST_5). Based on Unit-X's FSM, we know that ST_4 is stated as: "*Prepare for long term threats to the industry*", while ST_5 is stated as "*Focus innovation on high margin opportunities*". Thus, question $Q1_{45}$ reads: "*Preparing for long term threats to the industry helps us to focus innovation on high margin opportunities*."

The direction-specificity can be seen with this example: $Q1_{45}$, is not the same as its reverse, $Q1_{54}$, which would read: "*Focusing innovation on high margin opportunities helps us to prepare for long term threats to the industry*."

Example of 'bidirectional' wording for Part 1 of the questionnaire

The bidirectional approach to question wording was tested in our action research project with Libica. For example, $Q1_{24}$ inquires about the compatibility between Strategic Theme 2 (ST_2) and Strategic Theme 4 (ST_4). Based on Libica's FSM, we know that ST_2 is summarized as: "*Commit to uncompromised*

supply chain integrity," while ST_4 is summarized as *"Win in the market through customer knowledge and innovative solutions."* Thus, question $Q1_{24}$ reads: *"Committing to uncompromised supply chain integrity is compatible with winning in the market through customer knowledge and innovative solutions."*



Libica Project - Evaluation Questionnaire

Part 1: Coherence among strategic themes

Please select the answer option that best describes your opinion of the following statements.

1. Delivering exceptional customer experience and service levels is compatible with committing to uncompromised supply chain integrity

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

2. Delivering exceptional customer experience and service levels is compatible with having very efficient supply chain services in terms of cost and capital

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

3. Delivering exceptional customer experience and service levels is compatible with winning in the market through customer knowledge and innovative solutions

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

4. Delivering exceptional customer experience and service levels is compatible with providing a work environment that allows employees to develop their talents

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

5. Committing to uncompromised supply chain integrity is compatible with having very efficient supply chain services in terms of cost and capital

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

6. Committing to uncompromised supply chain integrity is compatible with winning in the market through customer knowledge and innovative solutions

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

Figure 49: First questions of Part 1 of Libica's questionnaire

The underlying assumption behind the bidirectional approach we used with Libica is that the question above, $Q1_{24}$, is equivalent to its reverse, $Q1_{42}$, which would read: *"Winning in the market through customer knowledge and innovative solutions is compatible with committing to uncompromised supply chain integrity."* Since we assume them to be equivalent, we only have to ask one of them.

Figure 49 presents the first six questions of Part 2 of Libica's evaluation questionnaire.

Examples of wording for Part 2 of the questionnaire

In our action research project with Unit-X, we used this wording. $Q2_{35}$ inquires about the support functional theme 3 (FT_3) provides to strategic theme 5 (ST_5) where FT_3 is summarized as *"Work as an integrated, global organization"*, and ST_5 is summarized as "*Focus innovation on high margin opportunities*". Question $Q2_{35}$ would then read: *"Working as an integrated organization helps us to focus innovation on high margin opportunities."* The same answer choices given in Part 1 of Unit-X's questionnaire were offered after each Part 2 question.

For Libica we used the stronger wording. So, for example, from Libica's FSM we know that functional theme 1 reads: *"Focus our efforts in efficient distribution,"* and that strategic theme 1 reads: *"Deliver exceptional customer experience and service levels."* Thus, $Q2_{11}$ for Libica reads: *"Focusing our efforts in efficient distribution is necessary for delivering exceptional customer experience and service levels."*

Figure 50 presents the first six questions of Part 2 of Libica's evaluation questionnaire.

Example of 'direction-specific' wording for Part 3 of the questionnaire

In our action research project with Unit-X we used the direction specific wording. For example, $Q3_{24}$, inquires about the support Functional Theme 2 (FT_2) provides to Functional Them 4 (FT_4). In the case of Unit-X, FT_2 is summarized as: *"Manufacture in high-volume plants"*, while FT_4 is summarized as *"Deliver best-in-class service"*. Question $Q3_{24}$ would then read: *"Manufacturing in high-volume plants helps us to deliver best-in-class service."* For Unit-X, we asked the respondent to ponder the statement and choose

the best answer from among the same answer choices as before.

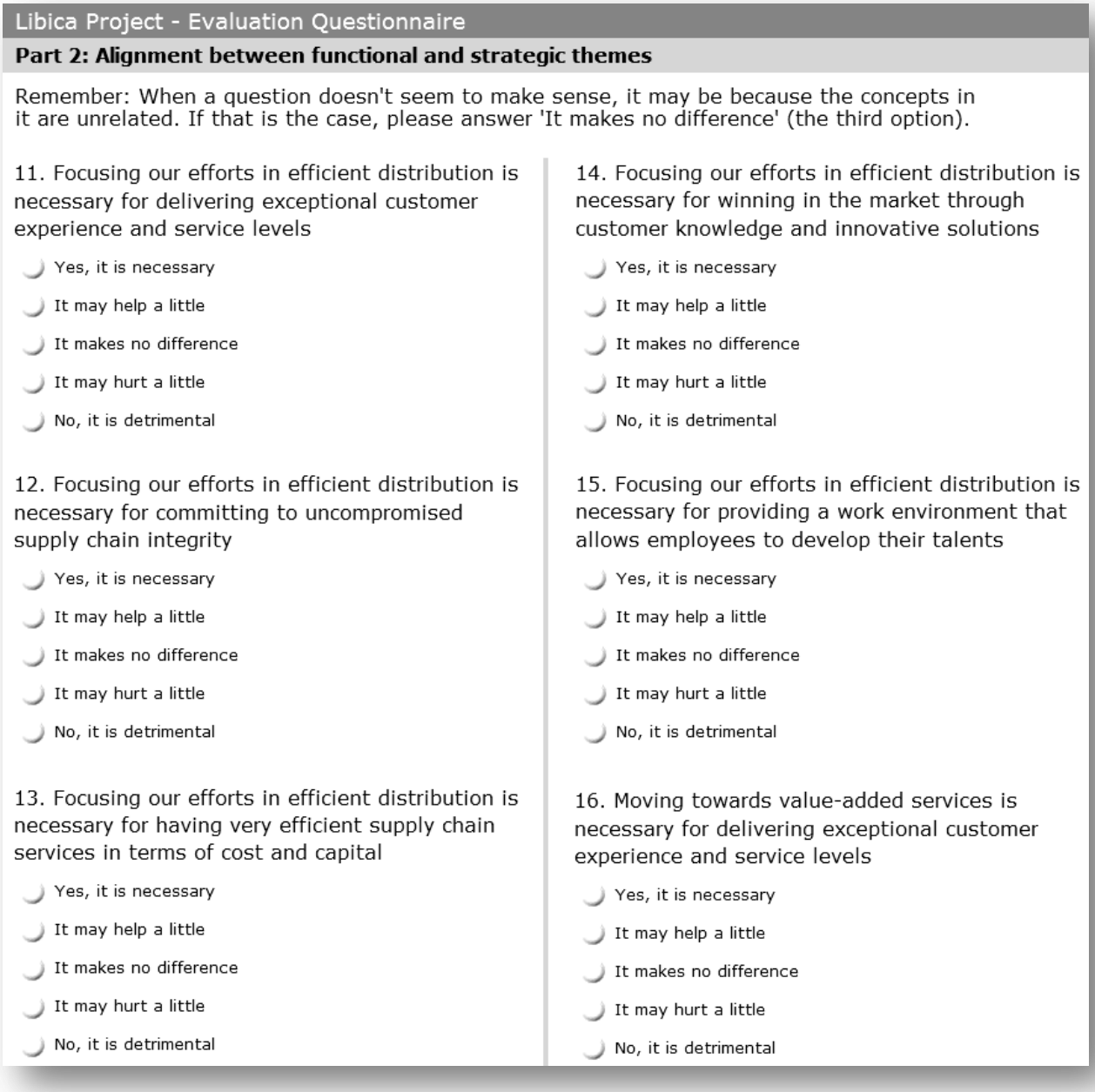


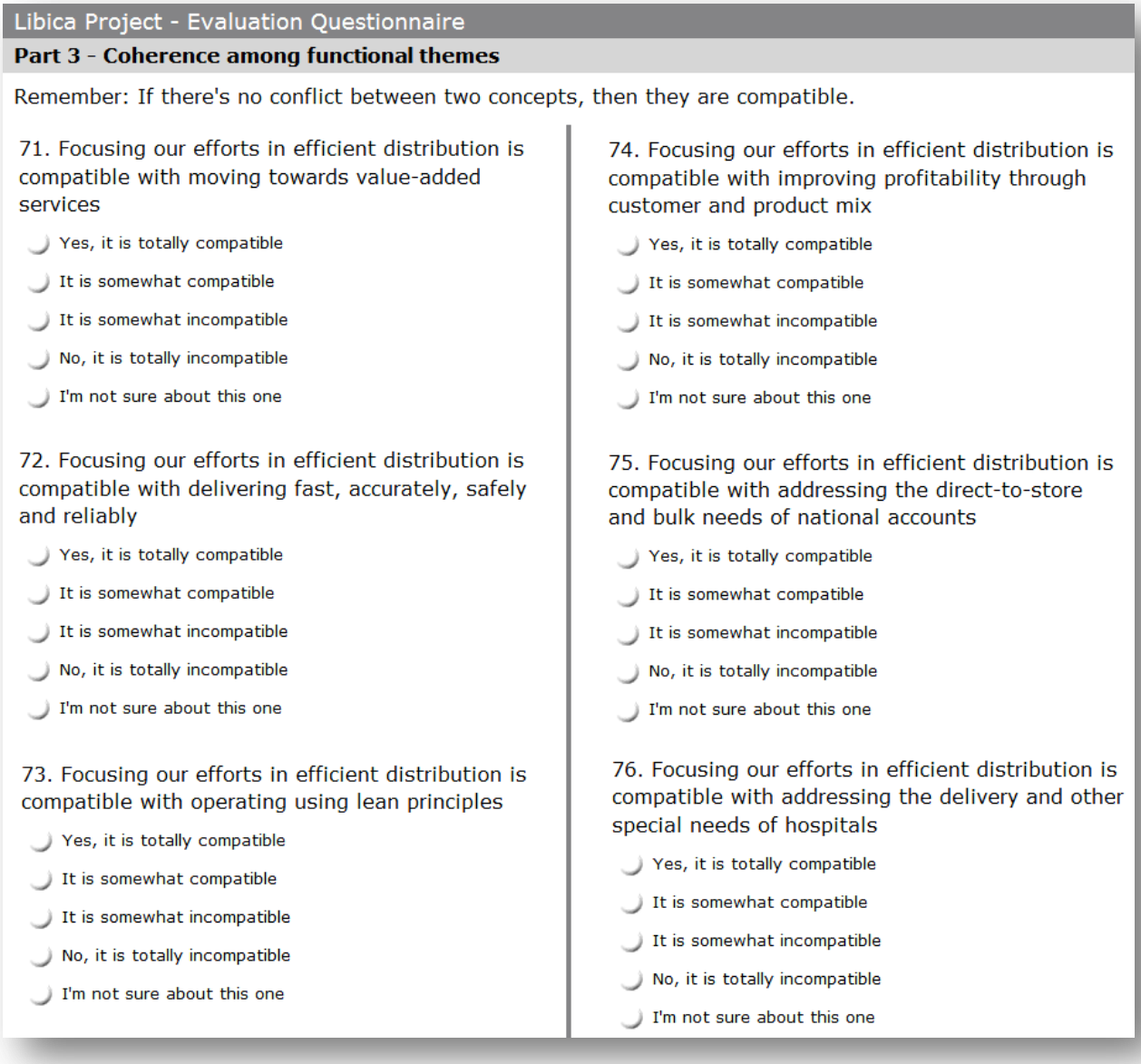
Figure 50: First questions of Part 2 of Libica's questionnaire

Example of 'bidirectional' wording for Part 3 of the questionnaire

We applied with Libica the bidirectional approach. For example, $Q3_{12}$ inquires about the compatibility between Functional Theme 1 (FT_1) and Functional Theme 2 (FT_2). Based on Libica's FSM,

we know that FT_1 is summarized as: *"Focus our efforts in efficient distribution,"* while FT_2 is summarized as *"Move towards value-added services."* Thus, question $Q3_{12}$ reads: *"Focusing our efforts in efficient distribution is compatible with moving towards value-added services."*

Figure 51 presents the first six questions of Part 2 of Libica's evaluation questionnaire.



Libica Project - Evaluation Questionnaire

Part 3 - Coherence among functional themes

Remember: If there's no conflict between two concepts, then they are compatible.

71. Focusing our efforts in efficient distribution is compatible with moving towards value-added services

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

72. Focusing our efforts in efficient distribution is compatible with delivering fast, accurately, safely and reliably

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

73. Focusing our efforts in efficient distribution is compatible with operating using lean principles

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

74. Focusing our efforts in efficient distribution is compatible with improving profitability through customer and product mix

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

75. Focusing our efforts in efficient distribution is compatible with addressing the direct-to-store and bulk needs of national accounts

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

76. Focusing our efforts in efficient distribution is compatible with addressing the delivery and other special needs of hospitals

- Yes, it is totally compatible
- It is somewhat compatible
- It is somewhat incompatible
- No, it is totally incompatible
- I'm not sure about this one

Figure 51: First questions of Part 3 of Libica's questionnaire

Example of 'full matrix' approach for Part 4 of the questionnaire

With Unit-X, being the first in-depth project we conducted, we were fortunate to count with the support of a strong champion at a high position within the organization, who suggested that we prepare a question for each one of these cells, what we call the 'full matrix' approach to questions.

In our action research project with Unit-X, we used the full matrix approach. Let us illustrate this with an example from the Unit-X exercise: $Q4_{24}$ for example inquires about the support Operational Theme 2 (OT_2) provides to Functional Theme 4 (FT_4). For Unit-X, OT_2 is summarized as: *"Prevent disruptions in the business"*, and FT_4 is summarized as *"Deliver best-in-class service"*. Question $Q4_{24}$ would then read: *"Preventing disruptions in the business helps us to deliver best-in-class service."*

Example of the 'parent-child' approach for Part 4 of the questionnaire

For example, Libica's Operational Theme 10 reads: *"Add profitable customers to our customer base,"* and its parent in the FSM, Functional Theme 5 reads: *"Improve profitability through customer and product mix."* Thus, $Q4_{10\,5}$ for Libica reads: *"Adding profitable customers to our customer base is necessary if we are improving profitability through customer and product mix."*

Figure 52 presents the first six questions of Part 4 of Libica's evaluation questionnaire.

Examples for Step 3 – Administer the questionnaires to respondents

In the case of Unit-X, a total of 10 individuals were chosen to participate in the strategy evaluation effort; each one of them received the same questionnaire. In the case of Libica, 25 individuals were chosen to participate; this group was divided in two subgroups, A and B, with randomly allocated members. The resulting subgroups were roughly equal in size (one with 12 members, the other with 13 members). We also divided the questionnaire into two subsets of questions: the first question would go to Subset A, and the next to Subset B, and so on. This allowed us to administer one Subset of the Questionnaire to each Subgroup, effectively cutting the workload of each individual in half: each

respondent would only have to answer every other question.

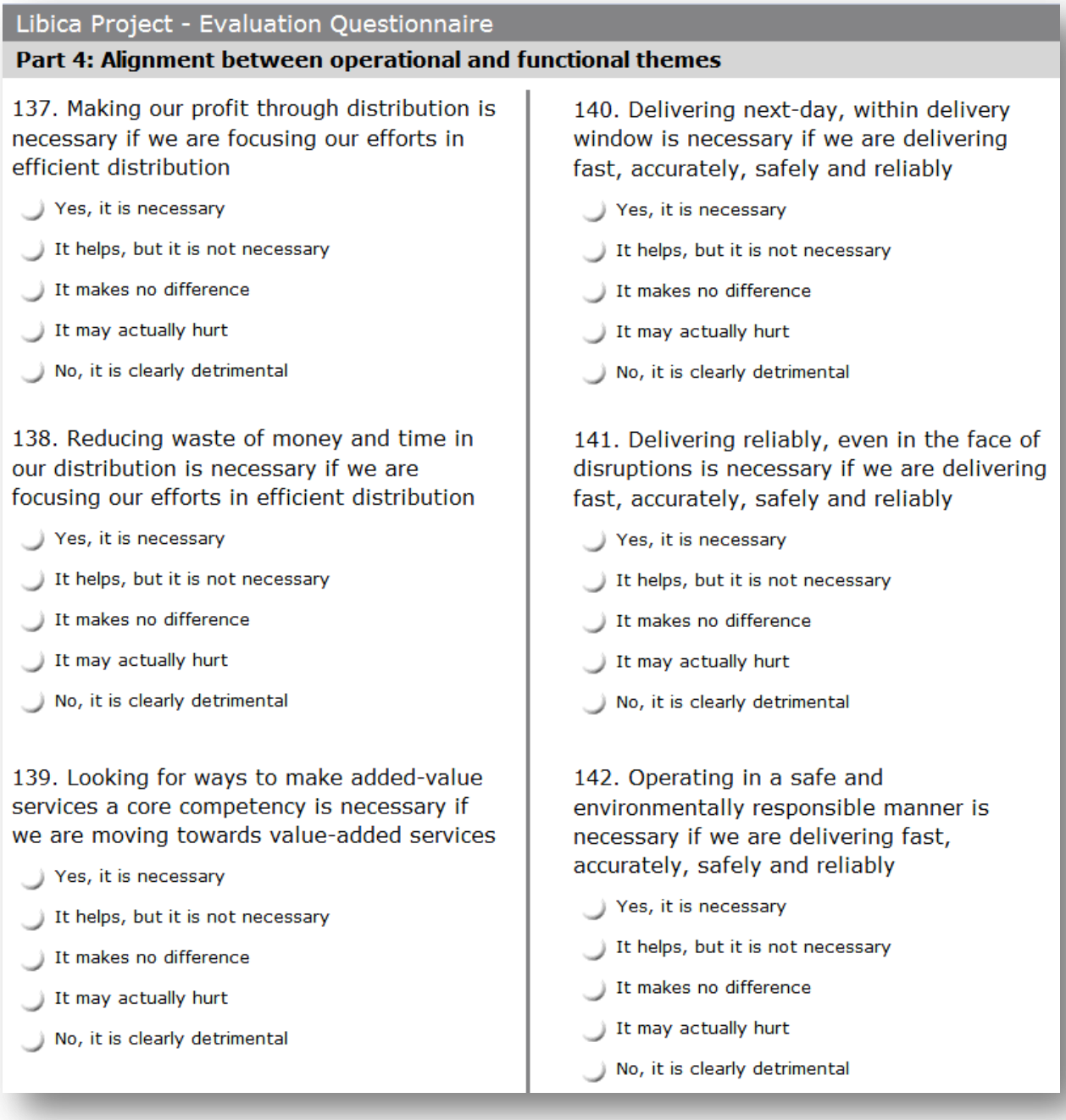


Figure 52: First questions of Part 4 of Libica's questionnaire.

Such measures to reduce the workload are important to ensure the quality of the answers, given that a long questionnaire, tiresome to the respondent, invites low quality answers. In both the case of

Unit-X and Libica, we administered the questionnaires online, using SurveyMonkey, and closely monitored the progress of the responses. We sent reminders to the recipients of the questionnaire that had not replied after a week or so of receiving the questionnaire. We also requested the sponsor of the project (the VP of Supply Chain in the case of Unit-X and the VP of Operations and Supply Chain in the case of Libica) to also send reminders to the members of the team. For Unit-X we had a response rate of 86% (since 356 questions were sent to 10 individuals and 3,055 answers were received). For Libica, we had a response rate of 95% (since 83 questions were sent to 25 individuals and 1,981 answers were received). We attribute such high response rates to the frequent reminders and a strong commitment from the team leaders, who championed for the completion of the project.

Examples for Step 4 - Code the answers into a spreadsheet

Examples of the nomenclature: R and A

Example for R: In the case of Unit-X, $R3_{21} = 10$ since 10 individuals were presented question $Q3_{21}$.

Example for A: In the case of Unit-X, $A3_{2,1,7}$ would refer to the answer choice that respondent 7 gave to question $Q3_{21}$ ("*It might hurt a little".*)

Examples of selecting a numerical scale for coding

The questionnaires have 4 parts: each part deals with one of the four zones/matrices.

- We used the 'full spectrum' scale in coding the answers to all four parts of Unit-X's questionnaire.
- We used the 'incompatibility headcount' scale for Parts 1 and 3 of Libica's questionnaire.
- We used the 'detrimental headcount' scale for coding Part 2 of Libica's questionnaire.
- We used the 'lack of support' scale for coding Part 4 of Libica's questionnaire.

Example of coding the answers from the questionnaire

Below is an example of how the facilitator can convert each answer using the scale, and place the resulting number (or code) in the cell that corresponds to that specific respondent and question. In the case of Unit-X we decided to use the 'full spectrum' scale. In Part 3, we have that $A3_{1,2,1}$ (e.g. the answer that respondent 1 gave to question $Q3_{12}$) was: "*It might help a little".* In the 'full spectrum' scale, that answer corresponds to "1", and we code it as such. As shown in Table 19, we enter "1" in the cell that corresponds to Individual 1 answering question $Q3_{12}$.

	$Q3_{12}$	$Q3_{13}$	$Q3_{14}$	$Q3_{15}$	$Q3_{16}$	$Q3_{17}$	$Q3_{18}$	$Q3_{21}$	$Q3_{23}$	$Q3_{24}$	$Q3_{25}$	…
Individual 1	1	0	1	2	2	0	0	0	0	1	2	…
Individual 2	2	0	0	2	2	0	0	1	0	-1	2	…
Individual 3	0	0	0	4	4	0	0	0	0	-1	?	…
Individual 4	1	0	0	4	2	0	1	1	0	-1	1	…
Individual 5	0	0	0	4	1	0	0	0	0	-1	2	…
Individual 6	0	-2	-1	2	2	0	-1	2	1	-1	-1	…
Individual 7	0	0	1	2	1	0	0	0	0	-2	2	…
Individual 8	4	1	2	4	4	1	1	4	4	2	4	…
Individual 9	-1	?	-1	4	2	-1	-2	1	2	-1	2	…
Individual 10	0	0	-1	2	1	0	0	?	0	-1	?	…

Table 19: Coded answers to Unit-X's Part 3, using the 'full spectrum' scale

Examples for Step 5 – Aggregate the individual answers into answer matrices

Example of 'simple average' aggregation of individual answers

For example, Table 20 shows how we aggregated through simple average the individual answers previously shown in Table 19.

	$Q3_{12}$	$Q3_{13}$	$Q3_{14}$	$Q3_{15}$	$Q3_{16}$	$Q3_{17}$	$Q3_{18}$	$Q3_{21}$	$Q3_{23}$	$Q3_{24}$	$Q3_{25}$	…
Average	0.7	-0.1	0.1	3.0	2.1	0.0	-0.1	1.0	0.7	-0.6	1.8	…

Table 20: Aggregating the answers of Unit-X's Part 3, through 'simple average'

Example of 'trimmed average' aggregation of individual answers

For example, if there is only one +4 in the group of answers, we will drop it, but if there are two +4's, then we will retain both of them. Table 21 repeats the aggregation exercise for the answers of Part 3 of

Unit-X's questionnaire, this time using the 'trimmed average' approach.

	$Q3_{12}$	$Q3_{13}$	$Q3_{14}$	$Q3_{15}$	$Q3_{16}$	$Q3_{17}$	$Q3_{18}$	$Q3_{21}$	$Q3_{23}$	$Q3_{24}$	$Q3_{25}$	…
Trimmed Average	0.5	0.0	-0.1	3.0	2.1	0.0	0.1	0.6	0.3	-0.8	1.8	…

Table 21: Aggregating the answers of Unit-X's Part 3, through 'trimmed average'

Comparing the values of Table 20 and Table 21 one notices how for most values there is no change, or only a marginal change. For a few others, however, the change is larger: those had a single, large outlier. Conducting the analysis with both 'simple average' and 'trimmed average' gives us some sense of the robustness of the insights we derive. As we will show below, that is what we did in the case of Unit-X.

Sample answer matrices from Unit-X and Libica

Below are three examples of answer matrices. Figure 53 shows Answer Matrix 2 from Unit-X. Answers to Part 2 of the Unit-X questionnaire were coded using the 'full spectrum' scale and aggregated using the 'trimmed averages' approach.

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
ST1	2.2	0.3	2.7	2.2	2.0	-0.1	1.7	2.2
ST2	1.4	1.4	1.6	0.5	2.9	0.4	1.2	1.4
ST3	3.6	2.0	2.2	-1.6	4.0	0.7	1.7	0.4
ST4	0.3	-0.7	2.2	0.4	0.9	0.6	0.1	1.3
ST5	1.9	0.3	2.3	1.5	2.0	0.5	0.9	2.0

Figure 53: Answer Matrix 2 for Unit-X ('full spectrum,' 'trimmed averages').

To understand any answer matrix, we must know first what scale was used to code the data, and – in the case of the 'full spectrum' scale – whether trimming was used. Matrix 2 is a very important one, since it shows us the 'fit' at the interface between the nominal and the executed strategies. So, it is worth spending some time to make sure the reader understands how to read a matrix like that shown in Figure 53. The headings of this matrix's columns, FT1, FT2, etc. refer to Functional Theme 1, Functional Theme 2, etc. The headings of the rows, ST1, ST2, etc. refer to Strategic Theme 1, Strategic Theme 2, etc.

The reader should notice that this Answer matrix follows the pattern we prescribed in Figure 44, and that it has a structure similar to the matrix (shown in Figure 37) used to create Part 2 of the questionnaire. As a reminder, the purpose of that part of the questionnaire was to explore the relationships in Zone 2 (illustrated in Figure 28), namely to explore the support the different functional themes provide to the different to strategic themes. Each given cell in the matrix gives us an idea of what kind of support the group thinks one given functional theme provides to one given strategic theme. For example, what kind of support does Functional Theme 1 provide to Strategic Theme 1? Look in the matrix for the cell relating FT1 as active concept (e.g. heading the column) and ST1 as passive concept (e.g. heading the row). We see that the 'trimmed average' is 2.2. On the 'full spectrum' scale (see Table 15) a value of 2 corresponds to "Yes, it helps significantly". We would need to analyze the spread of the values to have an idea of agreement, but this value of 2.2 suggests that, as a collective, the group thinks that minimizing the cost of procured materials (FT1) helps their firm significantly to better match customers with products (ST1) (refer to Unit-X's Functional Strategy Map in Figure 25).

Figure 54 shows a very interesting Answer Matrix 3 for Unit-X, discussed in detail in the next section.

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
FT1		0.6	1.4	-0.1	0.4	-0.4	1.4	0.4
FT2	0.5		0.4	-0.5	0.3	-0.2	0.9	1.1
FT3	0.0	0.3		0.4	0.4	0.8	1.2	0.4
FT4	-0.1	-0.8	2.2		-0.8	-1.2	1.9	1.8
FT5	3.0	1.8	1.3	-0.9		0.2	1.7	1.0
FT6	2.1	-1.1	1.1	-1.3	0.3		1.6	0.4
FT7	0.0	0.0	1.6	0.4	0.0	0.0		0.3
FT8	0.1	0.5	1.8	1.0	-0.3	0.0	0.4	

Figure 54: Answer Matrix 3 for Unit-X ('full spectrum,' 'trimmed averages').

Some changes in presentation allow us to take a relatively dry answer matrix, like those shown above, and make it more 'user-friendly'.

Are Libica's functional themes compatible? The following matrix summarizes what team members said.

The percentage in each cell refers to what fraction of the group thought there was incompatibility between two functional themes that intersect in that cell.

Notice that about three quarters of the respondents thought addressing the DSD and bulk needs of national accounts is incompatible, to some extent, with helping independent retailers be more competitive.

	Focuse our efforts in efficient distribution	Move towards value-added services	Deliver fast, accurately, safely and reliably	Operate using lean principles	Improve profitability through customer and product mix	Address the direct-to-store and bulk needs of national accounts	Address the delivery and other special needs of workshop customers	Help independent retailers be more competitive	Simplify things for us in our interaction with the customer	Collaborate with our suppliers, but not in all relevant areas	Manage through clear and well communicated objectives	Improve the impact of our workforce
Focus our efforts in efficient distribution												
Move towards value-added services	0%											
Deliver fast, accurately, safely and reliably	0%	27%										
Operate using lean principles	0%	0%	0%									
Improve profitability through customer and product mix	27%	18%	18%	9%								
Address the direct-to-store and bulk needs of national accounts	0%	0%	0%	0%	9%							
Address the delivery and other special needs of workshop	9%	0%	9%	0%	15%	38%						
Help independent retailers be more competitive	0%	0%	0%	0%	9%	73%	38%					
Simplify things for us in our interaction with the customer	0%	0%	0%	0%	23%	9%	0%	18%				
Collaborate with our suppliers, but not in all relevant areas	0%	0%	0%	0%	10%	18%	0%	0%	18%			
Manage through clear and well communicated objectives	0%	0%	0%	0%	0%	0%	0%	18%	0%	8%		
Improve the impact of our workforce	8%	0%	0%	0%	9%	0%	0%	15%	0%	9%	0%	

Average	4%	4%	5%	1%	13%	13%	10%	16%	6%	6%	2%	4%

Figure 55: Answer Matrix 3 for Libica ('incompatibility headcount' scale.)

For example, Libica's Answer Matrix 3 was used as a tool for discussion when we reported the findings back to the group. To make it easier to understand, we changed the headers from the cryptic FT#'s nomenclature to the full phrases of what these functional theme stands. The values, which had been coded using the 'incompatibility headcount' scale, were expressed as percentages. A brief companion text was added on top of the matrix, to call the reader's attention to a particular value, which was then highlighted with a circle. The result is shown in Figure 55.

Examples for Step 6 - Identify the top quartile values in each matrix

Example for a matrix coded with the 'full spectrum' scale

Let's use as example Answer Matrix 2 from Unit-X (shown in Figure 53)

1) We start with the positive values. Remove all the non-positive values from the matrix in question. As shown in Figure 56, in our example from Unit-X's Matrix 2, 37 values remained.

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
ST1	2.2	0.3	2.7	2.2	2.0		1.7	2.2
ST2	1.4	1.4	1.6	0.5	2.9	0.4	1.2	1.4
ST3	3.6	2.0	2.2		4.0	0.7	1.7	0.4
ST4	0.3		2.2	0.4	0.9	0.6	0.1	1.3
ST5	1.9	0.3	2.3	1.5	2.0	0.5	0.9	2.0

Figure 56: Only the positive values are retained.

This is easy to do in a spreadsheet: in Excel, for example, we can do it for X with =IF(X>0,X,"").

2) Now we will identify the values in the top quartile. Since we are currently working with positive values, "top" here means "most positive". Back to the Unit-X Matrix 2 example, we know we are looking for the highest 9 or 10 values (since 37 divided by 4 is 9.25). To help us identify these top 10 values, we rank all the 37 values we retained, in descending order (the highest value is ranked first, the next highest is ranked second, etc.). This is easy to do in a spreadsheet: in Excel we resort to the RANK function. The resulting ranking is shown in Figure 57. Now, for ease of identification, we shade in gray the 10 values with the highest ranking.

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
ST1	6	34	4	6	11		16	9
ST2	22	21	18	29	3	33	24	20
ST3	2	11	9		1	27	17	31
ST4	34		6	31	26	28	37	23
ST5	15	34	5	19	11	29	25	11

Figure 57: Rankings of the positive values in descending order.

3) We now list the top quartile positive values. For Unit-X's Matrix 2, the result is shown in Table 22. The ranking comes from Figure 57. For the cell in question, the active concept is the one heading the column and the passive concept is the one heading the row. The value (in this case a 'trimmed average' aggregate value) comes from the answer matrix, shown in Figure 56. Notice that in this case all the values are larger than 2 (*'helps significantly'* on the 'full spectrum' scale).

Ranking	Active Concept	Passive Concept	Value
1	Functional Theme 5	Strategic Theme 3	4.00
2	Functional Theme 1	Strategic Theme 3	3.56
3	Functional Theme 5	Strategic Theme 2	2.89
4	Functional Theme 3	Strategic Theme 1	2.67
5	Functional Theme 3	Strategic Theme 5	2.33
=6	Functional Theme 1	Strategic Theme 1	2.22
=6	Functional Theme 3	Strategic Theme 4	2.22
=6	Functional Theme 4	Strategic Theme 1	2.22
=9	Functional Theme 3	Strategic Theme 3	2.20
=9	Functional Theme 8	Strategic Theme 1	2.20

Table 22: Listing the top quartile positive values.

4) We move now to the negative values. We return to the original matrix (for our example, that one shown in Figure 53) and now remove all the non-negative values from it. As shown in Figure 58, from Unit-X's Matrix 2, a mere 3 values remained (since this was a mostly positive matrix).

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
ST1						-0.1		
ST2								
ST3				-1.6				
ST4		-0.7						
ST5								

Figure 58: Now only the negative values are retained.

5) Now we will identify the values in the top quartile. Since we are now working with negative values, “top” here means “most negative”. Back to the Unit-X Matrix 2 example, we know we are looking for 1 value only (since 3 divided by 4 is 0.75).

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
ST1						3		
ST2								
ST3				1				
ST4		2						
ST5								

Figure 59: Rankings of the negative values in ascending order.

To help us identify the top value, we rank the 3 values we retained, in ascending order (the lowest value is ranked first, the next lowest is ranked second, etc.). The resulting ranking is shown in Figure 59. We have shaded in gray the single value with the highest ranking.

6) We now list the top quartile negative values. For Unit-X’s Matrix 2, the result is shown in Table 23. The ranking comes from Figure 59 and the value comes from Figure 58. Notice that in this case the value is close to 2 (e.g. ‘hurts significantly’ on the ‘full spectrum’ scale).

Ranking	Active Concept	Passive Concept	Value
1	Functional Theme 4	Strategic Theme 3	-1.6

Table 23: Listing the top quartile negative values.

Example for a matrix coded with a binary scale

For this example, we resort to Answer Matrix 3 for Libica (Figure 55), coded using the ‘incompatibility headcount’ scale. It contains 66 values. Its top quartile will include ~16 values. Figure 60 shows the ranking of the values greater than zero, with the 15 top quartile values highlighted in gray. Eight values are tied in 16th place, so they are omitted.

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8	FT9	FT10	FT11	FT12
FT1												
FT2												
FT3		4										
FT4												
FT5	4	7	7	16								
FT6					16							
FT7	16		16		13	2						
FT8					16	1	2					
FT9					6	16		7				
FT10					15	7			7			
FT11								7		24		
FT12	24				16			13		16		

Figure 60: The top quartile values in Libica's Answer Matrix 3, shown in gray shade.

Examples for Step 7 – Derive insights from the analyzed matrices

Example for the 'threshold and ranking' approach

This is better illustrated through examples. As an example involving a binary scale, let us derive insights from Libica's Matrix 3, which explores interactions between functional themes, according to the team.

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8	FT9	FT10	FT11	FT12
FT1												
FT2												
FT3		i										
FT4												
FT5	i											
FT6												
FT7						i						
FT8						I	i					
FT9												
FT10												
FT11												
FT12												

Figure 61: Summary matrix 3 for Libica, using 'threshold and ranking' for a binary scale.

We look for cells in Figure 55 that contain values larger than the threshold of 25% (since these

values were coded using a binary scale) and at the same time fall in the top quartile according to Figure 60. We find that five cells fulfill both requirements: $A3_{1,5}$, $A3_{2,3}$, $A3_{6,7}$, $A3_{6,8}$, $A3_{7,8}$. These five cells in Matrix 3 are shown in Figure 61. The 'i' in the cells is meant to denote 'incompatibility' (the one in large case is meant to denote a particularly large value, in this case over twice the threshold).

In order to translate the incompatibilities we identified above into a statement or graph we have to remember what the labels of the relevant functional themes mean in Libica's case.

- FT1 stands for *"Focus our efforts in efficient distribution"*
- FT2 stands for *"Move towards value-added services"*
- FT3 stands for *"Deliver fast, accurately, safely and reliably"*
- FT5 stands for *"Improve profitability through customer and product mix"*
- FT6 stands for *"Address the direct-to-store and bulk needs of national accounts"*
- FT7 stands for *"Address the delivery and other special needs of workshops"*
- FT8 stands for "*Help independent retailers be more competitive"*

We can express **verbally** the insights we found. For example, the incompatibility between FT6 and FT8 can be expressed as follows: "*Our efforts to address the direct-to-store and bulk needs of national accounts are at least partly incompatible with our efforts to help independent retailers be more competitive."* Later we will explore with the group the rationale behind this assessment they made.

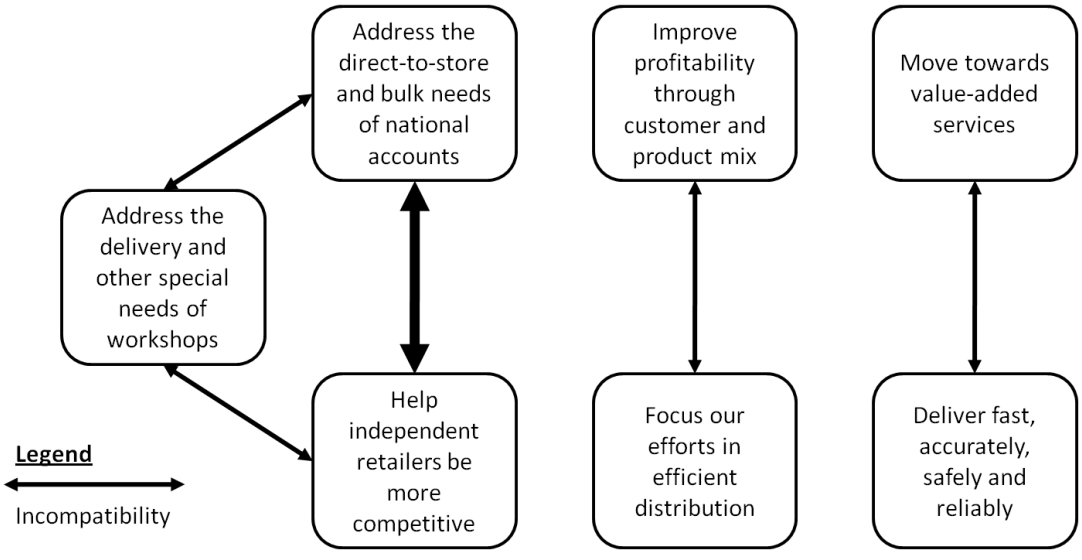


Figure 62: A graphical representation of the insights derived for Libica's Zone 3.

We can also express **graphically** the insights we found. For example, all five incompatibilities that we found for Zone 3 of Libica, through the analysis of Matrix 3, are shown graphically in Figure 62. Notice how this graph, not much more than a conceptual map, effectively communicates all five conflicts in a clean and concise manner. Notice also that the line used for the largest incompatibility is thicker.

On the other hand, Figure 63 provides an example for data coded with the 'full spectrum' scale. This of a 'threshold and ranking' summary matrix addresses Unit-X's Zone 2, namely how the functional themes support or hurt the strategic themes. In it, a plus sign (+) indicates a cell whose value is both over the threshold for positive values in a 'full spectrum' scale (namely, that is larger than 1.5) and falls in the highest quartile for the positive values in that matrix. By the same token, a negative sign (-) indicates a cell whose value is smaller than the threshold for negative values (namely, that is smaller than -0.75) and that falls in the lowest quartile for negative values in that matrix.

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
ST1	+		+	+				+
ST2					+			
ST3	+		+	-	+			
ST4			+					
ST5			+					

Figure 63: Summary matrix for Unit-X's M2. 'Threshold and ranking' for 'full spectrum' scale.

It is possible to derive some insights directly from the summary matrix, by reading their rows and columns, without resorting to a graphical representation. For example, an inspection the rows of the summary matrix in Figure 63 shows that all the strategic themes receive support from at least one functional theme (since in each row there is at least one + sign). We derive more insights, such as the following: strategic theme 1 (ST1: "Better match customers with products") is supported by four functional themes, whereas other strategic themes (like ST2, ST4 and ST5) receive support only form one functional theme each. Likewise, inspecting the columns of the summary matrix in Figure 63 we notice that some functional themes are providing support to multiple strategic themes (since their

columns have multiple + signs). In particular, FT3 (“Work as an integrated organization”) is providing support to four strategic themes (since there are four + signs in the column headed by FT3). More interesting yet is the insight that some functional themes do not seem to be providing meaningful support to any of the five strategic themes (since they have no + signs in the columns they head). Among these are FT2 (“Manufacture in high-volume plants”), FT6 (“Operate with the lowest work capital”), and FT7 (“Develop a consensus demand forecast”).

A further example of a ‘threshold and ranking’ summary matrix for ‘full spectrum’ data is provided in Figure 64, which deals with Unit-X’s Zone 3, namely how functional themes interact with each other.

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
FT1								
FT2								
FT3								
FT4			+			-	+	+
FT5	+	+					+	
FT6	+	-		-			+	
FT7			+					
FT8			+					

Figure 64: Summary matrix for Unit-X’s M3. ‘Threshold and ranking’ for ‘full spectrum’ scale.

From this matrix we derive an interesting piece of insight: some functional themes are more friendly towards their peers: particularly FT3 and FT3, each one supporting three other functional themes. At the same time, other functional themes are less friendly towards their peers: functional themes 4, 5 and 6 are helping no other functional theme; furthermore, FT4 and FT6 even hurt another functional theme.

Example for the ‘reciprocal values’ approach

As an example of this, consider Matrix 3 from Unit-X, (shown in Figure 54, page 176). The left part of Figure 65 shows where in the matrix we find negative values. Notice that the locations of negative values are, for the most part, symmetrical along the long diagonal: out of twelve negative values found in Unit-X's Answer Matrix 3, ten have a corresponding negative value across the long diagonal (as shown

in the right part of Figure 65).

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
FT1				-0.1		-0.4		
FT2				-0.5		-0.2		
FT3								
FT4	-0.1	-0.8			-0.8	-1.2		
FT5				-0.9				
FT6		-1.1		-1.3				
FT7								
FT8					-0.3			

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
FT1				–		–		
FT2				–		–		
FT3								
FT4	–	–			–	–		
FT5				–				
FT6		–		–				
FT7								
FT8					–			

Figure 65: Left, Unit-X's Answer Matrix 2. Right, 10 out of 12 negative values are reciprocal.

This suggests reciprocally detrimental relationships between the concepts. A graphical representation of these reciprocally detrimental relationships between concepts, such as that shown in Figure 66, proved an effective tool for communicating the idea to the firm.

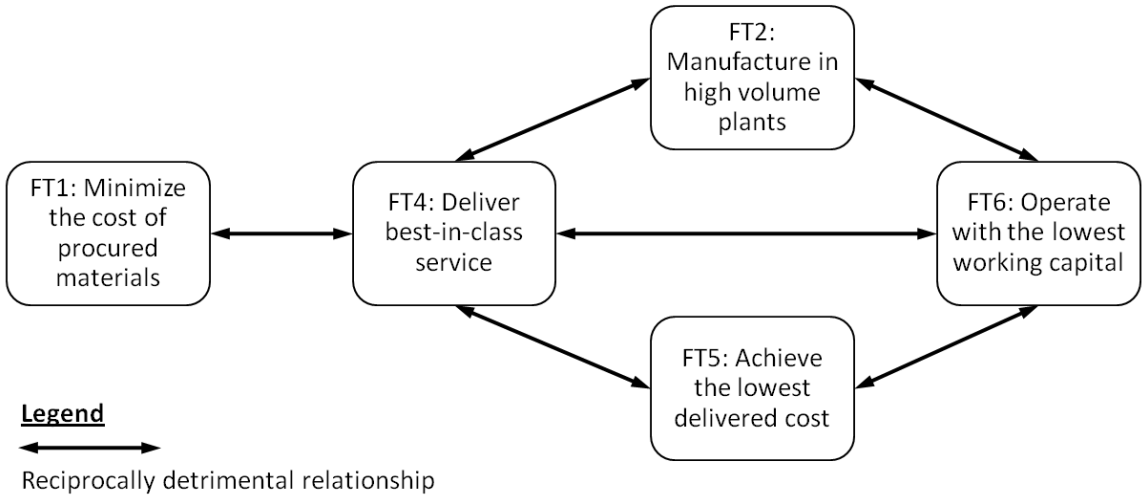


Figure 66: Graphical representation of reciprocally detrimental relationships between FTs

Examples for Step 8 – Compile the shortcomings in sufficiency

Examples for Task 1: Search the data for 'grievances'

Let us illustrate the output of this task with a few examples taken from interview #18 from the research project with Libica. In this interview the respondent described an issue that Libica had recently experienced with its largest customer, ACME (a fictitious name). The respondent told us that just 'wrapping our arms around the issue' had taken four months, and gaining access to ACME's facilities to explore the root causes of the problem took 60 days. The respondent mentioned this as an example of the lack of collaboration between Libica and some major customers, making the point that if there had been more of a partnership sense in place, a solution to the problem would have come faster. In that same interview, asked what he wished Libica had done differently in the past so that problems like this would be avoided, the respondent said: "*I wish that Libica was a more customer-focused organization, from the beginning, you know.* " Asked to clarify what he meant by "*more customer-focused*," he replied: "*Where we are now is that we have resources that face towards our manufacturers … and then when you look on the customer side, due to the nature of the business … I think we've lost the ability to really understand how our customers make money and how we help them money*." The respondent then went on to describe how they have lost focus of how easy or difficult it is to make business with Libica. "*We've been tough to do business with. Our first answer tends to be 'no' when a customer asks for something. We become more difficult to work with, and as we become more difficult to work with, solving problems becomes more difficult. The bigger the problems, the longer they last, the more money gets lost by everybody. That's what I mean by customer-focused.*"

While listening to this interview looking for activity data, grievances and to-do items, we wrote down (coded) the following grievances:

- *(Grievance) 4 months to wrap arms around issue of labeling ACME, 2 just for access*
- *(Grievance) Develop a reputation for being hard to work with*

- *(Grievance) Focus on driving higher margins from suppliers, at the expense of customer satisfaction*
- *(Grievance) When customers approach us with ideas, often our first answer is "no"*

Examples for Task 2: Consolidate all grievances in a list

Let us illustrate the output of this task with an example from Libica. Table 24 lists the grievances we identified while listening to the Libica interviews and sessions. In this text, '*we/us*' refers to Libica.

- *It took us too long to identify issue of labeling with ACME: 4 months to wrap our arms around the issue, 2 months just for gaining access. This suggests lack of collaboration with ACME and some other large customers.*
- *We have developed a reputation for being hard to work with.*
- *When customers approach us with ideas, often our first answer is "no."*
- *We have focused on driving higher margins from suppliers, and lost from sight customer satisfaction.*
- *Our SC guys have no ongoing working relationships with the suppliers' SC guys.*
- *Recent surveys found significant distrust of employees towards management.*
- *Our service level (i.e. order fulfillment) leaves much to be desired.*
- *Speed and completeness of customer serviced has been lost, since relationships between CSRs and customers were severed when CSRs were replaced.*
- *It takes us longer to set up a new account than others (including smaller regional players).*
- *The 'pod' of customer service representatives answering a customer's calls is larger than before, meaning customer service becomes less personalized.*
- *When an order is not filled, it is killed, meaning the customer will most likely have to place the order again.*
- *Our order management system cannot tell apart new orders from repeat unfulfilled demand.*
- *Lack of backorder capability in the ordering system encourages ghost orders.*
- *Expediting orders is a daily occurrence, whereas it should not be so.*

Table 24: List of grievances identified in Libica's interviews

Examples for Task 3: Organize the grievances thematically

What follows in Table 25 is an example of what the output of this summarization and organization looks like, again taken from the Libica exercise.

Grievances on the supply-side

- *We have to give a higher priority to routine operational collaboration with manufacturers:*
  - *We have to work with manufacturers to resolve problems. Presently, our supply chain guys have no ongoing working relationships with their supply chain guys.*
  - *We have to give a higher priority to collaboration to 'routinize' orders. Presently, we have 20 people expediting orders. This indicates a problem in the routine ordering procedures.*

Grievances on the demand-side

- *We suffer from a lack of collaboration with largest customer in certain key areas:*
  - *Collaboration to identify and solve problems is not good with ACME, our largest customer: e.g. it took us 4 months to wrap arms around issue of labeling, 2 months just for gaining access.*
- *We have developed a reputation for being hard to work with:*
  - *When customers approach us with ideas, often our first answer is "no."*
- *We have not paid enough attention to customer satisfaction:*
  - *The speed and completeness of customer serviced deteriorated as existing relationships between CSRs and customers were lost with the CS centralization. The 'pod' of CSRs answering a customer's calls is larger than before.*
  - *Service level (i.e. order fulfillment) leaves much to be desired.*
  - *It takes longer to set up a new customer account with us than with others (including smaller regional players.)*
- *Our ordering system has to be improved:*
  - *Lack of backorder capability in the ordering system encourages ghost orders.*
  - *The customer will most likely have to place the order again. This is extra work for them.*
  - *The system cannot tell apart new orders from repeat unfulfilled demand. This confounds our demand data.*

Grievances regarding internal affairs

- *Work to be done in gaining trust of employees:*
  - *Recent surveys found significant distrust of employees towards management.*

Table 25: Summary of grievances from Libica exercise, ordered thematically

Examples for Step 9 - Shortcomings in coverage

The process of inferring coverage issues is best illustrated by resorting to examples from our cases with Unit-X and Libica.

- Unit-X provides us an example of how we can infer coverage issues from comments made during

validation session for the final map. During the session to validate the Functional Strategy Map of Unit-X, one of the members of the team made a comment: the map seems to be silent about the organizational structure that should govern the supply chain. Should the supply chain team belong to the business unit exclusively, to the corporation exclusively or be a mix of both? So we made a note of "*Organizational structure*" as an area of interest that was not being explicitly addressed by the existing supply chain strategy.

- Unit-X provides us also with another example. Unit-X requested to hold an informal session to discuss the findings of the alignment evaluation. Comments made during this session were used to identify a missing area. Several members of the group commented that they would be better off if they could collaborate with suppliers and customers. We observed, then, that the Functional Strategy Map had no reference to collaboration, and that this corresponded to a lack of collaboration in reality. Thus, we added *"Collaboration with other supply chain parties"* as another area of interest that was not being explicitly addressed by the existing supply chain strategy.
- Libica provides us with an example of how we can infer coverage issues from comments made in the feedback to the partial maps. Asked to provide individual feedback on the partial maps, three different respondents pointed out that there was need to have collaboration with customers, particularly large national accounts. One respondent suggested *"adding a section for collaboration with customers."* Another person described it as a need for: *"establishing a strategic relationship with national chain customers."* A third one also mentioned the same idea. These suggestions were made along the lines of collaboration to improve processes, to improve accuracy of demand forecast. The respondents provided some elaborate ideas regarding what form this collaboration could take place: (a) to provide customers scorecards on service levels and expected demand, (b) to increase the visibility of service level agreements for each customer account and make use of them actively in managing the accounts, and (c) to align service level agreements with operational

capabilities. Thus, “Collaboration with customers” was noted as a missing area, a coverage gap.

Example for Step 10 - A Sample Evaluation Report

What follows is the Phase 2 Report prepared for Libica, discussing the salient points of the sufficiency, coverage and alignment evaluation. The report served as reference during the discussion with the team. In this report, the first person plural (‘we’, ‘us’, etc.) refers to the firm, Libica.

Sufficiency Evaluation

Supply-side sufficiency: Higher priority should be given to routine operational collaboration with manufacturers. Particularly working with manufacturers to resolve problems and collaborating in ‘routinizing’ orders.

Demand-side sufficiency: Libica should have been paying more attention to customer satisfaction. Particularly:

- The speed and completeness of customer serviced deteriorated when the relationships between the customers and the customer service representatives (CSRs) were severed by the centralization. The centralized CSRs of today lack the expertise that used to be gained through presence in - and rotation through - the facilities.
- Service level, understood as order fulfillment, *“leaves much to be desired.”*
- *“It takes longer to set up a new account with us than with others,”* even smaller regional players.
- The ordering system has to be improved. The lack of backorder capability in the ordering system *“encourages ghost orders.”* This results in extra work for the customer, who *“will most likely have to place the order again,”* and in demand confusion for us, since our *“system cannot tell apart new orders from repeat unfulfilled demand.”*
- Libica has not been receptive enough to new ideas from customers, and *“we have developed a reputation for being hard to work with.”* It’s said that when customers approach us with ideas,

often our first answer is *"no."*

In the particular case of our single largest customer, the lack of collaboration takes on a particularly acute dimension, as seen in a recent episode where a problem with labeling (caused in part by us dropping the ball) took an inordinately long amount of time to be identified. Just gaining access took months.

Internal sufficiency: There is work to be done to develop and earn the trust of our employees. Despite what has been done so far, we heard, recent surveys found *"significant distrust of employees towards management."*

Coverage Evaluation

There were multiple suggestions of activities that should be undertaken. These mostly fell within existing areas. For example, the suggestion of making a profit out of value added services can be located within the area of profitability or of competency.

However, three persons separately pointed out that there was one bona fide activity area that was entirely missing from the map as a top-level area of interest: collaboration with customers. One person suggested *"adding a section for collaboration with customers."* Another person described it as: *"establishing a strategic relationship with national chain customers."* A third one also mentioned the same idea. These suggestions were made along the lines of collaboration to:

- improve processes
- improve accuracy of demand / forecast
- provide customers scorecards on service and demand
- use service level agreements visible and actively in managing the accounts
- and aligning service level agreements with operational capabilities

Alignment Evaluation

A moderate incompatibility between two strategic themes was identified:

- *Committing to uncompromised supply chain integrity*
- *Having very efficient supply chain services in terms of cost and capital*

A somewhat detrimental relationship between an area of activity and a strategic theme was found:

- *Having very efficient supply chain services in terms of cost and capital*
- *Delivering fast, accurately, safely and reliably*

Some incompatibility among areas serving diverse types of customers was highlighted:

- *Addressing the direct-to-store and bulk needs of national accounts*
- *Helping independent retailers be more competitive*
- *Addressing the delivery and other special needs of workshops*

Looking at the average incompatibility scores in Matrix 3 (shown in Figure 55, page 177 of the thesis), four familiar areas of activity stand out as somewhat more troublesome than others (e.g. average higher than 10%):

- *Improving profitability through customer and product mix*
- *Addressing the direct-to-store and bulk needs of national accounts*
- *Addressing the delivery and other special needs of workshops*
- *Helping independent retailers be more competitive*

Poor support for two areas of activity was mentioned:

- *Collaborating with our suppliers lacks support because low priority is given to routine operations collaboration with manufacturers.*
- *Simplifying things in our interaction with the customer lacks support on account of an ordering interface that allows no backorders, and of customer service being centralized.*

Summarizing, in this Appendix – a companion to Chapter 6 – we provided real-life examples to illustrate the steps of our methodology to evaluate a supply chain strategy. In the next chapter we will propose a methodology to reformulate the supply chain strategy of a firm. We will also present the ideas behind this evaluation methodology, its theoretical foundation and the specific steps to apply it.

CHAPTER 7. A METHODOLOGY TO REFORMULATE THE SUPPLY CHAIN STRATEGY

As we mentioned in page 26, we found no satisfactory answer in the literature to the problem of how to reformulate a supply chain strategy. We decided to develop our own approach for reformulation[††]. The objective of reformulating a supply chain strategy is to enhance it to provide better support to the business strategy. When we set out to reformulate a supply chain strategy, we set out to produce a new, systematized statement that describes a supply chain strategy that is more valuable to the firm than what we currently have in place.

Foundations of our approach

Maintaining a consistent set of merit criteria

Consistent with the criteria we use to evaluate the merits of a supply chain strategy, our objective for the reformulation is to develop a new formulation for the supply chain strategy that is – ideally – superior to the status quo in alignment, coverage and sufficiency. More specifically:

- In terms of ***coverage***, we expect the new formulation to cover all the areas of interest that matter to the organization that we have identified so far at the time of the exercise.
- In terms of ***sufficiency***, we expect the new formulation to be superior to the status quo in satisfying the strategic imperative of the firm.
- In terms of ***alignment***, we expect the new formulation to address as many of the alignment problems we have identified so far, while creating as few new alignment problems as possible.

[††] To reformulate is "to formulate again," "in a different way." To formulate is to "put into a systematized statement or expression." To enhance is "to increase the worth or value of." Webster's Third New International Dictionary, Unabridged. Merriam-Webster, 2002.

A template in line with the literature

In page 22 we provided a definition of supply chain strategy as a "patterns of decisions" in areas relevant to the supply chain. This definition is informed by the literature, specifically by Narasimhan, Kim, & Tan (2008). Consistent with this definition, we devised a template upon which we can assemble a new formulation of a supply chain strategy. This 'formulation template,' shown in Figure 67, will be central to our approach to reformulate the supply chain strategy, used in conjunction with a few simple rules for alignment, sufficiency and coverage – discussed later in page 199.

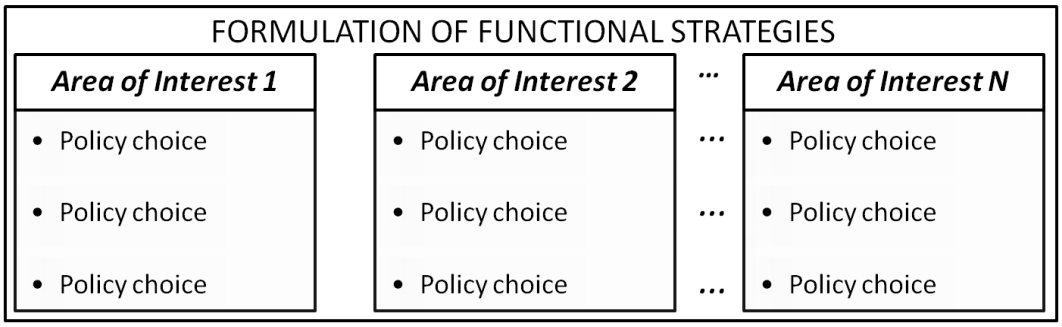


Figure 67: Formulation template, composed of areas and policy choices.

As can be seen in the template, a new formulation of the supply chain strategy is composed of a series of 'policy choices' in a number of different 'areas of interest.' The policy choices are strategic decisions the team makes, whereas the areas of interest are the different aspects of the business that the functions in question are addressing.

Notice that the template can be used to express either the current formulation or the new formulation. It is possible to express the *status quo* using the formulation template, e.g. to list the policy choices the firm has currently in place in the multiple areas of interest, based on the Functional Strategy Map.

Building upon principles from controlled convergence

To develop our approach to reformulation, we built again upon the principles of Pugh Controlled Converge, a time-tested methodology for conceptual design. As we mentioned in page 138, PuCC

operates by conducting iterations of comparisons of alternative concepts versus a reference concept, against a list of evaluation criteria. The idea is that this iterative process will help a team of experts to identify alternatives that are superior to the reference (see Figure 68).

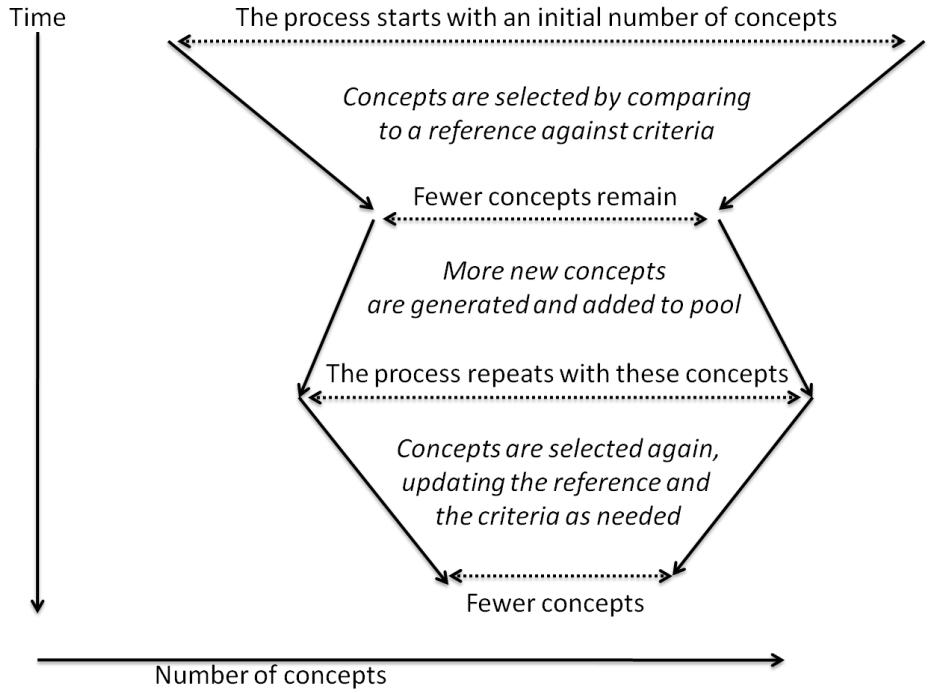


Figure 68: The main idea behind Pugh's controlled convergence (adapted from Frey, 2007)

To be able to apply these principles, we need to:

- Agree on a list of **evaluation criteria**, which in our case will be given by the strategic imperative of the firm, that is to say, the strategic objectives that the supply chain strategy is expected to support.
- Establish a **reference**, which in our case will be the most prominent policy choices the firm has in place in the different areas of interest, and against which all the new alternatives will be compared.
- Generate a pool of ***alternatives*** to the reference, which in our case will be policy choices other than the ones currently in place.
- Conduct several **iterations** in our effort to find superior alternatives to the status quo.

The traditional PuCC approach conducts all iterations as a group. 'Desk trials' conducted by the SC 2020 team as a test found that this approach was too slow for our application.

Round 1: Individuals	Round 2: Sub-groups	Rounds 3+: Group
Each individual is asked to propose new policy options in each area of interest, that they consider superior to what is currently in place.	Each subgroup is asked to assemble an alternative formulation of the functional strategies, which we call a 'Candidate'.	The group is asked to select a formulation that keeps the best of, and resolves the conflicts between, the Candidates.

Figure 69: Segmentation of the participants in the different iterations.

As an alternative, we tried conducting iterations at progressively increasing levels of aggregation: the first round individually, the second round at the level of subgroups, and the rounds from the third onwards as a single group (see Figure 69). Working at the individual level in the first round encourages each participant to provide inputs to the pool of alternatives, on his own rhythm and schedule. Working in subgroups in the second round, the better ideas can be retained and the participants become familiar with them, in preparation for the collective discussion that will take place in the third round.

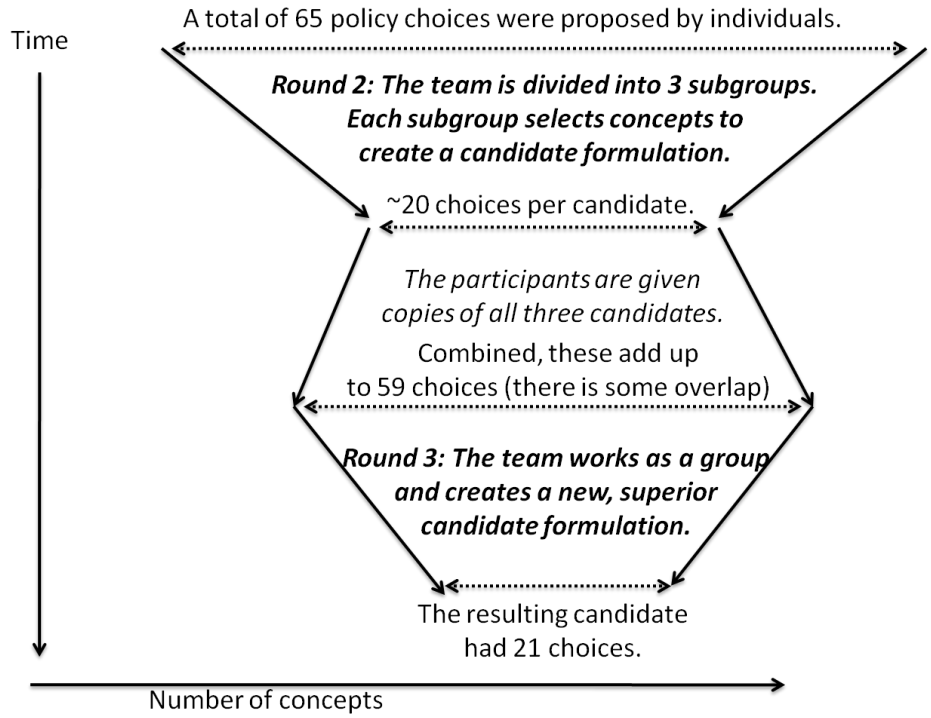


Figure 70: Applying the principles of controlled convergence in our project with Libica.

As we discuss later, this approach was tested successfully in two action research projects with firms. By counting the actual number of policy choices we had in each round in one of these projects, we can quantitatively show that convergence takes place, in a manner similar to that of PuCC (see Figure 70).

A mechanism for reformulation

Direction for assembly

Figure 69 makes reference to the task of 'assembling' a formulation. Assembly here means putting together the pieces of the formulation, namely, putting together the policy choices that as a whole will *be* the new formulation. This 'assembly' can be done in two directions: vertically or horizontally.

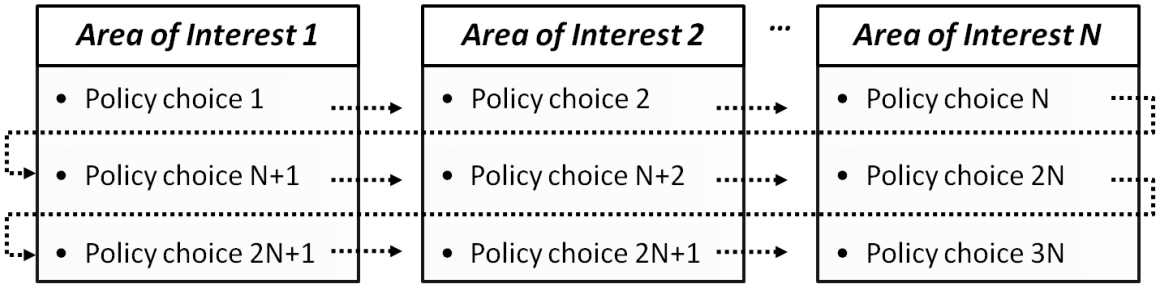


Figure 71: A graphical representation of 'horizontal assembly' of a formulation.

Horizontal assembly, represented in Figure 71, calls for making one policy decision per area at a time, and moving to the next area. This direction facilitates the resolution of conflicts that span across multiple areas of interest, because it prevents the group from making all the decisions relevant to a given area at once, at the expense of the other areas.

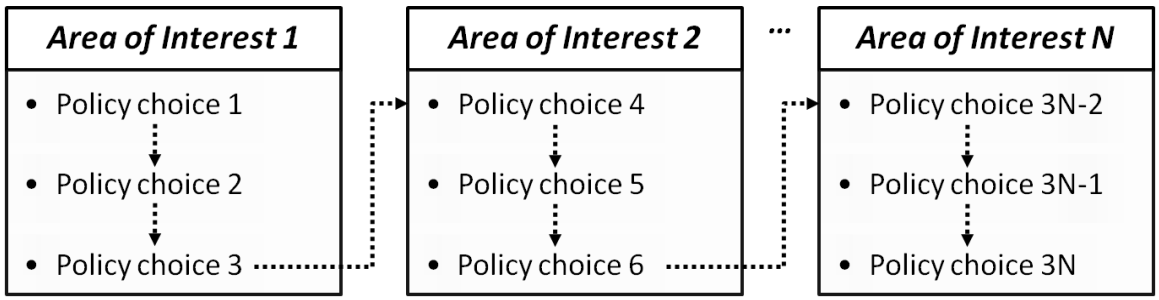


Figure 72: A graphical representation of 'vertical assembly' of a formulation.

Vertical assembly, represented in Figure 72, allows the group of experts to focus on one area at a time. It is faster than horizontal assembly, and thus it is the preferred option whenever the evaluation did not find strong conflicts across areas of interest, but rather conflicts inside each area of interest.

Reformulation rules

Either horizontally or vertically, the assembly is done following three 'reformulation rules,' whose purpose is to protect and promote alignment, coverage and sufficiency in the new formulation. These three rules are:

1. In the assembly process, all the areas of interest should be covered. In other words, no area of interest should be left empty with no policy choices in it. This promotes *coverage* by design.
2. Only policy choices that have been deemed superior to the *status quo* by the group of experts can be added to the formulation. This ensures by design that *sufficiency* will improve.
3. Before a policy choice can be added to the formulation, we must verify that it is compatible with every other policy choice we have added before. In other words, no incompatible policy choices can be added to the formulation. This promotes by design the *alignment* of the formulation.

Testing and refining through action research

The ideas for reformulation were tested and refined during our action research project with Unit-X and Libica. Due to reorganization efforts within Unit-X unrelated to our project, the 'reformulation' phase faced delays: the actual reformulation effort involved about 4 months of work, scattered over a full calendar year. Following the reformulation rules and working upon the formulation template, we produced, after three rounds or iterations, an alternative to their current supply chain strategy which reduced the conflicts we had previously identified.

In the case of Libica, the reformulation effort was much more efficient. Libica's Phase 3 begun with a rather clear idea of what we wanted to do, and did it without major obstacles, thanks to what we

learned during our project with Unit-X. The reformulation phase with Libica took only 1 month. Following the reformulation rules and working upon the formulation template, we produced after three rounds a potential replacement for the current supply chain strategy that addresses the conflicts we had identified in the previous phase, designed to be superior to the *status quo* in coverage, alignment and sufficiency.

Steps of Phase 3: the 'reformulation' methodology

The methodology we propose for reformulating the supply chain strategy of a firm is referred to as Phase 3. It encompasses seven steps, which can be broadly outlined as follows: In Step 1 we agree on the strategic imperative that the supply chain strategy is expected to serve. In Steps 2 and 3 we prepare a prioritized list of areas of interest that we will address during the reformulation. In Step 4 we make explicit what the firm has in place in each one of these areas. Steps 5, 6 and 7 are a series of iterations, conducted at increasing levels of aggregation (first individuals, then subgroups, and finally the whole group) generate alternatives to what the firm has in place and assemble these alternatives in a coherent 'candidate' that can replace the current supply chain strategy. The following is a list of the seven steps:

- Step 1: Agree with the team on the strategic imperative
- Step 2: Prepare a list of areas of interest
- Step 3: Prioritize the areas of interest
- Step 4: Summarize the starting point for each area of interest
- Step 5: Ask individuals for alternatives to *status quo*
- Step 6: Ask subgroups to assemble a 'candidate'
- Step 7: Ask the group to assemble a superior 'candidate'

The rest of this chapter will present each one of these steps in full detail. Since read on their own the steps may come across as a bit abstract, the reader is encouraged to refer to the Appendix of this chapter, which illustrates these steps using examples from our project with Libica. The reader may notice that the steps for reformulation are less in number and that they build heavily upon what we did

in the first two phases. This is because, in a manner of speaking, Phases 1 and 2 were paving the way for Phase 3.

Step 1: Agree with the team on the strategic imperative

The first step is to agree with the firm's team on what is the 'strategic imperative', e.g. the marching orders that the supply chain strategy is expected to serve and help fulfill.

Verify the nominal strategy remains the strategic objective

Previously, in Step 8 of Phase 1, we identified and stated explicitly the nominal strategy of the firm. Since we identified this in Phase 1 as the group of objectives that the firm is trying to achieve, and later used them in Phase 2 as our evaluation criteria, we recommend using them in Phase 3 as the strategic imperative, unless there is a specific and convincing reason to select something else.

The facilitator should present the firm's team with the nominal strategy identified in Step 8 of Phase 1 and ask them whether this remains the set of strategic objectives that the supply chain strategy is expected to support (the 'strategic imperative').

If they agree it is, then we move on. If, on the other hand, they make a convincing argument for using something else as the strategic imperative, then the facilitator will help them articulate this in the form of a list of strategic objectives in the form of imperative statements. As a rule of thumb that has worked well for us, we recommend keeping this list to five plus-minus two items.

Step 2: Prepare a list of areas of interest

This step is conducted by means of three tasks, described below.

Task 1: Identify areas of interest from the Functional Strategy Map

During Phase 1 we prepared a Functional Strategy Map. This map contains a series of functional themes, each one of which, in turn, has operational themes under it. If we ask, for each one of these

functional themes, “what is this functional theme about?,” resorting when needed to the operational themes for further clarification, we can identify the different areas of interest that are being addressed by the map. As the first task in the current step, we want to create a list of all these different areas of interest. This is better illustrated by the example, provided in the companion Appendix.

Task 2: Add the areas found missing in the coverage evaluation

In Phase 2, we identified shortcomings in coverage (Step 9), which were later validated with the group (Step 10). Building upon that knowledge, we will add to the list of areas of interest any areas of interest that were found to be missing from the map and that are of interest to the firm.

Task 3: Merge similar areas into new areas of interest

Some of the areas of interest that we have identified from the map and from the coverage evaluation are closely related. Now we want to identify which of the areas belong together. We want to find out which of these areas – in the judgment of the firm’s team – are so interrelated that they cannot be discussed separately. Task 3 consists of asking the firm’s team to go through the list of areas of interest, and to group those that are closely interrelated under a single area of interest that will be given a new name.

Step 3: Prioritize the areas of interest

Take the revised list, with all the new areas. We want to sort the items in this list according to their priority. ‘Priority’ here is assigned by the firm’s team, based on:

- Relationships of precedence and dependency that exist among the items. For example:
    - Ask the group to discuss what area from the list is the most has precedence upon the others, in the sense that – once decided – it will have the most impact on the other areas. This is the area we want at the top, or near the top, of the prioritized list.
    - Ask the group to discuss what area from the list depends on other. If discussing Area Y

makes sense only after discussing Area X, then X has priority over Y.

- Their contribution towards achieving the strategic imperative.
    - Ask the group which area has the largest impact towards supporting and enabling the strategic objectives of the firm. The larger the impact, the higher the priority.

Step 4: Summarize the starting point for each area of interest

Now we prepare a summary of what the firm has currently in place for each one of the areas of interest that came out of Step 2. This summary of the *status* quo for each area will serve as a starting point and as reference for the remaining steps of this phase.

The summary is easy to prepare by resorting to the Functional Strategy Map that we created in Phase 1. We know, from Task 2 of Step 2, exactly what functional themes belong into which areas of interest. Thus, by summarizing the ideas for these functional themes we can prepare a summary for each area of interest. This is better illustrated by the example provided in the Appendix to this chapter.

Step 5: Ask individuals for alternatives to *status quo*

We now proceed to ask each individual from the firm's team to propose alternatives to the *status quo* in each area of interest. We do this by preparing a questionnaire, to be completed individually by each member of the team. This questionnaire presents the individual with the summarized starting point for each area, and asks the individual to propose alternatives for that area. We also ask them to comment on whether they agree with summary of the *status quo* for that area. All the answers collected from individuals are then listed in a document, including comments and suggestions for each area.

Step 6: Ask subgroups to assemble a 'candidate'

Selecting a direction for assembly of the candidates

As we discussed in page 198, there is more than one way to assemble the candidate. Before we

move forward, we have to select in which direction we will assemble the candidates: *horizontally* (as in Figure 71, page 198) or *vertically* (as in Figure 72, page 198). Since horizontal assembly is more time-consuming – yet is better to ensure the cross-area consistency of the candidate – we recommend using the following rule of thumb for selecting the direction of assembly:

- If during Phase 2 ('evaluation') it was found that there are important alignment conflicts that spread across the areas of interest, then a 'horizontal assembly' is recommended.
- Elsewhere, for the sake of simplicity, a 'vertical assembly' is recommended.

Dividing the team into subgroups

Having collected a pool of alternatives at the individual level, we now move to working at the level of subgroups. For this step, we will divide the firm's team into several subgroups, with the purpose of assembling with each subgroup an alternative formulation of the supply chain strategy, or 'candidate' (as discussed in Figure 69). Since we want to generate at least two different candidates, we need at least two subgroups. Depending on the size of the team, we may have more than two; nevertheless, having more than four subgroups (resulting in more than four candidates) may make Step 7 more difficult.

A word about the composition of the subgroups: to the extent possible, the composition of the subgroups should resemble that of the whole team, in terms of hierarchy and function.

- For example, we should avoid placing all the senior members in one subgroup and all the junior members in another; it is preferable to have in each subgroup both junior and senior members.
- Likewise, we should avoid grouping all the available members from a given function in a single subgroup. Placing all the operations members in one subgroup and all the sales members in another subgroup would deprive the subgroup of the richness that comes from multiple perspectives; instead, it is preferable to have in each subgroup a good a mix of the functions.

Session to assemble the candidates

For each one of the subgroups, we will schedule a session to assemble a 'candidate', e.g. to prepare a new formulation of the supply chain strategy. In our experience a timeslot of 1 ½ to 2 hours is enough.

Pre-session reading material. Before the session, the members of the subgroup will be sent some reading material. This material includes:

a) the report on the 'evaluation' phase
b) the strategic imperative we agreed upon (from Step 1),
c) the prioritized list of areas of interest (produced in Step 3),
d) the starting point for each area of interest (from Step 4), along with the comments individuals made about this summary (collected in the survey of Step 5), and
e) the list of alternatives to the *status quo* provided by the individuals for each area of interest (collected in the survey of Step 5). Notice this list is not limited to individuals in that subgroup: it includes alternatives proposed by all the members of the larger team.

Conducting the session. The session can be conducted physically or remotely through an online meeting software. A proposed agenda for the meeting is as follows:

1) The session opens with a warm-up introduction, during which we state to the participants the objective of the session: to produce an alternative formulation of the supply chain strategy that is, in the opinion of the sub-group, superior to the *status quo*.
2) Then we go over the pre-session reading material with the participants, and instruct them to:
   - consider the strategic imperatives as the objective that should be supported by the 'candidate' they will assemble during the session,
   - keep in mind the conflicts and issues identified during the evaluation, so that we can produce a 'candidate' that is free of these problems to the extent possible,
   - use the summary of the *status quo* as both the 'starting point' and the reference to compare the

candidate they will assemble, and

- keep at hand the list of alternatives proposed by the individuals, and resort to it as needed, as a source for policy choices while assembling the candidates.

3) We then move to assembling the candidate. The steps for assembling the candidate differ somewhat depending on whether we will follow a vertical or a horizontal assembly direction, and are described below.

A vertical assembly, depicted in Figure 72 (page 198), starts by asking the subgroup to agree on a series of policy choices for Area of Interest 1. These choices can come either from the pool of alternatives for this area prepared in Step 5, or from new ideas generated during the discussion. Following the three rules for the assembly of candidates (from section "*Reformulation rules*"), only policy choices that are assessed by the group as superior (or at least equal) to the reference, e.g. the *status quo*, should be considered for inclusion. Likewise, the policy choices should be compatible among themselves, e.g. a new policy choice cannot be added to the area of interest if – in the opinion of the subgroup – it would generate a conflict with the policy choices that have already been made in that area at that point of the discussion.

A horizontal assembly, on the other hand, follows a different pattern. As depicted in Figure 71 (page 198), the subgroup is asked to agree only on one policy choice for each area of interest, and then move to the next area. Since at the time only one policy choice is being picked per area of interest, the group is advised to pick the one they consider most important for that area of interest, in terms of supporting the strategic imperative and against the reference of the *status quo*. These choices, as before, can come either from the pool of alternatives for this area prepared in Step 5 or from new ideas generated during the discussion. Following the rules specified in page 199, the only policy choices that are considered for inclusion are those that the subgroup assesses as: (a) superior or at least equal to the reference, *and* (b) compatible with the policy choices that have already been made. Once all the areas of interest have

been covered with at least one policy choice in this first pass, the process is repeated in a second pass, and then in a third pass (as shown in Figure 71), until the group is satisfied with the resulting candidate.

Step 7: Ask the group to assemble a superior 'candidate'

As we mentioned in page 197 (Figure 69), several iterations are conducted to help the group converge upon a superior candidate. The purpose of Step 5 was to conduct the first iteration (called 'Round 1' in Figure 69). The purpose of Step 6 was to conduct the second iteration ('Round 2'). The purpose of Step 7 is to conduct the third iteration ('Round 3'), and any other subsequent iteration that may be necessary. Step 7 is conducted at the level of the whole group. In terms of the mechanics, Step 7 is very similar to the previous one, with a few notable differences:

- We recommend conducting the session physically, e.g. gathering the team in a room.
- The pre-session reading material will consist of the strategic imperative and the different 'candidates' that were prepared by all sub-groups in Step 6.
- The main source of alternatives for the policy choices will now be the 'candidates' from Step 6.

Besides these three differences, the mechanics remains the same: following the chosen direction of assembly (e.g. vertical, horizontal), a series policy choices are made in different areas of interest. As before, to be eligible for consideration, policy choices should be superior to the *status quo* in terms of supporting the strategic imperative and should be compatible with all previously selected policy choices.

Multiple iterations may be necessary, depending on how fast the group 'converges' on a superior candidate. If after completing a single iteration the group reaches a satisfactory candidate, there is no need to continue. If on the other hand the candidate falls short of the group's expectations, further iterations should be conducted. Further information may have to be collected between iterations. As in Pugh's controlled convergence, the group should continue to refine its policy choices and to clarify its strategic imperative until convergence is achieved, that is to say, until the group finds a reformulation for its supply chain strategy that supports, to their satisfaction, the strategic imperative that was set for

them.

Summarizing, in this chapter we presented the methodology we propose to reformulate the supply chain strategy of a firm, building upon the principles of controlled convergence, yet following an assembly template and a set of rules tailored to the problem of supply chain strategy. We discussed the ideas behind this proposed methodology and its ties to the theory, and detailed the steps that should be followed to apply it. What follows next is a companion Appendix that will provide real-life examples to the steps of the 'reformulation' methodology.

APPENDIX TO CHAPTER 7. EXAMPLES OF THE REFORMULATION PROCESS

Chapter 7 presented the seven steps of our methodology to reformulate a supply chain strategy. The purpose of this companion Appendix is to illustrate these steps with real examples of the reformulation process. Examples are taken, mostly, from our action research projects with Libica. All sensitive information has been duly disguised to protect the confidentiality of these firms. Again, in this Appendix, 'we', 'us', etc. refers to the facilitator of the process, except where noted otherwise.

Example for Step 1: Agree with the team on the strategic imperative

This is illustrated with an example from our project with Libica. Figure 23 (page 133) shows the mapped nominal strategy of Libica, that we prepared during Phase 1 based on strategic documents provided to us by Libica. At the launch of Phase 3 we presented this nominal strategy map to Libica's team, which was gathered in a room. They were asked whether these remained the strategic objectives that the supply chain strategy was supposed to serve and fulfill, or whether something had to be changed, added or removed from it. The leader of the team, who was among the most senior executives in the room and who was the sponsor of the project, stated that in his opinion these objectives should remain the strategic imperative for Phase 3. The team agreed. As a reminder for the reader, these objectives are listed in Table 26.

- Make our customer's business less complex and more cost effective
  - Deliver exceptional customer service
  - Develop air-tight supply-chain integrity
  - Operate with a lean supply chain network
  - Compete through vision and know-how
  - Develop our employees to their full potential

Table 26: The strategic imperative for Libica's Phase 3.

Example for Step 2: Prepare a list of areas of interest for Phase 3

Task 1: Identify areas of interest from the Functional Strategy Map

In the case of Libica, the first two functional themes from the top down in the strategy map (shown in page 134), seem to be addressing the area of **competency**: "*What do we do well? What is our focus?"* are the questions these functional themes seem to answer. The third functional theme in Libica's map seems to be addressing the area of **outbound logistics**: "*How do we deliver?"* The fourth functional theme seems to be addressing the area of **internal logistics**: *"How do we operate our facilities?"* The fifth functional theme seems to be addressing the area of **profitability**: *"How do we make our profit?"* Working our way down, we can create a list of the areas of interest addressed by the Functional Strategy Map. The list we created for Libica is shown in Table 27.

- Competency: *What do we do well? What is our focus?*
- Outbound logistics: *How do we deliver?*
- Internal logistics: *How do we operate our facilities?*
- Profitability: *How do we make our profit?*
- National Accounts: *What do we do for national accounts?*
- Workshops: *What do we do for workshops?*
- Independents: *What do we do for independents?*
- Customer interaction: *How do we interact with the customer?*
- Collaboration with suppliers: *What kind, if any, do we have?*
- Collaboration with customers: *What kind, if any, do we have?*
- Management: *How do we manage our organization?*
- Workforce: *How do we interact with our workforce?*

Table 27: Areas of interest identified from the Functional Strategy Map.

Task 2: Add the areas found missing in the coverage evaluation

From notes taken during Step 10 of Phase 2, we have that participants pointed out the absence of an area for "*interaction with suppliers,*" for "*serving other customers*" (e.g. other than national accounts, workshops and independents) and for "*inbound logistics*". So we add these areas (shown in Table 28) to the list we are preparing.

- Interaction with suppliers: *How do we interact with suppliers?*
- Inbound logistics: *How do we move goods towards our facilities?*
- Other customers: *What do we do for other customers?*

Table 28: New areas of interest that we will add to the list

Task 3: Merge similar areas into new areas of interest

In the case of Libica, the grouped judged that discussion of competency and profitability belong together, since the focus of their effort is so closely related to how they make their profit that it makes no sense to separate them into two areas for the reformulation discussion. Likewise, they decided to group the three logistics-related areas into one new area called 'logistics,' the four customer service areas into a new area called 'serving the customer', etc. The five new areas that resulted from this grouping are shown in Table 29. They are listed in no particular order.

- **New area: Profitability and competency**
  - Competency
  - Profitability
- **New area: Logistics**
  - Outbound logistics
  - Internal logistics
  - *Inbound logistics*
- **New area: Serving the customer**
  - National Accounts
  - Independent retailers
  - Workshops
  - *Other customers*
- **New area: Interaction and collaboration**
  - Interaction with customers
  - Collaboration with suppliers
  - Collaboration with customers
  - *Interaction with suppliers*
- **New area: Managing the organization**
  - Management
  - Workforce

Table 29: The new areas of interest after the grouping of Task 3

Example for Step 3: Prioritize the areas of interest

This can be show more clearly with an example. In the case of Libica, we asked the team to sort the

five areas of interest by importance. They quickly agreed that how they compete and make a profit was the area that had precedence upon all the others, since it would dictate the relative importance that all other areas would have. They decided that serving the customers came a close second, followed by how the organization should be managed. The extent to which they collaborate and how they interact with other supply chain parties would follow from the previous three, and only then decisions about logistics could be made. The resulting prioritization of the areas of interest is shown in Table 30.

• **Area 1: Competency and Profitability**
• **Area 2: Serving the customer**
• **Area 3: Managing the organization**
• **Area 4: Interaction and collaboration**
• **Area 5: Logistics**

Table 30: Prioritizing the items in the list of areas of interest

Example for Step 4: Summarize the starting point for each area of interest

Here is an example from Libica. We start with Area 1. Table 30 reminds us the area that Libica's team ranked first is that of *Competency and profitability*. Table 29 reminds us that this new area of interest was created by combining two of the original areas we identified in the Functional Strategy Map: competency and profitability. As we discussed in page 201, competency is discussed functional themes 1 and 2, and profitability is discussed in functional theme 5. Libica's Functional Strategy Map (shown in Figure 24, page 134) provides us the substance of these functional themes and their respective operational themes, which are as follows:

- *FT1: Focus our efforts in efficient distribution*
    - *OT1: Make our profit through distribution*
    - *OT2: Reduce waste of money and time in our distribution*
- *FT2: Move towards value-added services*
    - *OT3: Look for ways to make added-value services a core competency*
- *FT5: Improve profitability through customer and product mix*
    - *OT10: Add profitable customers to our customer base*
    - *OT11: Increase profitable sales through existing customer*s

Starting point for Area 1: Competency and profitability
Libica makes its profit through distribution. As part of its focus on efficiency, Libica tries to eliminate or reduce waste in distribution. Libica tries to improve profitability through better customer and product mix: adding profitable customers and increasing profitable sales through existing customers. Libica wants to find ways to make added-value services one of its core competencies and a source of profit.
Starting point for Area 2: Serving the customers
Libica serves customers with very different needs using the same supply chain, services and pricing approach for all (what has been called a 'one size fits all' approach). Libica serves both the direct-to-store and the bulk needs of national accounts. Libica also tries to address the special delivery and safety needs of workshops. Libica helps independent retailers be more competitive and profitable, and offers them value added services.
Starting point for Area 3: Managing the organization
Libica as an organization is managed through clear and well communicated objectives. A high-level road map is developed and followed. Those in a leadership position are developed to be metric-driven and open to communication and change. Managers are encouraged to work cross-functionally to satisfy the customer's needs. Libica seeks educate and empower its workforce, and to develop its capabilities.
Starting point for Area 4: Interaction and collaboration
When interacting with the customers, Libica seems to operate in a way that simplifies things for itself, even if it represents more complexity for the customer. Libica has managed to establish better collaboration with some customers, while it still lacks collaboration with very large and important customers like ACME. So far Libica has given a low priority to routine operations collaboration with manufacturers. Libica collaborates with key suppliers, but not in all the relevant areas.
Starting point for Area 5: Logistics
Libica delivers next-day, within a delivery time window. Libica delivers reliably, even in the face of disruptions. Libica operates in a safe and environmentally responsible manner. Libica deliver accurately, within committed volumes. The physical delivery of the goods to the facilities is done by a third party, not by a Libica employee. When it comes to its warehouse operation, today Libica operates using lean principles, using optimal inventory levels and operating its warehouses efficiently.

Table 31: Summary of starting points for Libica's areas of interest

These we can summarize as follow: "*Libica makes its profit through distribution. As part of its focus*

*on efficiency, Libica tries to eliminate or reduce waste in distribution. Libica tries to improve profitability through better customer and product mix: adding profitable customers and increasing profitable sales through existing customers. Libica wants to find ways to make added-value services one of its core competencies and a source of profit."*This summary serves as our starting point for Area 1. We repeat this process for the remaining four areas. The resulting summaries are shown in Table 31.

Example for Step 5: Ask individuals for alternatives to *status quo*

Figure 73 shows a part of the questionnaire sent to Libica's team members, dealing with Area 1.

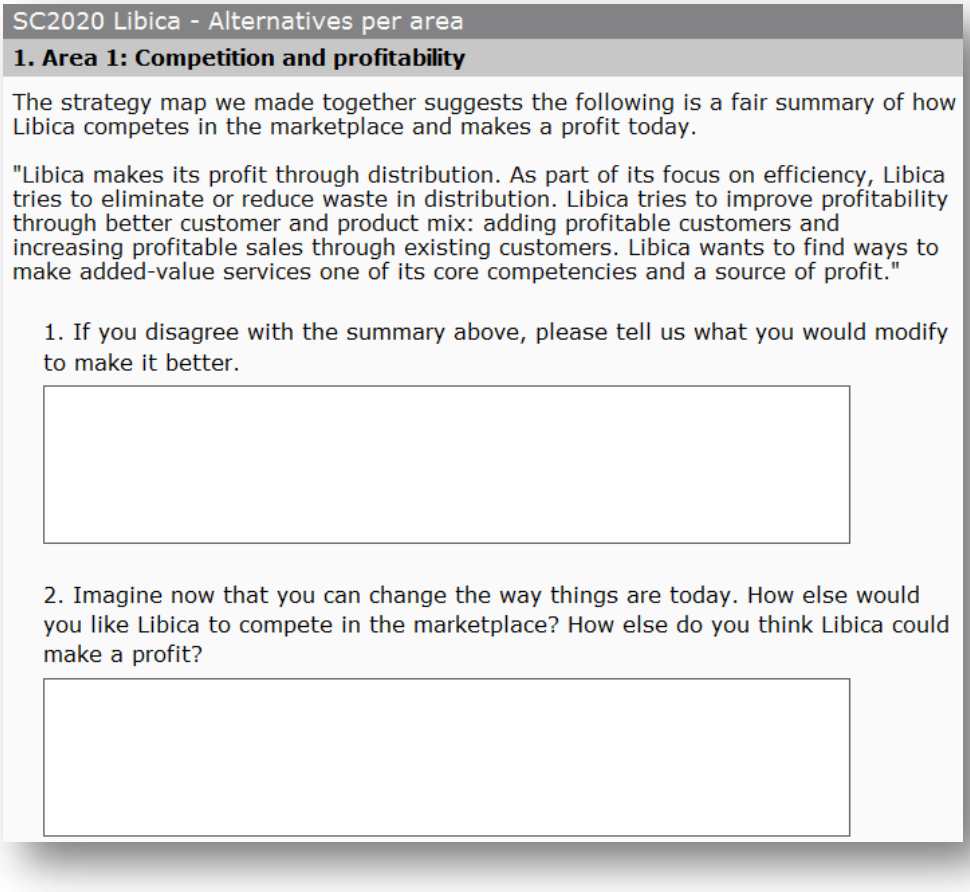


Figure 73: Questions for Area 1 sent to Libica team members during Step 4, Phase 3.

In the case of Libica, 18 out of 25 individuals answered the questionnaire.

For illustration, here are two answers we received to the first question. One respondent said: *"We*

certainly want better customers, more profitable customers, but I'm not sure we have a game plan that's working or a vision that's crystal clear to everyone." Another individual said: *"I agree with the provided statement except the last sentence. I am not sure that we are actively working to develop value-added services."* All these comments on the *status quo* summary are collected in a document and presented to the group. Notice that respondents cannot be linked to their answers.

Likewise, for illustration purposes, here are three answers we received to the second question. One respondent said: *"Assisting customers with management of their supply chains."* Another respondent said: *"I would disconnect price to the individual products, and charge customers fees based upon services."* Another respondent said: *"We need to truly understand what our customers value and are willing to compensate us for in the future. We also need to develop supply chain partnerships with our key customers to drive efficiency from the supplier to the end point."*

Excluding comments, a total of 65 alternatives to the *status quo* were provided by respondents as response to the questionnaire.

Example for Step 6: Ask subgroups to assemble a 'candidate'

Examples of selecting a direction for assembly

- Since for Unit-X we found cross-area conflicts (involving cost, service, manufacture and inventory), we decided to use a 'horizontal assembly'.
- For Libica, however, since we found mostly inter-area conflicts (involving service levels to different customers), we decided to use a 'vertical assembly'.

Example of dividing the team into subgroups

As an example, in the case of Unit-X, we had two subgroups with around 4 participants each. For Libica we had three subgroups with around eight participants each.

In our projects we used GoToMeeting, a software for conducting meetings over the Internet, since

the participants were spread across several states (in Libica's case) and even several continents (in Unit-X's). We conducted physical sessions during our supply chain strategy class at MIT in Fall 2009.

Example of Vertical Assembly

An example of a vertical assembly is provided by Libica. During the candidate generation session, Libica's Subgroup B started by discussing Area of Interest 1: "*Competency and profitability.*" They decided to make four policy choices in this area:

- To pursuit profit through both distribution and value added services and differentiation.
- To offer weekend delivery and secondary accounts at a profitable, extra-fee price and let customers self-select.
- To compensate sales personnel on profitability, not on sales.
- And to explore new markets in areas that look promising for development.

The subgroup then moved to discuss Area of Interest 2: "Serving the customers," where they made three policy choices. The subgroup then proceeded to discuss Area of Interest 3, and so on until all the areas of interest had been covered. The resulting 'candidate' assembled by Libica's subgroup B is given in Table 32. Another example, the 'candidate' prepared by Libica's subgroup C, is shown in Table 33.

Example of Horizontal Assembly

An example of a horizontal assembly is provided by Unit-X, whose Subgroup B started by making a policy choice for Area 1, "*Competitive advantage*": they decided that *"to offer consistent high-quality products"* would have the most impact on the strategic imperative. The subgroup moved then to Area 2, *"Customer service,"* and made one policy choice for that area: *"to segment customers and products into different service level categories."* The subgroup moved to each subsequent areas, making one policy choice per area, until all the areas of interest had been covered in this first pass. Then they ran a second and a third pass, adding policy choices as they saw fit. The resulting 'candidate' is shown in Table 34.

Area 1: Competency and profitability
• *Pursuit profit both through distribution and through more value added services and differentiation.* • *Offer weekend delivery and secondary accounts at a profitable, extra-fee price and let customers self-select.* • *Compensate sales personnel on profitability, not on sales.* • *Explore new markets in areas that look promising for development.*
Area 2: Serving the customers
• *Distinguish our pricing and costing models to have greater flexibility and depth to cost out our services based upon activity.* • *Determine if service segmentation is a viable option. Explore having a separate service level and supply chain capabilities for bulk customers.* • *Better understand what the customer wants, what they value, what they're struggling with, what's going to help them. Have the capability, through consulting, of looking at the customer and help them run the business better.*
Area 3: Managing the organization
Besides what is already in place (status quo), add the following: • *Align the compensation of the sales personnel with the overall profitability of an account compared to the expectation, considering portfolio.* • *Develop the capability to assess the profitability of an account.* • *The profitability expectations would vary depending on the segmentation and size of account.*
Area 4: Interaction and collaboration
• *To the extent possible, try to engage key large accounts more strategically.* • *Make communication at the operational level, between Libica and suppliers, more consistent.* • *Make sure the scorecard that Libica provides its suppliers reflects all the key issues from a supply chain perspective.* • *Get the right people talking to each other, and to the extent possible, share the data that could impact operations: (a) Between suppliers and Libica at the operational level, (b) On what we are planning to buy, (c) On what variations they have forecast and what disruptions they anticipate.*
Area 5: Logistics
• *Improve pick technology to allow Quality Control at the pick.* • *Improve NLC order to DC flow so that items are not handled twice and are pre-slotted to warehouse shelves.* • *Finalize Slow-move Logistics Center to allow for better product mix and density to drive customer satisfaction.* • *Improve order system to allow for better customer visibility to product availability and substitution hierarchy.* • *Allow customer segmentation based on profitability to determine the schedule of delivery.* • *Have a separate supply chain to serve the needs of bulk customers.* • *Explore the possibility of charging a premium for supplying low demand items or specialty items.*

Table 32: Candidate assembled by Libica's subgroup B

Area 1: Competency and profitability
• *Work with customers to help them manage their supply chain.* • *Do a better job selling the programs we have to help customers manage their business.* • *Add a menu of services, attached to cost. Have the three part offering, one with no-frills, one with middle-ground, and one with full options and best service. Charge accordingly.* • *Offer more manufacture services to more and larger suppliers. Like 3PL services, and managing accounts payable, packaging, etc. Extend to other customers.*
Area 2: Serving the customers
• *Serve customers with very different needs using the different services and pricing options for each.* • *Have the three part offering, one with no-frills, one with middle-ground, and one with full options and best service. Charge accordingly.* • *Let customers choose from the menu. Do not segment the customers. Let them segment themselves.* • *For the large accounts, where negotiation takes place corporately, they are basically tailoring their own option.* • *The customer should not be limited in what services they get by internal segmentation. Do not determine the services by segment. Remove the limitations caused by segments. Have either a more flexible way to segment customers or remove the limitations caused by segments.* • *Have different levels of priority in allowing customers to order inventory. Committed customers get first pick.*
Area 3: Managing the organization
• *Beware of metrics. There needs to be a more scientific way to set the metrics.* • *Use the right metrics in the rights areas.* • *Know when a metric is good enough and you can move on.* • *Make sure all parts of the organization are using the right metrics for their parts of the organization and they are held accountable to them.* • *Sales seems to be driven to just hit a sales number. Sales should pursue profitable revenue, not just volume. Strengthen incentives to get the right kind of volume, not just volume. The structure of the incentives will be modified.*
Area 4: Interaction and collaboration
• *When a customer is interacting with Libica, things should be as simple as they can be for the customer.* • *Be able to hold vendors accountable for the service that they commit to. Vendor management.* • *Continue to collect feedback about customers from the courier drivers.* • *Try to offer different types of collaboration that may attract the attention of the large customers that are currently not that engaged.*
Area 5: Logistics
• *Use the same facilities for all service options.* • *Figure out a way to do the different service level deliveries using the same facilities.*

Table 33: Candidate assembled by Libica's subgroup C

Area 1: Competitive advantage
• Offer consistent high-quality products. • Pursue leadership in quality and knowledge. • Offer long term, mutually profitable relationships.
Area 2: Customer service
• Segment customers and products into different service level categories. • Deliver >95% of orders on promised date. • Offer customers more visibility into the ordering process.
Area 3: Inventory management
• Have a multiple-tier inventory policy. • Keep stable inventory levels for all items. • Strive to minimize the level of working capital.
Area 4: Delivery logistics
• Develop a fast response supply chain. • Optimize the number of local warehouses. • Collaborate with customers on delivery logistics. • Ensure the integrity of the product during transit.
Area 5: Manufacturing
• Manufacture in flexible facilities. • Match the manufacturing capability to the local product mix.
Area 6: Demand planning
• Improve our internal forecasting ability. • Engage major customers in a 2-way forecasting discussion at the SKU level. • Reduce need for demand planning wherever possible.
Area 7: Organizational structure
• Have a matrix supply chain organization: part at corporate level, part at business level.
Area 8: Innovation
• Focus on market-driven innovation, in both existing and new markets. • Give innovation the preeminence of a core competency.
Area 9: Procurement
• Improve our collaboration with key suppliers at a strategic level. • Secure the lowest cost of raw materials in the long term. • Procure strategic raw materials at the corporate level.
Area 10: Alliances / partnerships
• Establish strategic partnerships with key customers and suppliers.

Table 34: Candidate assembled by Unit-X's subgroup B

Example for Step 7: Ask the group to assemble a superior 'candidate'

The output of Step 7, the final candidate assembled by Libica's group, is given in Table 35.

Competency and profitability

• *We compete by being a supply chain solutions provider. We change the game: move away from price, and into value and solutions. For this, we:*
  ○ *Work with customers to improve and manage their supply chain.*
  ○ *Master the art of minimizing and dealing with complexity: we will learn how to exploit latent capabilities to work with complexity.*
  ○ *Develop a real time understand of what is going on in the business.*
• *We make our profit by helping our customers to become profitable, and then sharing into this profit that we have created for them. For this, we:*
  ○ *Develop the ability to better understand which customers are not profitable.*
  ○ *Develop expertise in assessing the value, selling and pricing the solutions in a way that reflects the value they generate to our customers.*
• *We explore new markets in areas that look promising for development, such as:*
  ○ *Offering more services to manufacturers and other customers.*

Serving the customers

• *Offer several service-level categories, with different service options attached to cost. Allow customers to choose the category/options they want, and suggest to them what category we think would better serve them.*
  ○ *We can have, for example, three categories:*
  ▪ *A cost-oriented category with no-frills,*
  ▪ *A best-service category with at a premium price, and*
  ▪ *An intermediate service category at intermediate price.*
  ○ *We can also make weekend delivery an option customers can buy into, and accept secondary accounts at a profitable, extra fee.*
  ○ *We can also guarantee that customers who buy into committed volume get first pick.*
• *For the value-oriented customers, we work to better understand what the customer wants, what they value, what they're struggling with, what's going to help them. Develop the capability, through consulting, of looking at the customer and help them run the business better.*
• *For large customers, offer tailored supply chain solutions, and charge accordingly. Since negotiation take place at the corporate level, customers basically tailor their own option. We have to distinguish our pricing and costing models, so that we can have greater flexibility in our offerings. This requires an informed way to cost out our services, based upon activity.*

Managing the organization

In addition to the goals being pursued today, do the following:

- *We have to learn how to use metrics wisely.*
    - *Metrics used around the organization should be aligned with each other and with the overall objectives.*
    - *We should use a more scientific, systems-wide way to set the metrics, and develop an understanding of the impact of each metric, how getting them right or wrong affects us.*
    - *We should avoid metrics for the sake of metrics, and know when a metric is good enough so that we can move on.*
    - *We have to make sure all parts that impact the supply chain are using the right metrics for their parts of the organization and that they be held accountable to the metrics.*
- *The compensation of personnel whose decisions and actions impact the supply chain should be aligned, at least in part, with the overall profitability.*
    - *Particularly, Sales should develop the capability to assess the profitability of an account, and their incentives should be structured to pursue profitable revenue, not just volume.*

Interaction and collaboration

- ***Interaction with the customer:***
    - *Simplify things for the customer in all their interactions with us.*
    - *Incentivize customers to have better supply chain practices. Explore the root causes of inefficient supply chain practices on the part of the customers, and stop enabling them.*
    - *Be open to one-off interactions with primary customers on a select set of SKUs, with once a week delivery and high margins.*
- ***Collaboration with the customer:***
    - *Collaborate with customers according to their service category and supply chain competency.*
    - *Help promising customers to become knowledgeable in supply chain, for a fee.*
    - *To the extent possible, engage key large accounts more strategically. Offer different types of collaboration to attract large customers that are currently not strategically engaged.*
- ***Interacting and collaborating with suppliers:***
    - *Keep consistent communication with suppliers at the operational level: get the right people talking to each other. Exchange with our suppliers data that could impact operations, including leading indicators. The scorecard we provide suppliers should reflect all key supply-chain issues.*
    - *Hold vendors accountable for the services they commit to ("vendor management").*
    - *Change the nature of our interaction with suppliers, from transactional to strategic on supply chain matters.*

Logistics

In addition to what we do today, do the following:

- *Invest in capabilities to deliver. For this, we:*
  - *Improve our pick technology to allow Quality Control at the pick.*
  - *Improve order system to allow for better customer visibility to product availability and substitution hierarchy.*
  - *Explore the value and feasibility of pre-slotting products at the National Logistics Center, so that they are ready when they arrive at the Forward Distribution Center warehouse shelves.*
  - *Improve our own visibility of the product availability and expected delivery times.*
- *Find a way to deliver multiple service levels out of the same locations. For this, we:*
  - *Determine the schedule of delivery based on the segmentation, category or plan of given customer.*
  - *Explore the possibility of charging a premium for supplying low demand items or specialty items.*

Table 35: Enhanced version of Libica's supply chain strategy

In both our projects, Unit-X and Libica, only one iteration was necessary in Step 7.

Summarizing, in this Appendix – a companion to Chapter 7 – we provided real-life examples to illustrate the steps of our methodology to reformulate a supply chain strategy. In the next chapter we will assesses the merits of the proposed methodology for all three phases: capture, evaluation and reformulation. We will also discusses its limitations and suggest some directions for future research.

CHAPTER 8. DISCUSSION

Discussion of the Capture Methodology

Our action research projects with Unit-X and Libica allowed us to test on the field whether our approach would 'capture the elusive' supply chain strategy. Success could be judged on two accounts: the first is that the process managed to tap into the tacit knowledge to reveal the supply chain strategy ; the second is that the output, namely the Functional Strategy Map, is an actionable conceptualization of the supply chain strategy as a system.

First criteria. That the process managed to tap deep into tacit knowledge held by members of the organization became evident in the discussions we held to validate the partial maps and the final map. Across the table, while the team was discussing the evolving map, it was a common occurrence to hear a question like: "*Do we actually do this?*" Sometimes the answer would be *"Yes,"* other times it would be *"No,"* and in yet others it would be *"Well, kind of…"* But it was almost always followed by a colorful conversation on what the firm actually does, and why it does it. The ideas and purposes behind the activities, as well as the factuality of the activities themselves, were the subject of vivid and clarifying discussion.

Second criteria. That the Functional Strategy Map is conceptualizing the supply chain strategy of the firm as a system became evident in two facts: (1) The map contains *"a set of interrelated components working together to accomplish a common purpose."* Our map contains multiple concepts categorized by layers, and within each layer, these 'components' were expected to work together with the common purpose of supporting the concepts in the layer above them. (2) The conceptualization is actionable, in the sense that further action can be taken based on the map. For example, we used the Functional

Strategy Maps of both Unit-X and Libica not only as a tool for discussion, but also as the starting point for the evaluation and reformulation of their respective supply chain strategies.

The true test of a methodology is whether a third party, who has not been involved in developing it, can employ it with good results. Whether this will be the case with our methodology, we do not know yet. However, we have conducted some limited tests with third parties applying our methodology on their own.

We have first hand reports from a third party that the methodology facilitates tapping into tacit knowledge of the supply chain strategy. A consultant, who is not a member of our research group and was not involved in the process of developing the methodology, was given a copy of the methodology's documentation and asked to apply it in a project of her own. Through bimonthly meetings with her we have followed her progress in the use of the methodology and provided some general guidance. She has conducted multiple interviews following our guidelines, and through these has started to tap into the firm's tacit knowledge of their strategic activities and to create her own partial strategy maps. Although the project is still ongoing and the final result is unknown at this point, she has expressed to us already that the methodology is actionable and that can be followed without major difficulties.

In our experience, learning to build and use the FSM takes a relatively short time. During a masters-level class taught on the subject of supply chain strategy, the students were presented the idea of the FSM and – as homework – they were provided very succinct instructions on how to build the map and were given a detail-rich text describing the strategic activities of a firm. Based on the text, the students were able to create their own Functional Strategy Maps: all groups but one did it without any guidance from the instructors, while one group did get a one-hour clarification session. Later in the term, the same group of students were given Unit-X's FSM and, based on a case study they were provided, they were asked to modify the map to suggest changes to the current supply chain strategy of the firm. Students were able to use the map as a tool to discuss and reflect what changes they would make to

Unit-X's existing supply chain strategy. This experience, although not conclusive, suggests the potential of the FSM as a tool to facilitate the discussion of supply chain strategy in more concrete terms.

So far we have applied the methodology to the problem of supply chain strategy, with good results. Yet supply chain strategy is a particular cluster of functional strategies that addresses a particular problem. A question that remains to be answered is whether the methodology will be equally useful to other groups of functional strategies. The methodology is not biased towards supply chain management, and no problems applying it within other realms are anticipated.

In terms of limitations of the methodology, our experience with it suggests two instances where the steps in their current form present the facilitator with particular challenges. The first is dealing with the tensions that exist around 'grievances,' or burning areas of unresolved conflict in the organization, whose effect can be felt in the tacit knowledge: different members of the organization may have very different and strong views about these areas, which are not easy to reconcile and to conceptualize in a form that can be accepted by the group as a factual statement. A second challenge, related in its nature to the first, is how to capture in the map the activities of an organization that is undergoing a significant transformation. A firm that has already launched important changes to its activities, changes whose deployment has not been completed yet, will also reflect in its tacit knowledge a similar tension: some members of the organization will resist depicting it as an accomplished change, while others will resist depicting it as an unfinished change. As we continue to apply the methodology, we will learn more about how to deal with this transitional stages and how to map the activities around *grievance* areas.

Another possible shortcoming of the current state of our approach is that the Functional Strategy Map could become too introspective, missing perhaps the larger picture of the external environment that surrounds the firm beyond its own functions. Thus, an area that need further exploration is how well the Functional Strategy Map is accounting for the external environment of the firm, and if found wanting, then how could it be coupled with a compatible representation of the external environment, so

that not only an evaluation of internal coherence and of coverage of a supply chain strategy can be conducted, but also our evaluation of sufficiency can be made more robust in the frame of the demands from the external environment.

Discussion of the Evaluation Methodology

Our experience deploying the evaluation methodology in these two action research projects is encouraging. Admittedly, the process relies heavily on the members of the organization to conduct the evaluation, via online questionnaires, individual feedback and group sessions. This makes the tasks that the team members have to conduct – to put it in their own words – *"tedious"*. There is something repetitive about answering the questionnaires, and at some points the respondents may feel the weight of the process heavy on their shoulders. However, this reliance on the team members, which could be the method's most important downside, is also its biggest strength: by following this *'true to self'* approach, we allow the group the opportunity to evaluate their supply chain strategy in their own terms, in their own words, according to their own understanding and based on their own knowledge of their business. It is, if we may borrow the concept from anthropology, more of an *'emic'* approach, in that it keeps things in the same language used by the organization, and relies on them to evaluate the merits and flaws of what they have in place, without bringing the external, or *'etic'* views of external experts that may want to apply general theory to a specific circumstance.

The effort is – in our assessment – well worth the effort. This assessment is based on the following:

- During the validation session for Unit-X's Phase 2, the VP of Supply Chain said of the evaluation findings the following: *"You've hit the nail in the head."* He added: *"This is a very good crystallization of things."* On the evaluation report, he said: *"The report highlights the key issues. … You managed to find the key conflicts."* Commenting on a 3-way conflict we had found in Unit-X's current supply chain strategy (between service level, capital and economies of scale/cost, as shown in Figure 66), he commented: *"The 3-way conflict is a very, very important item right now."* Commenting on the

evaluation exercise in general, he concluded: *"Your system seems to be able to single out and capture the fundamental issues we're struggling with."* He added: *"I think we have a foundation for moving forward."*

- Likewise, the VP of Operations and Supply Chain of Libica, commented during our final meeting that his reaction to being faced with the 3-way conflict shown on the left hand side of Figure 62 was like an epiphany: "To me, it was like a light bulb went off…," he said, adding that he realized then that: *"We are trying to do everything!... And that was clear from the material."* His reference here to 'the material' refers to the matrices and graphs he was shown during the validation session for Phase 2.

An interesting and unexpected learning for us was that, even though our approach to evaluation, in particular that for alignment, seems to be rather 'introspective', it actually leads to useful insights about the external relationships of the firm. For example, during an exercise we conducted with Unit-X to validate the findings of the alignment evaluation, we discovered that for almost every conflict, a participant would volunteer a mechanism to improve the situation. The fact that this would happen spontaneously, almost as a natural consequence of being faced with the conflict, was not expected by us. The recommendations would go along the lines of: *"You know, about this problem… if we could improve our collaboration with our suppliers, then we could make this better"*, or *"If we could convince our buyers that it is in their best interest to provide us with accurate information on X, then this situation would improve"*, etc. Almost every conflict had a flip-side, in the form of an *"if"* clause involving very frequently an improved collaboration with other members of the supply chain. Thus, an unexpected learning of our exercise, which was originally focused on the internal coherence of a firm's supply chain strategy, is that improving the internal conflicts often requires the strengthening of external relationships, through collaboration and partnership. A similar experience occurred with Libica, where many of the conclusions pointed to the need to improve collaboration with both suppliers and customers. This assuages – at least partly – the concern about the map being 'introspective'.

Although we do not claim generalizability for these findings, being as they are based on a few in-depth cases, we do think this adds a new, unsuspected dimension to the long-held view of supply chain strategy coordination: improving internal conflicts often requires improving external relationships. It was suggested that a healthy supply chain strategy is composed of sound functional strategies that have healthy relationships among them, yet it was tacitly assumed that internal and external soundness were different. These exercises suggest that the relationship between the internal and external health is very close, and their division might be artificial when it comes to a supply chain strategy. For example, an internal supply chain strategy for a firm might be improved by improving the external supply chain relationships of the firm with its supply chain peers.

As a concluding comment: besides identifying conflicts, our evaluation method may also allow us to compare, side by side, two or more supply chain strategies, as long as the teams are willing to go through the 'tedious' exercise of answering the questionnaires twice. The comparison is done in terms of what we call "strategic focus," which we define as the supply chain strategy 's capacity to translate operational effort into support for the strategic goals of the organization. A discussion on one way this may be done is presented in the Appendix of page 235.

Illustrating the equivalency with DSM

In a previous chapter we intimated an equivalency between the matrices we can build based on the FSM and other tools, particularly the 'design structure matrix' (DSM). It is possible now illustrate this equivalency using concrete examples. A 'direction-specific' Answer Matrix 3 can produce a matrix similar to DSM. For example, we took that from Unit-X (Figure 54) and replaced any value larger than 2 ('helps significantly') with an 'X' mark. The result, shown in Figure 74 (with a legend in Table 36), is structurally similar to DSM. If the questionnaire used to build that answer matrix had asked questions in terms of 'dependency' (as opposed to 'compatibility' or 'support',) then the resulting matrix would be actually equivalent to the DSM: a matrix outlining dependency relationships between components of a system.

	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8
FT1			X				X	
FT2								X
FT3							X	
FT4			X				X	X
FT5	X	X	X				X	
FT6	X		X				X	
FT7			X					
FT8			X					

Figure 74: The equivalent 'design structure matrix' of Unit-X's Answer Matrix 3.

	OT1	OT2	OT3	OT4	OT5	OT6	OT7	OT8	OT9	OT10	OT11	OT12	OT13	OT14	OT15	OT16	OT17	OT18	OT19	OT20	OT21	OT22
FT1	2.22	1.13	0.25	0.25	0.56	1.10	-0.25	1.67	1.43	1.13	0.50	-0.57	0.00	0.38	1.11	0.33	-0.50	1.43	0.63	0.00	-0.83	1.38
FT2	1.00	1.20	0.00	-0.13	1.00	2.25	0.80	0.86	0.86	0.89	0.38	-1.00	0.57	0.13	0.57	1.00	-0.50	0.75	0.71	0.00	-0.40	1.13
FT3	1.00	0.78	0.25	0.11	1.00	0.71	0.29	3.50	2.57	2.25	1.00	0.83	1.14	0.67	1.14	0.00	1.00	0.33	0.00	0.33	0.00	1.57
FT4	1.22	2.67	1.78	2.10	2.60	-0.63	2.33	2.75	1.89	1.71	2.89	3.25	1.11	3.11	-0.88	0.00	2.43	0.00	0.17	-0.14	-1.29	3.14
FT5	1.40	1.56	1.38	0.57	0.60	-0.44	0.40	2.33	1.25	1.43	-0.14	-1.29	1.33	-0.75	1.38	0.13	-0.50	3.14	2.25	2.86	-0.43	1.38
FT6	0.89	1.57	0.25	0.22	0.63	-1.11	0.00	2.25	1.43	1.38	0.25	-1.43	1.29	-0.38	1.17	-0.13	-1.40	0.00	-0.57	1.00	2.50	1.67
FT7	0.00	0.57	0.00	0.40	0.90	0.33	0.75	2.63	0.50	1.29	0.33	0.50	1.14	0.63	1.56	-0.25	2.29	0.00	0.00	0.29	0.00	0.33
FT8	0.67	0.38	0.30	0.70	0.14	1.00	2.75	2.88	1.13	2.29	0.17	1.00	0.71	0.33	0.13	1.25	1.57	0.29	0.38	0.00	0.00	1.00

Figure 75: Answer Matrix 4 from the Unit-X exercise ('full matrix' approach).

	OT1	OT2	OT3	OT4	OT5	OT6	OT7	OT8	OT9	OT10	OT11	OT12	OT13	OT14	OT15	OT16	OT17	OT18	OT19	OT20	OT21	OT22
FT1	✓																					
FT2						✓																
FT3								✓	✓	✓												
FT4		✓		✓	✓		✓	✓			✓	✓		✓			✓					✓
FT5								✓										✓	✓	✓		
FT6								✓													✓	
FT7								✓									✓					
FT8							✓	✓		✓												

Figure 76: The equivalent 'techniques-tools' matrix of Unit-X's Answer Matrix 4.

Strategic Themes	
ST1	Better match customers with products
ST2	Maximize our impact in current markets
ST3	Have the lowest cost of delivered product
ST4	Pursue innovation on high margin niches
ST5	Identify and prepare for long term threats

Functional Themes	
FT1	Minimize the cost of procured materials
FT2	Manufacture in high-volume plants
FT3	Work as an integrated organization
FT4	Deliver best-in-class service
FT5	Achieve the lowest delivered cost
FT6	Operate with the lowest work capital
FT7	Develop a consensus demand forecast
FT8	Be the quality and knowledge leader

Operational Themes	
OT01	Procure based on these multiple criteria
OT02	Prevent disruptions in the business
OT03	Procure third party transportation services
OT04	Add locations in profitable growth markets
OT05	Keep the supply chain responsive
OT06	Dedicate specific products to specific lines
OT07	Ensure the highest product and process quality
OT08	Collaborate with other functions
OT09	Manage cross-business issues strategically
OT10	Have the best human resources
OT11	Use on-time delivery as a service metric
OT12	Meet the customer's expectations
OT13	Manage our customers in segments
OT14	Promise and fulfill delivery dates
OT15	Restrict demand when necessary
OT16	Offer products for three major markets
OT17	Listen to the customer
OT18	Reduce transportation costs
OT19	Reduce warehousing costs
OT20	Reduce the costs of serving customers
OT21	Keep work capital inside a target range
OT22	Have >99% accuracy on inventory information
OT23	Improve the efficiency of supply-chain operations
OT24	Plan with information from many sources
OT25	Conduct monthly demand forecast exercises
OT26	Have the right organization for demand planning
OT27	Grow with the market
OT28	Generate high margins
OT29	Comply with the industry's quality requirements
OT30	Know your business
OT31	Develop and protect our technical knowledge

Table 36: Legend of labels for Unit-X's matrices

Illustrating the equivalency with the 'techniques-tools' matrix

Likewise, a 'full matrix' Answer Matrix 4 can produce an equivalent 'techniques-tools' matrix, the tool proposed by Cigolini *et al.* (2004) to represent a supply chain strategy. To illustrate this, we took Answer Matrix 4 from Unit-X (shown in Figure 75) and replaced any value larger than 2 with a mark. The result, shown in Figure 76 (with a legend in Table 36) is equivalent to a 'techniques-tools' matrix. The sole difference that, in Cigolini *et al.*'s version, the matrix is limited to the interface between firms.

Discussion of the Reformulation Methodology

As a result of our reformulation exercise with Unit-X and Libica, we were able to produce improved formulations for their supply chain strategy, enhanced to improve coverage, alignment and sufficiency, and to reduce the conflicts we had found in the original formulations of the supply chain strategy.

The assembly of new formulations, by means of the formulation template (page 195) and the reformulation rules (discussed in page 199) was not only feasible but also easy to grasp for the firm's team. Besides serving its purpose of generating an alternative 'candidate' to replace the *status quo*, the process served as a tool to elicit a structured discussion about how to improve the supply chain strategy, in explicit terms and in a setting open to input from the whole team.

The approach, then, proved to be simple to use, yet effective as a tool for discussion and generation of new alternatives. The use of multiple iterations was conducive to a 'zeroing in' on the better concepts that were proposed by the team. There were 65 policy choices in Round 1, of which 59 remained in Round 2, but only 21 policy choices made it to Round 3. This narrowing of the options, where the best alternatives are retained while the weaker ones are discarded or modified, is reminiscent of Pugh's controlled convergence.

A tangible outcome of Phase 3 is an explicit new formulation (which we have alternatively called an 'enhanced version' or 'improved version') of the supply chain strategy of the firm. For Libica, the statement of the reformulated supply chain strategy was shown in Table 35, whereas for Unit-X it is

shown in Table 37, along with its starting point.

It is time now to consider the question: does the methodology work? The goal is to produce a new formulation for the supply chain strategy that was better than the *status quo* in terms of sufficiency (e.g. the strategic imperatives are satisfied), alignment (e.g. the policy choices are compatible among themselves) and coverage (e.g. all areas of interest are explicitly addressed). The case is made below that the methodology presented for Phase 3 successfully achieves this objective.

First of all, if the reformulation rules and the formulation template are followed properly, the new formulation of the supply chain strategy will, *by design*, be superior to the status quo. The rules to are designed to assemble a 'candidate' that is better than the status quo, if possible at all. Since inferior alternatives are not eligible as input for the process the result will either be a superior candidate or a forced stop of the process. Coverage is taken care of by design, since all known areas of interest must be addressed by the new candidate. Sufficiency is improved by design, since only choices superior to the *status quo* in terms of satisfying the strategic imperative are considered. And alignment is preserved by design, since only compatible choices are considered for inclusion, so that no incompatibilities arise.

That is the theory. Anecdotal evidence from our deployments suggests this is actually the case. For example, during the Phase 3 exercise with Libica, we asked their VP of Supply Chain and Operations to compare what the group had just proposed for Area 1 versus what the firm currently has for Area 1. He said: *"This is clearly superior to what we have in place right now."* This statement lends support to the idea that, if the assembly rules are followed, the result should be better than, or at least equal to, what the firm had already in place. Further deployments of the methodology in other firms may help us understand better under what circumstances the methodology can be helpful and how it can be made more effective.

However, even in its current form, it has proven to be a helpful starting point for actual firms to engage into discussion about how to improve their supply chain strategy for today.

	Starting point	Enhanced version
Competitive advantage	Pursue leadership in quality and knowledge.	Offer consistent high-quality products. Pursue leadership in quality and knowledge. Offer long term, mutually profitable relationships.
Customer service	Aim at delivering over 95 percent of orders on the promised date.	Segment customers and products into different service level categories. Deliver >95% of orders on promised date. Offer customers more visibility into the ordering process.
Inventory management	Strive to operate with the lowest level of working capital.	Have a multiple-tier inventory policy. Keep stable inventory levels for all items. Strive to minimize the level of working capital.
Delivery logistics	Work to reduce transportation and warehousing costs.	Develop a fast response supply chain. Optimize the number of local WHs. Collaborate with customers on delivery logistics. Ensure the integrity of the product during transit.
Manufacturing	Use large scale production lines and avoid change-overs.	Manufacture in flexible facilities, with standardized, repeatable processes. Match the manufacturing capability to the local product mix, to the extent that it is economically justified.
Demand planning	Develop demand forecasts internally, through consensus.	Improve our internal forecasting ability. Engage major customers in a 2-way forecasting discussion at the SKU level. Reduce need for demand planning wherever possible.
Organizational structure	Have a matrix supply chain organization: part at corporate level, part at business level.	Have a matrix supply chain organization: part at corporate level, part at business level.
Innovation	Have no clear innovation policy currently in place.	Give innovation the preeminence of a core competency. Create new markets for existing products (market-driven innovation). Create new products (product-driven innovation).
Procurement	Procure strategic raw materials at the corporate level.	Improve our collaboration with key suppliers at a strategic level. Actively pursue mechanisms to ensure availability of raw materials at low cost. Procure strategic raw materials at the corporate level.
Alliances / partnerships	Have no significant strategic partnerships in place.	Establish strategic partnerships with key customers and suppliers.

Table 37: Starting point and enhanced version of Unit-X's supply chain strategy

Furthermore, it may also serve as a stepping stone for the strategic planning in longer time horizons: currently Libica is building upon the findings of our capture, evaluation and reformulation exercises to launch a scenario planning exercise that may help them prepare their supply chain strategy for the challenges of the future.

Summarizing, in this chapter we assessed the merits of the methodology we have proposed for all three phases: capture, evaluation and reformulation, based on their theoretical merits and the result of our action research projects. We discussed its limitations and suggested some directions for future research. What follows is an Appendix that suggests an alternative use of the scores we collected for the evaluation matrices. It proposes an approach to generate a metric of 'strategic focus' as a tool to compare alternative supply chain strategies.

APPENDIX: AN ALTERNATIVE USE FOR THE MATRIX VALUES

Besides its tested purpose of identifying conflicts, the evaluation matrices may also allow us to compare two or more supply chain strategies. In this appendix we discuss how this can be done.

The comparison would be done in terms of what we call *"strategic focus,"* defined as the supply chain strategy 's capacity to translate operational effort into support for the strategic goals of the organization. The assumption, as shown in Figure 77, is that effort put into operations is transferred into support to strategic goals by the mediation of operational themes, functional themes and strategic themes.

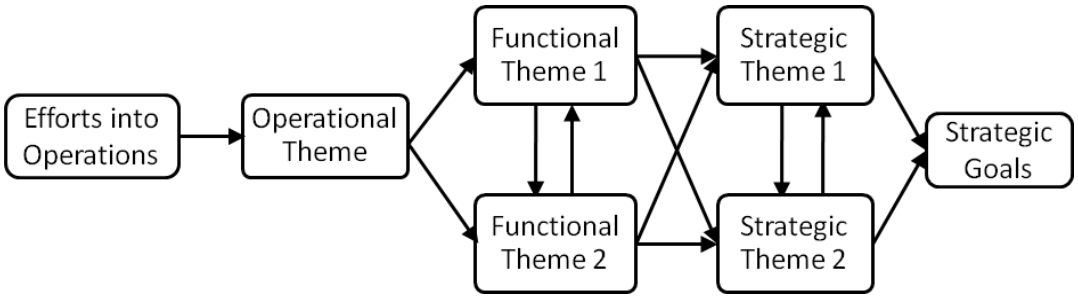


Figure 77: Assumption of how operational effort supports strategic goals

Support scores

The strategic focus is quantified using a set of "support scores" based on the support extended by operational effort to the business strategy. Support scores also provide us with a relative reference against which we can then compare the merits of different supply chain strategies. A clear application for this kind of comparison is to assess the benefit of improvements made to an existing supply chain strategy, where the modified and the original versions would be compared in a quantifiable manner.

The generation of support scores starts at the top level, with strategic themes. According to our theoretical framework, strategic themes articulate the business strategy and are presumed to be the

result of extensive deliberation at high levels of the organization. Each strategic theme makes an intrinsic contribution to the achievement of the strategic goals of the organization. Each strategic theme *i* is assigned an 'intrinsic score' A_i equal to 1, based solely on the merit of being a strategic theme.

$$A_i = 1 \quad \text{for i=1…}N_{ST}$$

Strategic themes can further contribute to the achievement of the strategic goals of the organization by enabling and supporting its peers. In other words, a strategic theme – which is considered good by default – is even better if it helps other strategic themes. The average 'peer support' score B_i that a strategic theme *i* provides to all other strategic themes can be found in matrix M1, using this equation:

$$B_i = \frac{1}{N_{ST} - 1} \times \sum_{j=1}^{N_{ST}} M1_{ij} \quad \text{for i=1…}N_{ST} \text{ and } i \neq j$$

The intrinsic score and the peer-support score of each strategic theme *i* are combined into a composite score C_i, using this equation:

$$C_i = A_i + B_i \text{ for i=1…}N_{ST}$$

In contrast with strategic themes, which are considered synonyms with the business strategy, the functional themes are adjudicated no intrinsic value on their own. Whatever value they have comes from supporting the business strategy, in two manners: directly and indirectly. The direct support is provided to the business strategy via support to the strategic themes. The indirect support is provided by means of via other functional themes, which in turn support the strategic themes. Each functional theme is assigned a score for each one of these types of support, and then merge them in a combined score.

Data on the direct support is obtained from matrix M2, which contains the assessment of the support that each functional theme gives to each strategic theme. This support is weighted in terms of the value of the strategic theme being helped by invoking the composite score C_j for each strategic

theme *j*.

A 'direct support' score D_i for functional theme *i* is calculated as follows:

$$D_i = \frac{1}{N_{ST}} \times \sum_{j=1}^{N_{ST}} \left(M2_{ij} \times C_j \right) \text{ for i=1…N}_{FT}$$

Data on the indirect support comes from matrix M3, which contains the assessment of the support that each functional theme provides to other functional themes. This support is weighted in terms of the value of the functional theme being helped by invoking direct support score D_j of each functional theme *j* being helped.

An 'indirect support' score E_i for functional theme *i* is calculated as follows:

$$E_i = \frac{1}{N_{FT} - 1} \times \sum_{j=1}^{N_{FT}} \left(M3_{ij} \times D_j \right) \text{ for i=1…N}_{FT} \text{ and i≠j}$$

The composite support score F_i for a functional theme *i* is obtained by combining the direct and the indirect support scores, as follows:

$$F_i = D_i + E_i \text{ for i=1…N}_{FT}$$

Operational themes are concepts that express, at an intermediate level of abstraction, how the supply chain strategy is implemented into operational choices. A good operational theme is expected to support the functional themes, their immediate hierarchical superiors, as a way to ultimately support the business strategy.

Operational themes are only assigned a single score, a 'support' score, based on matrix M4 and weighted by means of the composite scores of the functional themes they are supporting.

The support score G_i of an operational theme *i* is calculated as follows:

$$G_i = \frac{1}{N_{FT}} \times \sum_{j=1}^{N_{FT}} \left(M4_{ij} \times F_j \right) \text{ for i=1…N}_{OT}$$

These sequence of scores that we have generated, from A_i to G_i, can be put to good use in many

ways. Particularly, we would like to highlight two. First, they provide us with a better understanding of how the operational efforts are transferred – or lost on the way – to supporting the strategic objectives of the organization. Second, they provide an actionable – albeit somewhat relative – scale for comparing several supply chain strategies, and by extension, comparing improvements made to an existing supply chain strategy.

We will elaborate on both these applications in more detail. The insight obtained suggests a new analogy to discuss the merits of a supply chain strategy that goes beyond the usual 'strategic alignment' (Tan *et al*., 1999). It is called 'strategic focus,' and it could serve as a more actionable and robust metric, while being equally simple and intuitive.

Understanding Strategic Focus

Figure 77 made the point that operations do not impact strategic objectives directly. Instead, their effect 'travels' through a series of conceptual layers, namely the operational themes, the functional themes and strategic themes. The quality of this transmission would depend, on the quality of the relationship these multiple themes have with its horizontal and vertical neighbors.

Now that we have developed our support scores in the previous section, we can outline an equivalent circuit but in mathematical terms. The overall average support G provided by the operational themes to the achievement of the strategic goals, is expressed by:

$$G = \frac{1}{N_{OT}} \times \sum_{i=1}^{N_{OT}} G_i$$

Thus, replacing G_i with its definition shown before, we get that:

$$G = \frac{1}{N_{OT} \times N_{FT}} \times \sum_{i=1}^{N_{OT}} \left(\sum_{j=1}^{N_{FT}} M4_{ij} \times F_j \right)$$

The intuition behind this equation is that the support that operations provide to the overall strategic objectives depends on two things:

- the support that operational themes provide to the functional themes (expressed in the equation as $M4_{ij}$), and
- the functional themes' ability to transmit this support to the strategic themes (expressed in the equation as F_j)

In other words, operations can provide a magnificent support to the strategies of their respective functions, and yet – if the components of the supply chain strategy happen to be in disarray or severe conflict – the effort put on operations will not fully reach the strategy as it was intended. A part will be lost in the transmission; how big a part depends on how big the conflict is.

Extending this analysis on the remaining scores reveals a similar chain of dependencies. Since:

$$G = f(G_i)$$

$$\text{where } G_i = f(M4, F_j)$$

And:

$$F_i = f(M3, M2, C_j)$$

$$\text{where } C_i = f(M1)$$

Thus ultimately,

$$G = f(M1, M2, M3, M4)$$

Notice how all four areas of logical interaction are involved as middlemen (via the matrices) on the transmission of operational effort to support for the strategic goals. The role these zones of interaction play could be for better, but it could also be for worse. The support that an operational effort ultimately lends to the achievement of strategic goals passes through four 'lenses', the four zones of interaction.

This means that a perfectly well executed operation can contribute much or little to the achievement of the strategic objectives of the firm, depending on how well 'focused' the four lenses are.

- If the relationships within each area of logical interaction are supportive and constructive, the lenses

will be ‘in focus’ and will concentrate the operational effort on the achievement strategic goals.

- If the relationships within any area of logical interaction are detrimental and conflictive, the lens corresponding to that area will be ‘out of focus’ and will dissipate the operational effort, and part of it will be lost.

This is what ‘strategic focus’ means. It could serve as an alternative or complement to the familiar analogy of ‘strategic alignment,’ as we think it offers more actionable insight. Figure 78 illustrate the concept of strategic focus graphically.

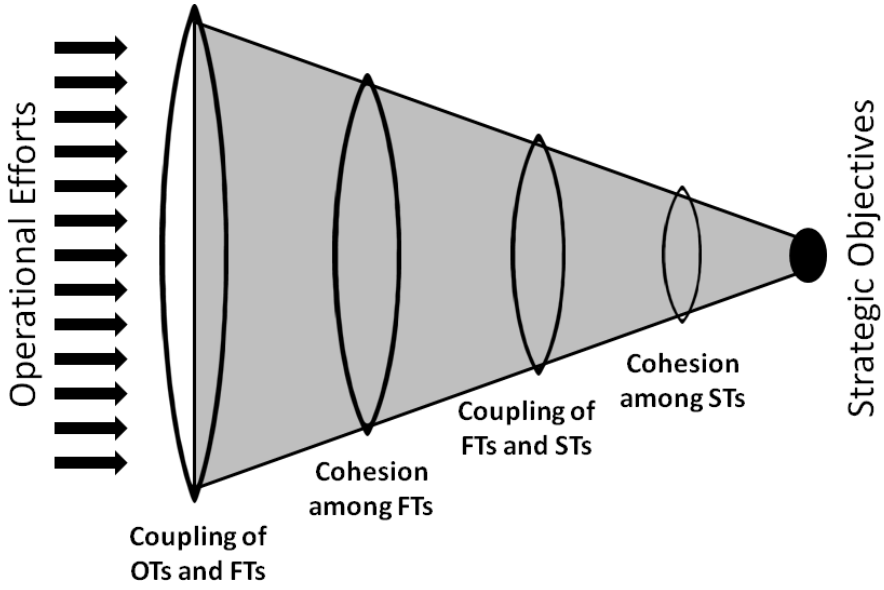


Figure 78: Graphical representation of the concept of strategic focus.

Comparing Supply Chain Strategies

The evaluation scores can be used to compare the effectiveness of different supply chain strategies. Being able to compare two different supply chain strategies enables us to assess the impact of changes to the supply chain strategy.

According to our theoretical framework, the supply chain is expressed by means of several functional themes. Thus, a change in the supply chain strategy implies a change in one or more functional themes. The interaction of the new themes could be different from that of the previous

functional themes.

Presumably, due to the plural trade-offs that exist in supply chain management, a specific change made to a central element of the supply chain strategy will seldom be entirely positive. Most likely, even as it provides improved support to some themes, it will also hurt some others. That's the nature of the beast. The crucial question faced in practice is: all things considered, is a given reformulated supply chain strategy doing a better job overall than the previous supply chain strategy? Based on the concept of 'strategic focus', we define 'doing a better job' as more effectively translating the operational effort into support for the strategic goals.

A supply chain strategy is better than another supply chain strategy if the G score of the former is higher than G score of the latter. As defined before, G is the overall average support provided by the operational themes to the achievement of the strategic goals in a given supply chain strategy. Let us define G^X as the score G for supply chain strategy X, and G^Y as the score G for supply chain strategy Y. Then, we say that X is a preferable to Y if $G^X > G^Y$.

Let us illustrate the use of G scores by means of a real example, based on our effort with Unit-X. Let us call Unit-X's current supply chain strategy 'P' (where P stands for present). The G score for the present supply chain strategy P was found to be:

$$G^P=0.59$$

There are important conflicts between three out of four functional themes that compose the supply chain strategy: FT4, FT5 and FT6; and the functional theme of the manufacturing strategy: FT2. Admittedly an oversimplification, for the sake of illustration let's suppose that we reformulate these two functional themes, FT4 and FT6, in such a way that their reciprocal conflicts with FT5 and their being hurt by FT2 is eliminated. This can be simulated by replacing, in matrix M3, the scores of conflict with values equal to the average of non-conflictive scores.

In Figure 54 we show the original matrix M3. Let's start by replacing the scores of FT2 hurting FT4

and FT6, by scores equal to the average support given by FT2 to other themes. The average of $M3_{2j}$ for $j \neq \{4, 6\}$ is equal to 0.39. Thus, we define new values $M3_{2j}=0.39$ for $j=\{4, 6\}$. This simulates the elimination of conflict between FT2 and FT4, FT6.

Now we will replace the scores of FT4 and FT6 reciprocally hurting FT5, by scores equal to the average support given by themes other than these three to all other functional themes. From the amended matrix M3 we know that the average of $M3_{ij}$ for $i \neq \{4,5,6\}$ and $j=1\ldots8$ is 0.53. Thus, we define new values $M3_{ij}=0.53$ for $i=4\ldots6$ and $j=1\ldots8$. This simulates the elimination of conflict between FT4, FT6 and FT5.

Taken together, these changes to matrix M3 simulate the third area of interaction in an improved, reformulated supply chain strategy, that we call 'R' (where R stands for reformulated), where the conflicts between functional themes have been eliminated. Using the previous M1, M2 and M4, and the revised M3, we get a new G score for supply chain strategy R, which is:

$$G^R=0.69$$

Is the reformulated supply chain strategy preferable to the present supply chain strategy? Since $G^R > G^P$, we take the reformulated supply chain strategy to be a better conveyor of operational effort into the achievement of strategic goals, and thus to be a better supply chain strategy. Thus, even if the G score does not give us an absolute measure of the goodness of a supply chain strategy, it does help us compare the relative merits of variations of a supply chain strategy, or of alternative supply chain strategies within the same context. Indeed, the final decision to implement the enhancements that will improve the G score depends heavily on the financial assessment of the investment according to the company policies.

Conclusions

In the present appendix, we have proposed a method to evaluate the merits of a supply chain strategy, based on a theoretical framework that we have developed as part of a larger project.

Two applications of our evaluation method are: (a) the identification of conflicts within the supply chain strategy and with other functional strategies, and (b) the comparison of different supply chain strategies in terms of their ability to transfer operative effort into support for the strategic objectives of the organization.

An interesting insight derived from our evaluation method is that 'strategic focus' could be used in place of 'strategic alignment' as more robust and actionable analogy of the goodness of a supply chain strategy. Another insight is that the internal effectiveness of a firm's supply chain strategy is closely related to the health of its external relationships.

Areas for future research include:

- What other applications could use the support scores produced in our evaluation method?
- Is a supply chain strategy benchmarking reference possible based on the evaluation scores?
- How can multiple parties be considered by the method?

In conclusion, we think the application of the evaluation method we propose can help managers improve their supply chain strategies while giving academics a more powerful tool to analyze supply chain strategies. It can help managers and academics move our imperfect supply chain strategies closer to more *focused* ones.

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