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# Eliciting and representing a supply chain strategy

**Roberto Perez-Franco**[1]

1 MIT Center for Transportation and Logistics

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Roberto Perez-Franco, MIT Center for Transportation and Logistics

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*Approach.* A framework to represent a supply chain strategy for a business unit was developed through an inductive theory-generation approach. A method to elicit the current *as is* supply chain strategy of a business unit was developed through collaborative management research projects and validated by several third party projects.

*Findings.* The proposed method and framework were used to elicit the *as is* supply chain strategy of business units in nine different projects, mostly conducted by third parties. In every case, the validity of the result was confirmed by the business unit.

*Research limitations.* The proposed framework and method have limited scalability beyond a single business unit. Also, they may be less useful when the supply chain strategy is undergoing a dramatic transformation.

*Originality.* The paper proposes a novel way to characterize the supply chain strategy of a business unit as a conceptual system. The paper also proposes an innovative approach to tap into the tacit knowledge of the organization to reveal the patterns of decisions underpinning its current supply chain strategy.

**Keywords: Supply chain strategy, strategy elicitation, strategy representation**

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**Corresponding Author:**
Roberto Perez-Franco
MIT Center for Transportation and Logistics
77 Massachusetts Ave, E40-293, Cambridge, MA 02139
Email: roberto@mit.edu

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Roberto Perez-Franco

*Center for Transportation and Logistics, Massachusetts Institute of Technology*

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## 1. Introduction

*Importance of supply chain strategy*

Three decades ago, Shapiro and Heskett (1985) described "strategy" as the more important of two faces of what was then called logistics. A few years later, in a pioneering article on supply chain management (SCM), Stevens (1989) claimed that an integrated supply chain strategy (SCS) is necessary for a supply chain (SC)[1] to realize its potential and provide the business a competitive advantage.

[1]In this paper, *supply chain* is used in its current sense (Mentzer *et al.*, 2001; Carter *et al.*, 2015).

Since the turn of the century, supply chain strategy has become "an increasingly important topic" (Morash, 2001, p. 50). Varma *et al.* (2006, p. 226) claim that "top performers have a clear supply chain strategy aligned with overall business objectives and customer requirements". Narasimhan *et al.* (2008, p. 5234) assert that "in the competitive global environment in which firms operate today, developing a successful supply chain strategy is critical to a firm's long-term competitive success". More recently, Roh *et al.* (2014) stated that "supply chain practices solidly built upon a supply chain strategy can enhance the firm's and its supply chain partners' business performance and thus their competitiveness."

*Discussing a specific SCS is difficult*

Because of this, it is important for practitioners to *discuss* their own supply chain strategy *in a substantive and factual manner*. Many events may move a business unit to discuss its supply chain strategy. Aitken *et al.* (2003) argue that changes to the supply chain strategy are necessary as a product proceeds through its life cycle, in order to maintain competitiveness. Other motivators may be changes inside the business unit, like the arrival of a new CEO with a different strategic vision for the company, or changes in the business environment, such as new regulations, new technologies, new competitors, and entry to new markets.

Meaningful discussion of specific supply chain strategy remains difficult for practitioners. "It is often the case that high-level discussions of supply chain strategy are completely void of facts" (Hicks, 1999, p. 27). Part of the difficulty of discussing the supply chain strategy of a business unit may stem from what Bakir and Bakir (2006) call the "elusiveness" of strategy. But it also may be that the difficulty of discussing supply chain strategies results from there being many unanswered questions "about how best to characterize supply chain strategies" (Frohlich and Westbrook, 2001). Discussed below are two of these unanswered questions.

*The question of SCS representation*

An important problem that has no answer in the literature is how to *represent* a supply chain strategy in a clear and actionable manner. To better understand what this entails, imagine a scenario in which a practitioner, such as the new head of supply chain in a business unit, wants to discuss with her staff a new supply chain strategy that she is considering. Assume that lack of information is not a problem: all the relevant aspects of the new supply chain strategy are known to her, since it is her creation.

The question, then, is as follows: how can this practitioner *represent* this supply chain strategy? In other words[2], how can she *portray* or *describe* this supply chain strategy in order to *communicate* it to her staff? How can she *articulate* it (i.e. express it distinctly), *conceptualize* it (i.e. represent it with concepts), or *characterize* it (i.e. define it in form, or describe its distinctive features), so that her staff can understand it well enough to engage her in an intelligent discussion about its merits and flaws?

[2]Using related terms, and their definitions from the Oxford English Dictionary.

This is the first of two questions this paper will consider.

*SCS is not always well-defined and explicit*

Before considering the second question, it is important to understand that supply chain strategies are not always *well defined*. Harrison and New (2002) conducted an international survey on supply chain strategy, targeting "senior managers with responsibility for supply chain operations" within "relatively large business units" "from all the major industrial sectors". A "major issue to be investigated in the survey was the current state of supply chain strategy" and its "relative importance" within the business unit.

From the 258 usable responses they received, more than half (58%) of the respondents reported that their business units lacked a well-defined supply chain strategy. This percentage broke down as follows: 43% of all units reported having supply chain strategies that "lacked detail", with "only some elements defined"; and 15% reported that their supply chain strategies were either "patchily defined with poor definition" or altogether "non-existent". This cannot be entirely explained as a lack of interest in supply chain strategy: a total of 180 business units reported supply chain strategy was "an important or very important factor" for them, and almost half of these (47%) lacked a well-defined supply chain strategy.

Additionally, supply chain strategies are not always made *explicit*. Perez-Franco (2010, p. 83) reports that, out of 20 case studies about supply chain excellence prepared in 2005 for the [Project Name Withheld], only two (10%) made explicit reference to the firm's supply chain strategy, despite the cases being focused on the supply chain practices of world-class firms. In comparison, 18 of the 20 cases (90%) explicitly stated the firm's business strategy. Similarly, based on a series of qualitative interviews with practitioners, Thomas *et al.* (2011, p. 661–662) discovered that many of them feel that in their organizations "the overall supply chain strategy was ambiguous", and expressed the wish that it could be more clear and widely shared.

Finally, supply chain strategies are not always *documented*. Dittmann (2012) reports on a "survey on the state of supply chain strategy", conducted with his colleagues at a Supply Chain Forum meeting. "Overall, 62% of the respondents said that they have a supply chain strategy, but, upon further probing, only 30% of those respondents confirmed that their strategy was a *documented, multiyear strategy*. Thus only 18% of companies (30% of 62%) can produce an up-to-date supply chain strategy document with a detailed project road map that goes at least three years" Dittmann (2012, p. 4).

*What is a supply chain strategy?*

What about the other 70% of that 62%? As Dittmann points out, these firms are not able to produce a "documented, multiyear" supply chain strategy. But does this mean that these firms *lack* a supply chain strategy altogether? Or could it be that what they understand as a supply chain strategy is something other than "a detailed project road map that goes out at least three years?"

Mintzberg (1978) warns against "the notion that strategies . . . are deliberate plans conceived in advance of the making of specific decisions." By instead defining *strategy* as "a *pattern* in a stream of *decisions*," Mintzberg says, one is able to research strategy in a broader descriptive context and to "study both strategies that were intended and those that were realized despite intentions." Similarly, Andrews (1987) states that "strategy is the *pattern of decisions* in a company" that "reveals" its *goals*. Porter (1996) states that "the essence of strategies is in the *activities*".[3]

Narasimhan *et al.* (2008, p. 5234) state that a "supply chain strategy can be viewed as the *pattern of decisions* related to sourcing products, capacity planning, conversion of raw materials, demand management, communication across the supply chain, and delivery of products and services." Cigolini *et al.* (2004, p. 12) — after conducting an extensive meta-analysis of over a hundred case studies in supply chain management — claim 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."

A supply chain strategy can also be viewed as the "objectives and policies for the supply chain" (Stevens, 1989, p. 4), or — to put it "in terms of goals *and* actions" (Brun and Castelli, 2008, p. 169) — as "the set of *objectives* that a company wants to achieve by undertaking specific SCM *decisions*" (Brun and Castelli, 2008, p. 170).

The term *supply chain strategy* "is relatively new in business sciences" (Hofmann, 2010, p. 259), and has no consensus definition. For the purpose of this paper, the supply chain strategy of a business unit will be defined as *the patterns of decisions related to its supply chain activities*, and *the set of objectives the business unit seeks to achieve through these activities*. This definition has clear links to the literature mentioned above (including Mintzberg, 1978; Andrews, 1987; Stevens, 1989; Porter, 1996; Cigolini *et al.*, 2004; Narasimhan *et al.*, 2008; Brun and Castelli, 2008, among others).

*The question of SCS elicitation*

This leads to the second question to be addressed in this paper: how to *elicit* an existing supply chain strategy *as is*, based on facts. To better understand this question, imagine a scenario in which a practitioner, the head of a supply chain, wants to discuss with her staff the *current* supply chain strategy of her business unit. It may be that her business unit has what Harrison and New (2002) call a "clearly defined" supply chain strategy, but she doubts whether this strategy *as it is stated* corresponds to the strategy *as it is executed*. On the other hand, it may be the case that her business unit has what Harrison and New (2002) call a "patchily defined" or "non-existent" (we would say *tacit*) supply chain strategy.

The question, then, is as follows: how can this practitioner *elicit* the current supply chain strategy of her business unit *as is*? In other words[4], how can she *reveal*, *draw forth* or *bring out* the current supply chain strategy of her business unit, in a manner that is *grounded in fact*?

[3]The emphasis in the quotes in this section is ours.

[4]Using related terms, and their definitions from the Oxford English Dictionary.

*Research objective*

This paper addresses both questions stated above, and thus has two research objectives. The first is to propose a *framework* to *represent* a supply chain strategy for a business unit in a clear and actionable manner, one that can serve as a starting point for substantial discussion, including — as necessary — the evaluation and reformulation of this SCS. The second is to propose a *method* to *elicit*, in a manner grounded in fact, the *'as is'* supply chain strategy that a business unit currently has in place, considering its pattern of decisions and activities.

## 2. Literature Review

According to Giunipero *et al.* (2008, p. 75), supply chain strategy is "the most discussed area in the [SCM] literature". Recent articles have examined supply chain strategies within particular industries, such as the food industry (Lyons and Ma'aram, 2014) and the fashion industry (Brun and Castelli, 2008; Kim, 2013). Others have explored the relationship between supply chain strategy and other strategies of a company, such as its global financial strategy (Blackman *et al.*, 2013) and its environmental strategy (Wu *et al.*, 2014). Studies have looked at the link between supply chain strategy and a product's life cycle (Aitken *et al.*, 2003; Patil *et al.*, 2010), or how it affects the quality of a cluster's information technology (Zhou *et al.*, 2014).

However, only a handful of articles have addressed — even in passing — the questions of how to elicit and represent a supply chain strategy. Discussed below are the most relevant approaches found in the literature.

*Arcs of integration*

Frohlich and Westbrook (2001) 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". For example, the supply chain strategy of a given firm could be characterized as having a narrow arc of integration with customers and a broad arc of integration with suppliers.

A limitation of this approach is its focus on a single feature, namely *integration*. It also fails to capture how the supply chain strategy relates to the firm's overall business strategy or to its supply chain operations in the field. Additionally, it is not clear how the characterization of a supply chain strategy as an *arc of integration* can serve as an actionable starting point for a substantial discussion of its other aspects, or for a subsequent evaluation and reformulation.

*Segmentation tree*

Brun and Castelli (2008), working on the problem of supply chain strategy in the fashion industry, propose a "framework model for SC strategy segmentation within a portfolio approach", which they call a "segmentation tree." This model is based on the assumption that three elements — product, brand and retail channel — suffice

for "a complete overview of the fashion industry". By segmentation, the authors refer to whether a firm applies "the same strategy to all its business segments" or instead "segment its strategy depending on [any of] the three proposed elements." The authors suggest that a supply chain strategy in the fashion industry would be sufficiently defined by knowing how this segmentation takes place on the basis of the three elements, and in what order the elements were prioritized: "it can be supposed that the overall supply chain strategy of a company could be described by a segmentation tree" (Brun and Castelli, 2008)

However, the segmentation tree is rather limited when it comes to describing the supply chain strategy of a firm. Just as the *arcs of integration* focus solely on *integration* at the expense of every other aspect of the supply chain strategy, the *segmentation tree* focuses solely on *segmentation*, and is largely blind to other aspects of a supply chain strategy. It also fails to capture how the supply chain strategy of a firm relates to its overall strategy or to its supply chain operations. When it comes to industries other than fashion, or when more is required from a representational device than just a summary of how segmentation was carried out, the *segmentation tree* approach is not enough.

*Techniques-tools matrix*

Cigolini *et al.* (2004) explicitly ask: "how can [a SCS] be operationally defined and represented?" They develop a partial catalog of "techniques" that operate at the level of interface between companies, and then identify in the literature the supply chain "tools" that support the implementation of these techniques. The authors propose creating a "techniques-tools matrix" that lists the supply chain techniques as row headers and the supply chain tools as column headers. The matrix contains a check mark in each cell where a tool provides support to a technique. Cigolini *et al.* (2004) state that "perhaps the most promising usage of the techniques-tools matrix is in its inherent ability to synthesize and represent supply chain management techniques."

The *techniques-tools matrix* is significant as a pioneering effort to operationally define and represent a supply chain strategy, but it suffers from numerous limitations: (1) the matrix fails to capture how the supply chain techniques and tools relate to the firm's overall strategy; (2) by focusing exclusively on the interface between firms, it deliberately ignores the activities that take place inside the firm; (3) the matrix lacks the readability expected from a representational device; (4) there is no provision for the tacit nature of some supply chain strategies: it is not clear how the matrix is to be built and how the techniques and tools being used in the case of a particular firm are to be identified; (5) by relying on a catalog of supply chain techniques, the matrix builder may be tempted to pick items from the catalog based on *social desirability* (i.e. because they sound good), as opposed to items that are grounded on the activities of the firm; and (6) after the matrix has been built, it is not clear how it can be used as an actionable starting point for evaluating and reformulating a supply chain strategy.

*CPPR Framework*

Martinez-Olvera and Shunk (2006) have proposed a framework called *Customer-Product-Process-Resource* (CPPR), built on the premise that there are six "business models" manufacturing firms may follow. Each one is associated with a series of specific values for "supply chain structural elements," which in turn define a supply chain strategy. Martinez-Olvera and Shunk (2006, p. 4517) present "a realignment methodology," which consists of four steps. Step 1 of this methodology, to "assess the *as-is* situation," is relevant to our questions. They describe it as "establishing" the "current way of operation" of the company "using the configuration attributes" given by the CPPR framework.

Although the CPPR realignment method as presented in Martinez-Olvera and Shunk (2006) invites practitioners to "assess the *as-is* situation," it is not clear how the "supply chain structural elements" of a particular firm are to be identified in a manner that avoids selections made by their *social desirability*. Additionally, by relying on a predetermined set of elements in predefined areas, this approach ignores variables in other areas that are not covered by the CPPR framework, variables that may be important to a given firm.

In conclusion, the extant literature lacks a satisfactory answer to the two questions presented.

## 3. Developing a Framework of SCS

Research for this paper started with an effort to develop what Yin (2013) calls a preliminary "understanding - or theory - of what is being studied," to be referred to as a working framework of supply chain strategy. This effort included four stages: (1) early exploratory interviews, (2) the analysis of a pool of existing case studies, (3) the development of an early framework through a first collaborative management research (CMR) project, and (4) the testing and refinement of the framework through a second CMR project.

*Early exploratory interviews (2006–2007)*

A series of five exploratory interviews were conducted with supply chain managers from multiple firms, in different industries and levels in the hierarchy — from vice-president (VP) to plant manager — to explore their views of supply chain strategy and its role in their firms. Their answers suggested that the purpose of the supply chain strategy is largely to make the business strategy *happen*. This view was confirmed through two additional interviews with a VP and an executive VP (EVP) of supply chain strategy from different firms who confirmed that they would receive the business strategy from their superiors as a given strategic imperative, and were then asked to formulate and execute a supply chain strategy to *support* it.

*Analysis of existing case studies (2007)*

Seeking to better understand how — if at all — the supply chain strategy and business strategy are expressed in the setting of a supply chain function, the research team analyzed a pool of twenty existing, publicly available case studies on the subject of supply chain excellence, prepared in 2005 as part of the [Project Name Withheld].

To develop an understanding of how supply chain strategy and business strategy were articulated in these cases, an inductive approach was followed, borrowing heavily from the qualitative toolkit (Easterby-Smith *et al.*, 2002), in particular from the grounded theory tradition (Glaser and Strauss, 1967). Qualitative methods help the researcher keep personal assumptions in check and maintain an open thought process to emergent — and often unsuspected — findings (Gummesson, 2000; Eriksson and Kovalainen, 2008).

Techniques such as open and categorical coding, typically recommended for the analysis of qualitative data (Charmaz, 2014), were employed extensively to analyze passages of the cases that referred to the strategy of the firms. Open coding was used in a first pass to stay close to the data, while categorical coding was used afterwards to help identify 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 and Kovalainen, 2008). Other techniques for the analysis of qualitative data were applied as needed. For example, tables that summarize the evidence (Eisenhardt, 1989; Eisenhardt and Graebner, 2007) were used to compare and contrast some key features of the cases. Also, conceptual maps (Miles and Huberman, 1994) were used to graphically summarize the framework that emerged from the analysis. The details of this analysis are extensively presented in Perez-Franco (2010).

*Business strategy.* The analysis revealed that an explicit business strategy was provided in 18 out of 20 cases. In the remaining two cases a business strategy could be inferred from the text. A qualitative analysis of the business strategy statements in these cases suggests that, when the business strategy is given to the supply chain function as a strategic imperative, it includes concepts of two types: (**i**) a brief statement of the central idea of the business strategy, which this paper will call the *Strategy Core* (*SC*), and (**ii**) several (typically 3-5) statements that expand and elaborate upon the Core, which this paper will call *Strategy Pillars* (*SP*). These two concepts were logically connected. Arranging them in hierarchical layers allows one to express the essence of a business strategy as a logical tree or a cascade of concepts, with the Strategy Core at the top. This idea extends to the supply chain strategy, as discussed below.

*Supply chain strategy.* Only two out of the 20 cases in the pool made any reference to a supply chain strategy. However, the text of the remaining 18 cases revealed that in the description of how a supply chain operates (of its activities, choices, policies, processes, etc.), several interconnected, recurrent themes could be found regarding the supply chain and related functions, whose stated purpose was to make the business strategy possible and successful. A battery of qualitative data analysis techniques was applied to descriptions of the supply chain activities to obtain a conceptual map — constructed as a logical tree or cascade of intermediate concepts — showing how general statements

about the business strategy related to specific statements about operations in the field. An additional two layers of concepts were identified: (**iii**) guiding principles driving the functions, which this paper will call *Functional Principles* (*FP*), and (**iv**) general statements about how operations are conducted, which this paper will call *Operational Practices* (*OP*). These address the supply chain's activities, policies, choices, decisions, etc.

The research team then moved to prepare similar conceptual maps for other firms, but based on primary data, i.e. data obtained directly from the practitioners with the explicit purpose of building the map (as opposed to an existing case study that was made with a different purpose in mind).

*Developing an early framework (2007–2009)*

To that end, the research team conducted a *collaborative management research* (CMR) project with Lamynix[5], a business unit of a specialty manufacturer. Collaborative management research is "defined as an emergent and systematic inquiry process, embedded in an agreed-upon partnership between actors with an interest in influencing a certain system of action and researchers interested in understanding and explaining such systems" (Pasmore *et al.*, 2008). The origins of collaborative management research can be traced back to the works of *action research* pioneers (Shani *et al.*, 2004). Action research, "an informed investigation into a real management issue ... resulting in an actionable solution" (Thorpe and Holt, 2007), is "especially suited for an applied field such as logistics", states Näslund (2002), since it strives "to advance both science and practice".

The CMR project with Lamynix lasted two years; the first half-year was dedicated to creating the conceptual map. During this time, data collection about the activities of the supply chain function was conducted through 41 hour-long qualitative interviews. From the data collected in these interviews, we developed an understanding of how the supply chain strategy, in the form of Functional Principles and Operational Practices describing supply chain activities, serves as a logical bridge between the business strategy and the operations that are taking place in the field.

With the purpose of validating the conceptual map prepared from the interview data, three panel discussions were conducted, approximately three hours long each, with a team of eight supply chain managers of the business unit.

The resulting conceptual map was much richer than the early one made with secondary data. An additional layer was identified: (**v**) specific statements about means in place to support the Operational Practices, which this paper will call *Supporting Means* (*SM*). This includes mechanisms, resources, systems, capabilities, personnel, etc.

Based on the Lamynix map, we developed an early understanding of how these five different layers interact. An early framework of the supply chain strategy of a business unit, in relation to its overall strategy and field operations, emerged. It was tested and refined through a second CMR project.

[5]The name of this company has been disguised.

*Testing and refining the framework (2009–2010)*

A second CMR project was conducted with Libica[6], a distribution company. The project lasted seven months, three of which were dedicated to building the map. Data collection for the map included 22 hour-long qualitative interviews on the business unit's activities. Validation of the map was conducted during a four-hour panel discussion with a team of two dozen managers from the supply chain and related functions. The research team used the Libica conceptual map to test and refine the previously developed framework. The result of this revision, called the *working framework* of the supply chain strategy of a business unit, is shown in Figure 1. It positions supply chain strategy as a logical, conceptual bridge between the business strategy and the operations in the field.

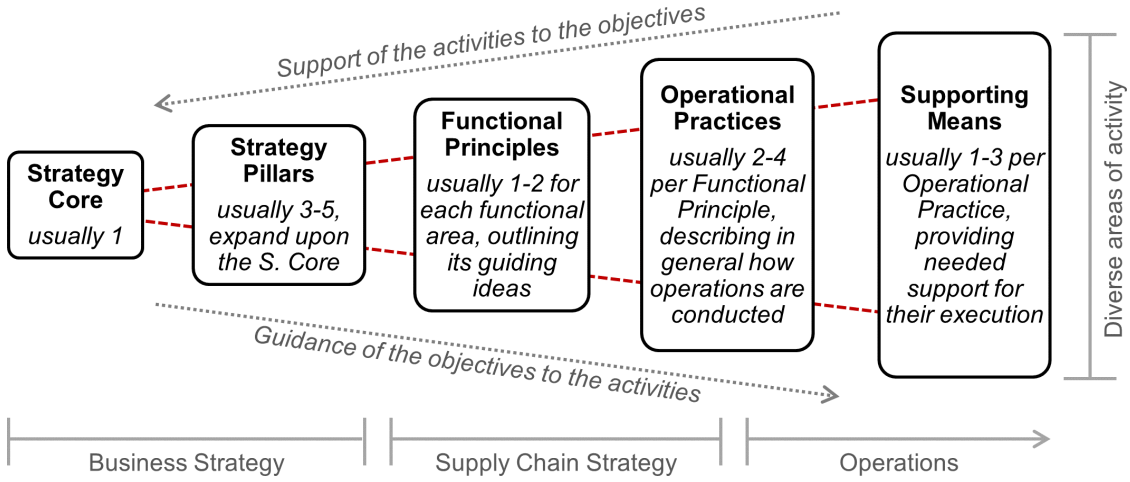


Figure 1: Working framework of the supply chain strategy of a business unit

The conceptual map from Libica also helped deepen our understanding of how the different layers relate to each other. These relationships are described in Figure 2. This second project also illuminated the distinction between two concepts which will be called *nominal* and *executed* (see bottom of Figure 2). Nominal concepts are those that come from the business unit's stated objectives; among the nominal concepts are the Strategy Core and the Strategy Pillars. Executed concepts are those inferred from the activities of the business unit; among the executed concepts are the Supporting Means and the Operational Practices. Functional Principles can be of either type: in some instances they are explicitly stated by the business unit as objectives (*nominal*), while in others they have to be inferred from the activities of the business unit (*executed*). The nominal concepts are collectively referred to as the *Nominal Strategy*. The collective of executed concepts is the *Executed Strategy*.

[6]The name of this company and all other sensitive information have been disguised.

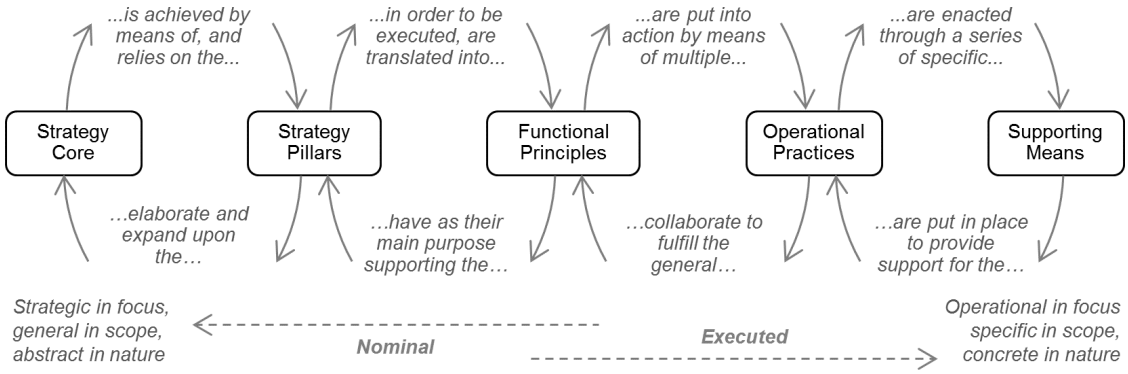


Figure 2: Relationships between different layers of our framework

The layers of concepts described in Figures 1 and 2 run along a spectrum that goes from the *strategic* to the *operational* in focus, from the general to the specific in scope, and from the abstract to the concrete in nature. At the strategic end of the spectrum is the Strategy Core, the driving force behind the strategy of the business unit, which together with the Strategy Pillars represent the *Business Strategy*. At the operational end of the spectrum is the means that support the supply chain operations of the business unit, dubbed Supporting Means. Bridging these two ends of the spectrum are the Functional Pillars and the Operational Practices, which together represent what will be called the *Supply Chain Strategy*. This spectrum is called the *Strategy-Operations Continuum*. The increasing diversity of themes towards the operational end of the spectrum is called the *Thematic Range* (see Figure 3).

## 4. Representing a SCS

As an answer to the first question, this paper proposes that the supply chain strategy of a business unit can be represented as a collection of concepts, both nominal and executed, spread along the *strategy-operations continuum* and the *thematic range*, linking the business strategy and the supply chain operations of the business unit. These *concepts* interact with each other and should work together as a *system*, to achieve a common goal — namely, sufficiently supporting the business strategy in a harmonious and comprehensive manner. They compose a system of concepts, a *conceptual system*, which can be represented graphically in a format known as a *conceptual map*. A map used to represent the supply chain strategy of a business unit is called a *Functional Strategy Map* (FSM). A template for building an FSM is provided in Figure 3.

A sample of an FSM representing a supply chain strategy is given in Figure 4 (to save space, only four layers are shown). The names and number of the layers used to build a FSM are not fixed: an example using six levels with different names can be found online.[7] Based on data from Ghemawat and Nueno (2003), it represents the supply chain strategy of Zara at the time that case was written.

[7]URL for Zara's FSM: `zirie.com/ZaraFSM.pdf`

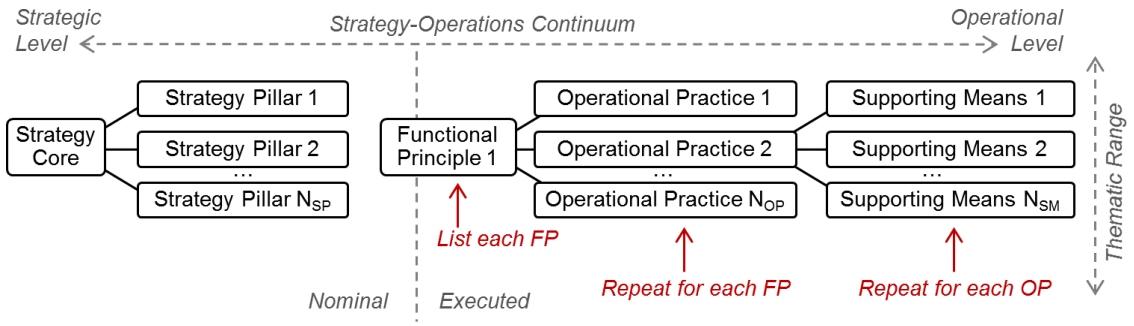


Figure 3: Template for representing a SCS in a FSM

## 5. A Method for Eliciting a SCS

As an answer to the second question, this paper proposes a series of ten steps — distilled from the CMR projects — that practitioners can follow to *elicit* the *'as is'* supply chain strategy of their business unit and represent it using an FSM. Called the *Functional Strategy Mapping Method* (FSM Method), it is presented in Appendix 1 as an actionable Protocol in clear and straightforward language applicable to a generic business unit. A brief summary is provided below.

***Step 1****: Scope.* Define the scope of the project. Identify which functions besides the supply chain will be included. Then identify individuals within these functions to be interviewed. Include individuals directly involved in crafting the business strategy, and others from the two closest hierarchical levels reporting to these.

***Step 2****: Interviews.* Start the interviews by asking the individuals about the activities they perform, and later steer toward the supply chain activities of the business unit. The individual serves as vehicle to tap into the business unit's practices; specific activities serve as gateway to elicit the supply chain strategy.

***Step 3****: Identify areas and activities.* Listen to all the interviews and identify tentative areas of activity. Inside each area, look for references to specific activities. For each activity, look for means or details that support its factuality. Retain only the activities for which supporting means or details were found. Likewise, retain only the areas of activity for which well-supported specific activities were found. Prepare a hierarchical summary for each area of activity.

***Step 4****: From summary into partial map.* Translate the hierarchical summary for each area into a *partial map*, i.e. a diagram showing concepts and the relationships between them. Given the hierarchical structure of the summary prepared in Step 3, its translation into a partial map is straightforward.

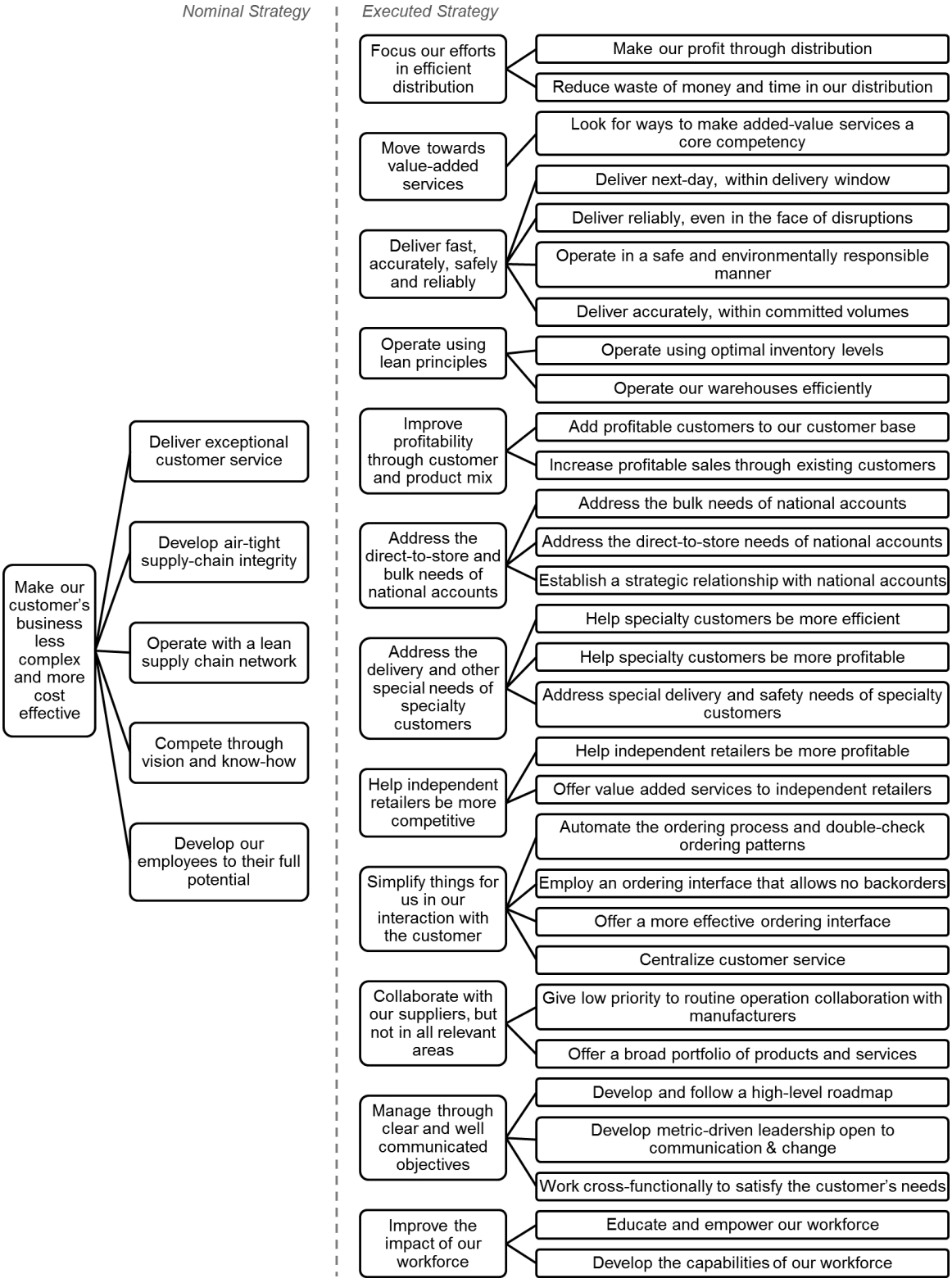


Figure 4: Validated Functional Strategy Map for Libica (showing 4 levels)

***Step 5**: Validate partial maps.* To confirm that the partial maps are a fair representation of what the business unit's supply chain strategy does, present them to a panel of members of the business unit possessing in-depth knowledge of the relevant areas. Based on their feedback, the partial maps can be revised to improve their validity.

***Step 6**: Combine maps of related areas.* Examine the collection of partial maps to find strongly related areas. Every time two or more partial maps deal with strongly related areas, attempt to combine them into a single partial map, with the objective of reducing the complexity of the final output.

***Step 7**: Add layer if needed.* Whenever needed to keep the number of items in the top two layers within a reasonable range, a new layer of sub-areas can be added between the first layer (areas) and the next layer (activities). In it, each sub-area should combine the ideas behind the activities grouped under it.

***Step 8**: Map Core and Pillars.* Negotiate access to written documents stating the business unit's overall strategy. Identify in these documents both the central strategy statement of the business unit (the Strategy Core) and the set of expanded strategic objectives (the Strategy Pillars). Map them conceptually.

***Step 9**: Assemble the FSM.* Assemble the FSM out of the elements prepared thus far. Following the template shown in Figure 3, place on the left hand the nominal map prepared in Step 8, and on the right hand the first two or three layers of the partial maps prepared in Steps 2 through 7.

***Step 10**: Validate the FSM.* To validate the FSM, ask individuals whether, in their opinion, it is an accurate representation of what the business unit does. The feedback of individuals, while kept anonymous, is then discussed in a panel with the respondents. The FSM can be revised as needed to improve its validity.

*Illustrative example*

As an illustration of the Protocol, Appendix 2 provides a detailed example, based on the CMR project with Libica. The final FSM is shown in Figure 4 (without the fifth layer, to save space.) The boundary between the nominal and executed strategies in this map is denoted by a dotted line.

## 6. Testing and validation

Nine projects have applied in the field this paper's approach to expressing a business unit's supply chain strategy. This section will discuss how these projects have contributed to test and validate the method.

*First-hand testing and validation*

The CMR projects with Lamynix and Libica were an opportunity not only to develop but also to test first-hand our approach to elicit and represent the supply chain strategy of a business unit. The results highlighted two important success factors of the new method: first, it elicited the supply chain strategy of the business unit, not as it *should be*, but *as it is*; second, the resulting FSM was deemed an actionable conceptualization of the supply chain strategy of the respective business units by the executives in charge. Both of these aspects are expanded and discussed below.

*Eliciting the SCS "as is".* That the FSM Method managed to elicit the supply chain strategy of the business unit *as it is*, based on facts, became evident during the validation of the partial maps and the final FSM of both Lamynix and Libica. Across the table, while the teams were discussing the evolving map, it was common to hear a question like: "*Do we actually do this?*" followed by a rich, nuanced conversation on what the business unit *actually* does, and why. The ideas and purposes behind the activities, as well as the factuality of the activities themselves, were the subject of clarifying and substantial discussion.

*Actionability of the FSM.* That the resulting FSM is actionable became clear when the FSMs of both Lamynix and Libica were used as the starting point for the evaluation and reformulation of their respective supply chain strategies. The details of these exercises will be discussed in separate papers, but citations of some reactions to the findings of the evaluation exercise are shown below.

Of the findings obtained through the analysis of Lamynix's FSM, the company's VP of SC said, "You've hit the nail on the head ... This is a very good crystallization of things." The resulting report of the evaluation exercise (which was based on the FSM) "highlights the key issues" and "managed to find the key conflicts." He added: "Your system seems to be able to single out and capture the fundamental issues we're struggling with... I think we have a foundation for moving forward." Likewise, Libica's EVP of Operations and Supply Chain described his reaction to the main finding as an epiphany: "To me, it was like a light bulb went off...." He added that the cause of the problem they were facing "was clear from the material."

The reactions to the findings of these evaluation exercises reveal the FSM's potential as an actionable device. It serves as foundation to conduct further analysis beyond the mere characterization of the supply chain strategy, which can produce useful, factual insights about the supply chain strategy of a business unit.

*Third-party projects.* Besides the two projects conducted first-hand by the authors, the FSM Method has been applied in at least seven other projects, all conducted by third parties who received varying degrees of guidance. These projects are described below.

*Projects by practitioners in Colombia*

The first third-party to try the FSM Method in the field was a group of practitioners based in Bogota, Colombia. These practitioners were not involved in the process of

developing the FSM Method. Aware of the work, they requested a copy of the protocol to apply it in several projects. Three practitioners applied the FSM Method's protocol step by step in as many projects. Through on-line and physical meetings, the research team followed their progress and provided guidance when needed. One of the projects was aborted when the project sponsor was promoted before the project completed. The two other projects — both in the food industry — resulted in FSMs that were validated by teams from the respective firms as fair representations of the supply chain strategies in question. Both FSMs were then used as starting points for the evaluation of the supply chain strategies of these two business units.

One of the practitioners commented: "The method is well-defined, clear and easy to follow," and reported that the SC Director of the target business unit remarked that the map "captures in a clear form concepts that we are not capable of explaining inside the company." The Director described the maps as "a useful tool to communicate across areas," and expressed surprise that "through such simple interviews it was possible to capture in a clear manner *what* the organization does and *how* it is done."

*Master thesis in the US*

Another application of the FSM Method was a master's thesis project advised by one of the authors of this paper and conducted by a team of two graduate students, Hung and Pierce (2011, p. 47–50), regarding the supply chain strategy that an aerospace company used for a specific project. The students were given the FSM protocol and some general guidance on the approach, yet they were afforded wide latitude in its implementation. The students chose to expedite some of the steps in the protocol so they would require less time, at the expense of granularity. The resulting FSM was validated by the target business unit as representative of their supply chain strategy. In their conclusions, Hung and Pierce (2011, p. 40–41) state the FSM Method is "applicable to the aerospace industry", since it allowed them to "elicit the tacit supply chain strategy" of the project they were analyzing, which enabled them to "evaluate and diagnose how well the current supply chain strategy ... fits with the project's documented business strategy."

*Projects by Barros* et al. *(2013) in Portugal*

An academic researcher in Portugal, not involved with developing the FSM Method but aware of it, requested the protocol and illustrative examples of the FSM method in order to apply the approach in her research. She neither requested nor received any significant guidance on the approach besides a few cursory clarifications. Due to time constraints, she also decided to adapt the protocol to speed up the process of creating the maps. She successfully completed FSMs in four case studies in different industries: semiconductors, automotive, pharmaceuticals and wines. These FSMs were validated by the target firms and published in Barros (2011, p. 37) and Barros *et al.* (2013, p. 1063–4). The "functional strategy mapping method" was chosen for their research, state Barros *et al.* (2013), "because it captures practices that express the implemented supply chain strategy and allows an easy verification of the alignment between these

practices and the firm's overall strategy."

As in the case of the two American graduate students, the abbreviation of certain steps prevents these projects from serving as a validation of the *exact* Protocol presented in Appendix 1. But the fact that these five projects completed FSMs that were then validated by the target companies as representative of their respective supply chain strategies is at least evidence in favor of the applicability of the framework to represent the supply chain strategy of a business unit across a diversity of industries.

## 7. Comparison with Extant Literature

Eisenhardt (1989) has stated that an "essential feature of theory building is the comparison of the emergent concepts, theory, or hypotheses with the extant literature". Both the working framework and the general ideas behind the steps of the FSM Method were compared to the extant literature, both within supply chain strategy and from other areas.

*SCS as a linking entity*

Hofmann (2010, p. 257) has suggested that "linkages" are "the essence of SCS: particularly due to the cross-sectional and integrating nature of SCM". This is compatible with the idea presented here that the supply chain strategy of a business unit, represented as a conceptual system spread along the *strategy-operations continuum* and the *thematic range*, serves to logically *link* the business strategy and the supply chain operations.

*A hierarchical chain of strategies*

The hierarchical nature of the working framework of supply chain strategy is in line with the proposition from Narasimhan *et al.* (2008) that supply chain strategy "could be viewed as part of a hierarchical chain of strategies," as a "cascading strategy" that "serves to integrate the supply chain processes with the overall direction of the enterprise". The fact that the framework — which was developed independently and without knowledge of their work — fell in line with the proposition of Narasimhan *et al.* (2008) lends credence to its theoretical validity.

*Tapping into tacit knowledge*

*Tacit knowledge* is a prominent concept in organizational literature (Baumard, 1999; Harrison, 2004; Tsoukas, 2004). Nonaka (1994), a foundational figure in popularizing the idea of tacit knowledge, states that it involves both cognitive and technical elements: among the cognitive elements are the individual's images of reality; and of the technical element is the concrete know-how of certain processes. Actual practices "can diverge greatly from official descriptions of these practices. ... Nonetheless, through careful investigation, managers can often find gaps between official *mandates* ... and the actual *practices*" (Harrison, 2004, p. 92, emphasis ours). While some authors (e.g. Baumard, 1999, p. 98) advocate "a long immersion in the organization being studied" of over

half a year for investigating tacit knowledge, other authors (e.g. Harrison, 2004, p. 93) argue that "intensive interviews" are an equally valid means to access "the richest data on emergent practices." To be useful, these interviews 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" (Harrison, 2004, p. 93) This prescription for tapping into the tacit knowledge of an organization provides support to Step 2 of the FSM Method.

*Activities as the essence of strategy*

As mentioned earlier, the idea that a firm's strategy can be found in its decisions and activities is well-rooted in the literature (Mintzberg, 1978; Andrews, 1987; Porter, 1996), and these ideas have been extrapolated to supply chain strategy (Cigolini *et al.*, 2004; Narasimhan *et al.*, 2008; Brun and Castelli, 2008). These ideas fall within a relatively recent school of thought in the strategy field known as *strategy as practice* (Jarzabkowski, 2005; Johnson, 2007; Golsorkhi *et al.*, 2010), and provide support to Steps 3 through 7 of the FSM Method, as they seek to reveal a business unit's executed strategy based on an analysis of its supply chain activities.

*Conceptualization and crystallization*

Nonaka (1994) defines four different modes of knowledge conversion, two of which go across the tacit-explicit divide: the conversion of explicit knowledge into tacit knowledge is called "internalization", while the conversion of tacit into explicit knowledge is called "externalization". The latter is of particular importance since, according to Nonaka, the "articulation of tacit perspectives" is "a key factor in the creation of new knowledge," by means of which "concepts become transferable".

As extensions to the ideas of externalization and internalization, Nonaka presents "conceptualization" and "crystallization". In conceptualization, "tacit 'field-specific' perspectives are converted into explicit concepts that can be shared beyond the boundary of the team." In crystallization, the knowledge created by the team is "crystallized into some concrete 'form'," such as a concept or system (Nonaka, 1994). Through crystallization, "various departments within the organization test the reality and applicability" of the concept or system created by a team. This is facilitated by "encouraging experimentation" and "usually leads to refinement of the concept" (Nonaka, 1994).

The FSM Method includes steps to facilitate both conceptualization and crystallization of knowledge regarding the supply chain strategy. Steps 2 through 7 deal with conceptualization, namely making the supply chain strategy explicit as it is executed in the activities of the firm; whereas Step 10 provides a first step towards crystallization.

*FSM and the techniques-tools matrix*

An FSM can be used as a starting point to build the techniques-tools matrix proposed by Cigolini *et al.* (2004). Figure 6 shows a matrix built on the basis of Lamynix's FSM (Perez-Franco, 2010, p. 94). The eight FPs from Lamynix's FSM were arranged

| | OP1 | OP2 | OP3 | OP4 | OP5 | OP6 | OP7 | OP8 | OP9 | OP10 | OP11 | OP12 | OP13 | OP14 | OP15 | OP16 | OP17 | OP18 | OP19 | OP20 | OP21 | OP22 | OP23 | OP24 | OP25 | OP26 | OP27 | OP28 | OP29 | OP30 | OP31 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FP1 | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FP2 | | | | | | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | |
| FP3 | | | | | | | | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | |
| FP4 | | ✓ | | ✓ | ✓ | | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | | ✓ | | | | | ✓ | ✓ | | ✓ | ✓ | | | | ✓ | |
| FP5 | | | | | | | | ✓ | | | | | | | | | | ✓ | ✓ | ✓ | | | ✓ | | | | | | | | |
| FP6 | | | | | | | | ✓ | | | | | | | | | | | | | ✓ | | ✓ | | | | | | | | |
| FP7 | | | | | | | | ✓ | | | | | | | | | ✓ | | | | | | | ✓ | ✓ | ✓ | | | | ✓ | |
| FP8 | | | | | | | ✓ | ✓ | | ✓ | | | | | | | | | | | | | | | | | | | | ✓ | ✓ |

Figure 5: A 'techniques-tools matrix' built on the basis of a FSM

as row headers and the 31 OPs from the FSM were arranged as column headers to form an 8 x 31 matrix. For every instance where the team of experts from Lamynix agreed an OP provided support to a FP, a check mark was added to the matrix.

The only substantial difference between the resulting matrix and the one shown in Cigolini *et al.* (2004) is that variant is not limited to concepts in the interface between firms or to concepts chosen from a catalog, whereas theirs is.

*Similarities with Schnetzler, et al.'s (2007)*

Finally, it is interesting to compare the FSM, which is mostly built from the ground up and based on the knowledge of specific activities of the firm, with the graphical depiction of a "decomposed" supply chain strategy — the SCDD — found in Schnetzler *et al.* (2007). A supply chain strategy formulated following their approach will be developed entirely from the top down. Whereas the FSM is a factual representation of a current supply chain, the SCDD depicts is a new supply chain strategy design. Both share a tree-like structure, yet the SCDD uses fixed, predetermined categories for the 'branches', while the FSM Method allows these categories to emerge from the data collected in the interviews. Differences notwithstanding, the structural similarities and the fact that the FSM was developed independently from, and without knowledge of, the SCDD (Schnetzler *et al.*, 2007) lends some validity to this approach.

## 8. Limitations and future research

*Limitations of the FSM Method*

It may be difficult to map areas of unresolved conflict within the organization. Different members of the organization may have very strong, divergent views that are hard to reconcile and to conceptualize in a form that can be accepted by the group as a factual statement.

A second challenge is to capture activities that are undergoing a significant and fast transformation. A firm that has already launched important changes to its activities whose deployment has not yet been completed 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.

*Areas for further research*

In its current form, the FSM Method works best for expressing the supply chain strategy of a single entity, such as a single business unit. Future research may look into adapting these ideas to mapping the supply chain strategy of a group of business units.

Further research may look into how the external environment of a business unit may be represented in a way that is compatible with the FSM, for the sake of subsequent evaluation and reformulation efforts.

The applicability of the FSM Method to areas beyond supply chain management seems promising, but is still unexplored. Since the FSM Method is not based on theory specific to supply chain management, it might be applicable to other realms within management and strategy.

## 9. Conclusions

This paper makes several contributions to the supply chain strategy literature. The first is a working definition of the supply chain strategy of a business unit as both the patterns of decisions related to its supply chain activities (the *executed strategy*), and the set of objectives the business unit seeks to achieve through these activities (the *nominal strategy*). This definition is in line with the extant literature.

Another contribution is the idea that the supply chain strategy of a business unit can be represented as a *conceptual system*, i.e. a collection of concepts (both nominal and executed) spread along the *strategy-operations continuum* and the *thematic range*, linking the business strategy and the supply chain operations of the business unit and working together to achieve the goal of sufficiently supporting the business strategy in a harmonious and comprehensive manner.

The third contribution is the Functional Strategy Mapping Method, an approach to elicit the *'as is'* supply chain strategy of a business unit. By allowing practitioners to reveal and express the supply chain strategy of a business unit in clear and realistic terms, the FSM Method should encourage and facilitate the discussion of a firm's supply chain strategy in a grounded and meaningful manner. The FSM Method *ties back* to the literature (Eisenhardt, 1989) in multiple ways.

The FSM Method was applied in two collaborative management research projects and by third parties in an additional seven projects. The resulting Functional Strategy Maps were deemed by the respective business units as fair representations of their supply chain strategies. Furthermore, in half of these projects the FSMs served as starting points to conduct later evaluation exercises that yielded important insights about these firms' supply chain strategies. These insights were described by the heads of supply chain in these firms as both accurate and revealing, lending further weight to the validity of the FSM as a grounded depiction of a business unit's supply chain strategy.

Even though the FSM Method has some limitations, the self-knowledge that a firm gains from creating a FSM has proven beneficial both as a device to communicate

their supply chain strategy and as a meaningful starting point for its evaluation and improvement efforts.

## Appendices

Appendices 1 and 2 can be downloaded here: `zirie.com/append.pdf`

## References


Aitken, J., Childerhouse, P. and Towill, D. (2003), "The impact of product life cycle on supply chain strategy," *International Journal of Production Economics*, vol. 85, no. 2: pp. 127–140.

Andrews, K. (1987), *The concept of corporate strategy*, Dow Jones-Irwin Homewood, Ill.

Bakir, A. and Bakir, V. (2006), "Unpacking complexity, pinning down the elusiveness of strategy: a grounded theory study in leisure and cultural organisations," *Qualitative Research in Organizations and Management: An International Journal*, vol. 1, no. 3: pp. 152–172.

Barros, A. C. (2011), *Methodologies for the selection of tailored practices for supply chain management*, Ph.D. thesis, Universidade Tcnica de Lisboa – Instituto Superior Tcnico.

Barros, A. C., Ana, P. B. and Blanco, E. E. (2013), "Selection of tailored practices for supply chain management," *International Journal of Operations & Production Management*, vol. 33, no. 8: pp. 1040–1074.

Baumard, P. (1999), *Tacit knowledge in organizations*, SAGE Publications, Thousand Oaks CA.

Blackman, I. D., Holland, C. P. and Westcott, T. (2013), "Motorola's global financial supply chain strategy," *Supply Chain Management: An International Journal*, vol. 18, no. 2: pp. 132–147.

Brun, A. and Castelli, C. (2008), "Supply chain strategy in the fashion industry: Developing a portfolio model depending on product, retail channel and brand," *International Journal of Production Economics*, vol. 116, no. 2: pp. 169–181.

Carter, C. R., Rogers, D. S. and Choi, T. Y. (2015), "Toward the theory of the supply chain," *Journal of Supply Chain Management*, vol. 51, no. 2: pp. 89–97.

Charmaz, K. (2014), *Constructing grounded theory*, SAGE Publications, Thousand Oaks CA.

Cigolini, R., Cozzi, M. and Perona, M. (2004), "A new framework for supply chain management: conceptual model and empirical test," *International Journal of Operations & Production Management*, vol. 24, no. 1-2: pp. 7–41.

Dittmann, J. P. (2012), *Supply chain transformation: building and executing an integrated supply chain strategy*, McGraw Hill Professional.

Easterby-Smith, M., Thorpe, R. and Lowe, A. (2002), *Management research: an introduction*, SAGE Publications, Thousand Oaks CA.

Eisenhardt, K. M. (1989), "Building theories from case study research," *Academy of Management Review*, vol. 14, no. 4: pp. 532–550.

Eisenhardt, K. M. and Graebner, M. E. (2007), "Theory building from cases: opportunities and challenges," *Academy of management journal*, vol. 50, no. 1: pp. 25–32.

Eriksson, P. and Kovalainen, A. (2008), *Qualitative methods in business research*, SAGE Publications, Thousand Oaks CA.

Frohlich, M. T. and Westbrook, R. (2001), "Arcs of integration: an international study of supply chain strategies," *Journal of Operations Management*, vol. 19, no. 2: pp. 185–200.

Ghemawat, P. and Nueno, J. L. (2003), "Zara: Fast fashion," .

Giunipero, L. C., Hooker, R. E., Joseph-Matthews, S., Yoon, T. E. and Brudvig, S. (2008), "A decade of scm literature: Past, present and future implications," *Journal of Supply Chain Management*, vol. 44, no. 4: pp. 66–86.

Glaser, B. and Strauss, A. (1967), "The discovery of grounded theory: strategies for qualitative inquiry," *Aldin, Chicago*.

Golsorkhi, D., Rouleau, L., Seidl, D. and Vaara, E. (2010), *Cambridge handbook of strategy as practice*, Cambridge University Press.

Goulding, C. (2002), *Grounded theory: a practical guide for management, business and market researchers*, SAGE Publications, Thousand Oaks CA.

Gummesson, E. (2000), *Qualitative methods in management research*, SAGE Publications, Thousand Oaks CA.

Harrison, A. and New, C. (2002), "The role of coherent supply chain strategy and performance management in achieving competitive advantage: an international survey," *Journal of the Operational Research Society*, vol. 53: pp. 263–271.

Harrison, M. I. (2004), *Diagnosing organizations: Methods, models, and processes*, SAGE Publications, Thousand Oaks CA.

Hicks, D. A. (1999), "The state of supply chain strategy," *IIE solutions*, vol. 31, no. 8: pp. 24–29.

Hofmann, E. (2010), "Linking corporate strategy and supply chain management," *International Journal of Physical Distribution & Logistics Management*, vol. 40, no. 4: pp. 256–276.

Hung, J. and Pierce, N. (2011), *A qualitative mapping and evaluation of an aerospace supply chain strategy*, Master's thesis, Massachusetts Institute of Technology.

Jarzabkowski, P. (2005), *Strategy as practice: An activity based approach*, SAGE Publications, Thousand Oaks CA.

Johnson, G. (2007), *Strategy as practice: research directions and resources*, Cambridge University Press.

Kim, B. (2013), "Competitive priorities and supply chain strategy in the fashion industry," *Qualitative Market Research: An International Journal*, vol. 16, no. 2: pp. 214–242.

Lyons, A. C. and Ma'aram, A. (2014), "An examination of multi-tier supply chain strategy alignment in the food industry," *International Journal of Production Research*, vol. 52, no. 7: pp. 1911–1925.

Martinez-Olvera, C. and Shunk, D. (2006), "Comprehensive framework for the development of a supply chain strategy," *International Journal of Production Research*, vol. 44, no. 21: pp. 4511–4528.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D. and Zacharia, Z. G. (2001), "Defining supply chain management," *Journal of Business Logistics*, vol. 22, no. 2: pp. 1–25.

Miles, M. B. and Huberman, A. M. (1994), *Qualitative data analysis: An expanded sourcebook*, SAGE Publications, Thousand Oaks CA.

Mintzberg, H. (1978), "Patterns in strategy formation," *Management Science*, vol. 24, no. 9: pp. 934–948.

Morash, E. A. (2001), "Supply chain strategies, capabilities, and performance," *Transportation Journal*, vol. 41, no. 1: pp. 37–54.

Narasimhan, R., Kim, S. W. and Tan, K. C. (2008), "An empirical investigation of supply chain strategy typologies and relationships to performance," *International Journal of Production Research*, vol. 46, no. 18: pp. 5231–5259.

Näslund, D. (2002), "Logistics needs qualitative research-especially action research," *International Journal of Physical Distribution & Logistics Management*, vol. 32, no. 5: pp. 321–338.

Nonaka, I. (1994), "A dynamic theory of organizational knowledge creation," *Organization science*, vol. 5, no. 1: pp. 14–37.

Pasmore, W. A., Stymne, B., Shani, A. B., Mohrman, S. A. and Adler, N. (2008), "The promise of collaborative management research," *Handbook of collaborative management research*, pp. 7–31.

Patil, R., Avittathur, B. and Shah, J. (2010), "Supply chain strategies based on recourse model for very short life cycle products," *International Journal of Production Economics*, vol. 128, no. 1: pp. 3–10.

Perez-Franco, R. (2010), *A methodology to capture, evaluate and reformulate a firm's supply chain strategy as a conceptual system*, Ph.D. thesis, Massachusetts Institute of Technology, Engineering Systems Division.

Porter, M. E. (1996), "What is strategy?" *Harvard Business Review*, pp. 61–78.

Roh, J., Hong, P. and Min, H. (2014), "Implementation of a responsive supply chain strategy in global complexity: The case of manufacturing firms," *International Journal of Production Economics*, vol. 147, Part B: pp. 198–210.

Schnetzler, M. J., Sennheiser, A. and Schönsleben, P. (2007), "A decomposition-based approach for the development of a supply chain strategy," *International Journal of Production Economics*, vol. 105, no. 1: pp. 21–42.

Shani, A. R., David, A. and Willson, C. (2004), "Alternative roadmaps," *Collaborative research in organizations: Foundations for learning, change, and theoretical development*, p. 83.

Shapiro, R. D. and Heskett, J. L. (1985), *Logistics strategy: cases and concepts*, West Publishing Company St. Paul, Minnesota.

Stevens, G. C. (1989), "Integrating the supply chain," *International Journal of Physical Distribution & Materials Management*, vol. 19, no. 8: pp. 3–8.

Thomas, R. W., Defee, C. C., Randall, W. S. and Williams, B. (2011), "Assessing the managerial relevance of contemporary supply chain management research," *International Journal of Physical Distribution & Logistics Management*, vol. 41, no. 7: pp. 655–667.

Thorpe, R. and Holt, R. (2007), *The SAGE dictionary of qualitative management research*, SAGE Publications, Thousand Oaks CA.

Tsoukas, H. (2004), *Complex knowledge: Studies in organizational epistemology*, Oxford University Press.

Varma, S., Wadhwa, S. and Deshmukh, S. (2006), "Implementing supply chain management in a firm: issues and remedies," *Asia Pacific Journal of Marketing and Logistics*, vol. 18, no. 3: pp. 223–243.

Wu, T., Wu, Y.-C. J., Chen, Y. J. and Goh, M. (2014), "Aligning supply chain strategy with corporate environmental strategy: A contingency approach," *International Journal of Production Economics*, vol. 147, Part B: pp. 220–229.

Yin, R. K. (2013), *Case study research: design and methods*, SAGE Publications, Thousand Oaks CA.

Zhou, H., Shou, Y., Zhai, X., Li, L., Wood, C. and Wu, X. (2014), "Supply chain practice and information quality: a supply chain strategy study," *International Journal of Production Economics*, vol. 147, Part C: pp. 624–633.