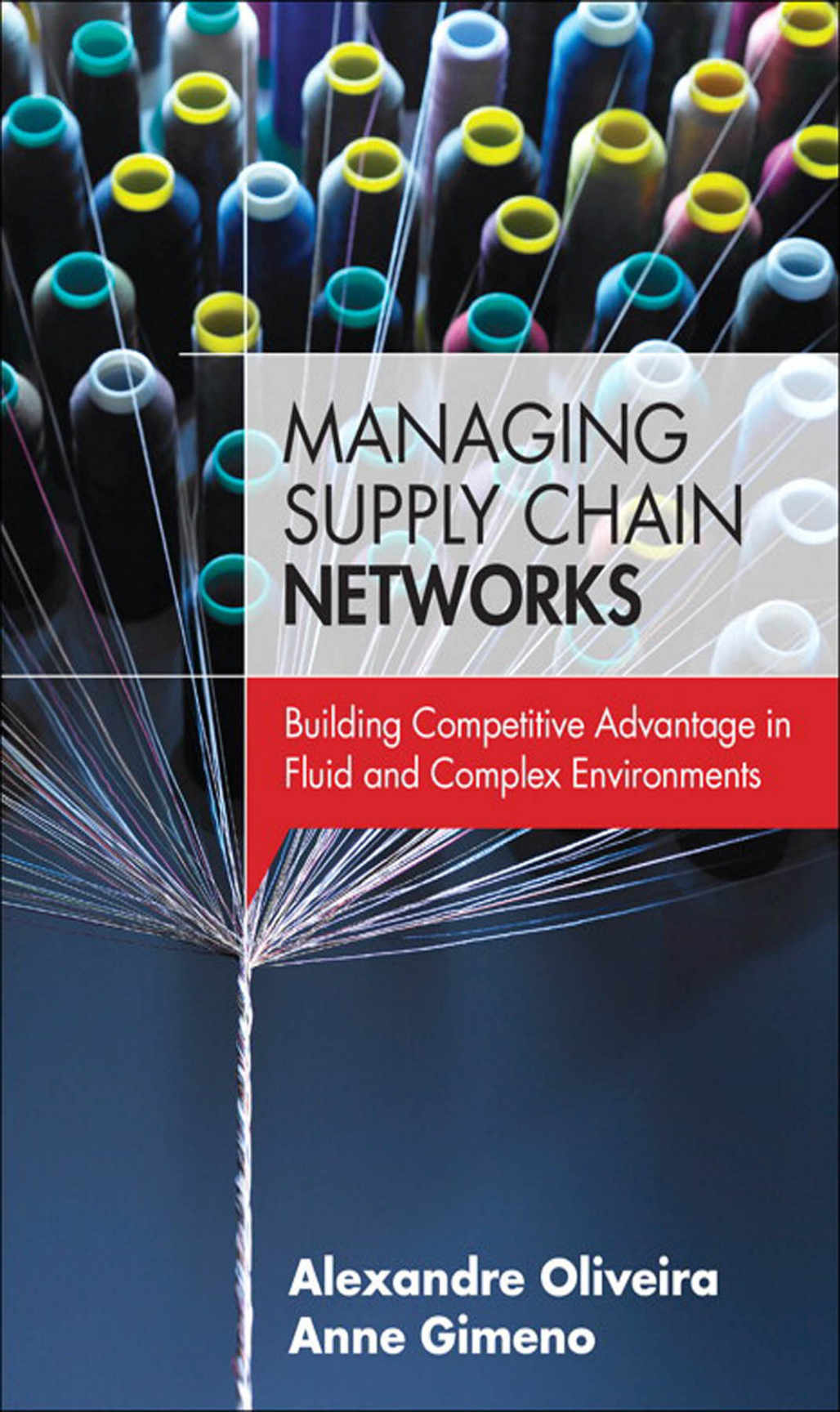
MANAGING
SUPPLY CHAIN
NETWORKS
Building Competitive Advantage in
Fluid and Complex Environments
Alexandre Oliveira
Anne Gimeno

Managing Supply Chain Networks

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Managing Supply Chain Networks

Building Competitive Advantage in Fluid and Complex Environments

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About I.B.S.

The Brazilian Institute of Supply Chain Management Professionals, a leading regional professional association since 2007, benefits its members via technical events, courses, and an annual congress in São Paulo, Brazil.

I.B.S. promotes knowledge transfer with other knowledge centers around the world. The Committee for International Cooperation (CCI) is the structure that builds partnerships for technical cooperation and knowledge exchange with foreign institutions. Ideal partners are national or regional professional associations or universities.

You can find more information about I.B.S. at www.ibpsc.net/IBS.

Preface

During the past few decades, academics and practitioners have debated about the best approach to define a firm's strategy. The model based on the dynamics of competition within an industry called the Five Forces That Shape Strategy (Porter, 1985) has been largely accepted despite several dissonant opinions.[1,2,3] Recently an interesting approach called the Blue Ocean Strategy (Kim, et al. 2005) suggested management strategies that focus more on creating or entering unexplored markets than on competing in aggressive environments where Porter's forces exist. These theories suggest the snapshots of the business environments are led by few people, typically managers, directors, or external consultants.

Approaches based on the economic model of imperfect competition suggest the market winner is the best competitor among all firms that dispute space in a dynamic and competitive environment. The corporate governance structure responsible for delivering shareholder value on the one side and stakeholder expectations on the other includes some of the following mechanisms: the board of directors, board committees, the chief executive officer, executive committees, management committee, and independent auditors. The traditional business environment usually offers a clear imbalance between the relative influence of shareholders and stakeholders in favor of the stakeholders.

But a dramatic change in these relative forces is one of the most perceivable effects of the creation of fluid and complex supply networks. This is a consequence of the deep business environment

[1] K. P. Coyne and S. Subramaniam, "Bringing Discipline to Strategy," *The McKinsey Quarterly,* no 4 (1999): 14–25.

[2] B. Wernerfelt, "A Resource-Based View of the Firm," *Strategic Management Journal,* 5 (April-June): 171–180.

[3] D. Recklies, "Beyond Porter – A Critique of the Critique of Porter," accessed March 2014 from www.themanager.org/strategy/BeyondPorter.htm.

transformation that destroyed the fundamentals of value chain management and the very basic principles that supported previous strategic thinking. In addition, technology omnipresence is the underlying mechanism that has altered the dynamism of the business environment and shrunk both the economic and industry cycles. Barriers to entering new markets have reduced, new entrants have multiplied, and substitution of products and service is customers' expectation in most industries. This factors have reduced the importance of the rivalry among existing competitors because these have developed external alliances in order to survive. Companies no longer compete; supply chains do. In fact, the supply chains' networks compete with each other. This scenario has distanced the Five Forces Model from applicability as it reduces the effects of each of the forces.

The ability to design businesses capable of elasticity, resilience, and responsiveness requires an environment triggered by constantly updated market knowledge. The only asset that matters is people. The only strategy that delivers long-lasting shareholder value is the innovation-enabled knowledge leadership. The only business model that enables a truly innovative environment is the management of supply chains' networks. It is necessary to perceive (sense based on knowledge) the next market changes and anticipate the new strategy. The quality of being able to sense is known as wisdom. Excellence in managing supply networks creates wise competitors—a conglomerate of complementary businesses that work together to win in the market and deliver value to shareholders and stakeholders.

The challenge is then to identify the mechanisms that enable market changes' responsive strategies for fluid and complex supply networks. This new business environment has no longer the premises that sustained the arguments for the value chain. A new paradigm exists. Previous dynamism and volatility has been overcome by market fluidity, complexity, and unpredictability. The only relevant long-term strategy capable of creating and sustaining shareholder value is knowledge management. While the traditional value chain approach

prepares for competitiveness, the value chain prepares for innovation. Innovativeness is the consequence of the wise application of knowledge accumulated over time. The ability to change and simultaneously add value represents the ultimate competitive leadership.

The organization must be able to concurrently deliver a groundbreaking cost-benefit environment to shareholders and stakeholders. Some firms previously ignored during traditional strategic thinking models are now influential stakeholders. The governance structures that balance shareholder value and stakeholder interest need to review their policies because their relative importance is now very similar. Once the single firm no longer has the resources to compete in its industry sector and given that only through alliances will this firm shape high-performance supply networks capable of beating other equally designed supply networks, it is possible to understand the power these elements external to the firm have. Given the multiplication of players that influence the supply network of which a firm is a part, and because many of these players are influential enough to be considered stakeholders, there is a multiplying effect of externalities within the wise competitors. This massive effect of externalities is associated with the reduction of suppliers' bargaining power, the reduction of barriers to entry in the markets, and the reduction of barriers to create substitute products or services, as explained previously, disabling any competition theory (perfect or imperfect) from explaining the new economy business environments.

It is during this period that the wise competitors start to create a common governance structure, represented by the Supply Network Governance Diamond (SNG Diamond Model). Each firm assigns one or more representatives to build a multicompany structure focused on the long-term success of the entire network environment. The diversity of ideas forms the premium raw material to deliver innovation. The wise competitors collaborate and build a common governance structure capable of promoting knowledge transfer and strategic decision making. This creative environment continuously produces new

ideas to respond to all sorts of challenges that test the performance of the supply networks. Risks, opportunities, problems, and trends are the filters to select the most appropriate ideas that are tested, deployed, and experienced by the wise competitors.

The value-added innovation rate is proportional to the ability of transferring knowledge within supply network firms—the wise competitors. To innovate means to "make changes in something established, especially by introducing new methods, ideas, or products."[4] The players of the innovative supply network are the wise competitors capable of creating permanent knowledge flows that allow business visibility to the point of sensing even the smallest environment oscillation. Therefore, innovative supply networks anticipate strategy adjustments prior to the creation of disruption valleys by preserving and increasing shareholder and stakeholder value.

Authors' Note

Over the years, the common understanding of world-class operations has evolved from the simplistic, focused management of functional silos to a comprehensive approach of supply network management as the driver to deliver ultimate shareholder value. Although many commentators have tried to describe this evolution, most have failed to properly address the supply chain's fundamental building block: knowledge management. Therefore, their analyses also overlooked the only element that delivers long-term sustainable shareholder value: people.

We are writing five books for Pearson that cover the most important features of this evolutionary journey. These books will provide detailed roadmaps and models to diagnose, implement, and sustain

[4] www.oxforddictionaries.com/definition/english/innovate

world-class supply chain network management in organizations of all types:

- *A Guide to Supply Chain Management: The Evolution of SCM Models, Strategies, and Practices* (an e-book) introduces the core concept of knowledge management as the only strategy capable of steering supply chains networks management to successfully compete in highly competitive markets. This introductory work reviews supply chain practice from its earliest stages and presents reference models that support our view of this discipline as a business driver to deliver shareholder value.

  This book introduces the *Supply Network Alignment Reference Model* (SNAR Model), which organizes the supply chain networks into knowledge areas that enable accurate decision making from the strategic level to daily management decisions.

  This book also introduces the *Supply Network Knowledge Management Maturity Roadmap* (SKMap). Before the development of a supply network reference model, it was necessary to understand the intermediate evolutionary stages of knowledge management within the supply chain. The SKMap organizes and correlates several strategies and practices according to a unique structure that allows you to understand how to face the future challenges of managing supply chain networks in fluid and complex environments.
- *Supply Chain Management Strategy: Using SCM to Create Greater Corporate Efficiency and Profits* explores how supply chain management delivers shareholder value. The introduction covers topics such as the supply chain master plan, cash-management cycle, purchase-to-pay cycle, and manufacturing-to-revenue cycle. This book introduces the *Supply Network Business Value Model* (SNValue Model) and discusses the supply chain mechanisms that generate value for the business. It addresses the following topics: enabling sales volume

growth, enabling market-share growth, reducing revenue cycle, reducing lost sales, supporting marketing and sales initiatives, enabling customer experience by improving customer perception, managing the cost to serve, offering differentiated service packages, enabling margin growth, reducing cost of sales, balancing asset management, and balancing service level and cost structure.

This book also presents the *Business Value Impact Chart* (BV Chart) and the *Balanced Control Panel* (BC Panel). The third part of the book covers how each of the SNAR Model knowledge areas can contribute to each of the factors that enable shareholder value. The tool used to establish these relationships is the BV Chart.

- *Executing the Supply Chain: Modeling Best-in-Class Processes and Performance Indicators* covers the supply network governance cycle and explains the mechanisms needed to understand the business though process mapping, risk analysis, and the definition and use of performance indicators for all areas directly or indirectly related to supply chain management. The second part of the book presents how each of the SNAR Model knowledge areas can be monitored and controlled by performance indicators. Other chapters present real-world metrics from companies of different sizes, sectors, and countries, and discuss benchmarking techniques.
- *Customer Service Supply Chain Management: Models for Achieving Customer Satisfaction, Supply Chain Performance, and Shareholder Value* focuses on the role of customer service as a strategic integrator for differentiated supply chain management. This book presents the *Customer Service Management Model* (CSM Model), a dynamic mechanism developed to evaluate the interactions present in the customer service environment. The model presents four pillars and provides a

quantitative approach to understand the connection between them:

1. Customer Service Level Expectation
2. Supplier Service Level: Hired Performance
3. Customer Service Level Perception
4. Supplier Service Level: Delivered Performance

Although the book discusses some traditional customer service elements such as pre-transactional, transactional, and post-transactional service, the most important topics are customer service strategies, managing service levels, and customer service organization, respectively.

- *Managing Supply Chain Networks: Building Competitive Advantage in Fluid and Complex Environments* presents a solid roadmap for managing knowledge within organizations across all industries. You learn how to build, implement, and sustain long-term knowledge management as a consistent strategy to deliver business value through supply chain innovation leadership.

  This book presents the *Supply Network Governance Diamond Model* (SNG Diamond) which is executed through...people! The SNG Diamond Model is a common governance structure focused on the long-term success of the entire supply network that connects knowledge management and risk management and reviews policies that promote the innovative environment required to face the challenges of managing fluid and complex supply networks.

1

From Value Chain to Value Network

As introduced in the preface, during the past few decades academics and practitioners have debated about the best approach do define a firm's strategy. Different approaches generate specific consequences on the effort to implement the designed strategy and on the quality of the business results that derive from the strategy's lifecycle. The model based on the mechanism of imperfect competition within an industry called the Five Forces That Shape Strategy (Porter 1985) is largely accepted, despite several dissonant opinions.[1,2,3] Recently, an interesting approach called the Blue Ocean Strategy (Kim, et al. 2005) suggests management strategies that focus more on creating or entering unexplored markets rather than competing in aggressive environments where Porter's forces exist.

Both models offer theoretical arguments to support a "what-to-do" approach for these methodologies that follow a strategy-definition sequence. Despite any discussion regarding the validity or applicability of the theoretical arguments these models use, the fact is that no what-to-do model is capable of delivering a quality response to contemporary business environment challenges. The firm's success depends on "how-to-do" elements (see Figure 1.4).

1. K. P. Coyne and S. Subramaniam, "Bringing Discipline to Strategy," *The McKinsey Quarterly,* no 4 (1999): 14–25.
2. B. Wernerfelt, "A Resource-Based View of the Firm," *Strategic Management Journal, 5* (April-June): 171–180.
3. D. Recklies, "Beyond Porter – A Critique of the Critique of Porter," accessed March 2014 from www.themanager.org/strategy/BeyondPorter.htm.

The idea that "every firm is a collection of activities that are performed to design, produce, market, deliver, and support its product" was presented in (Porter 1985) and illustrated as shown in Figure 1.1.

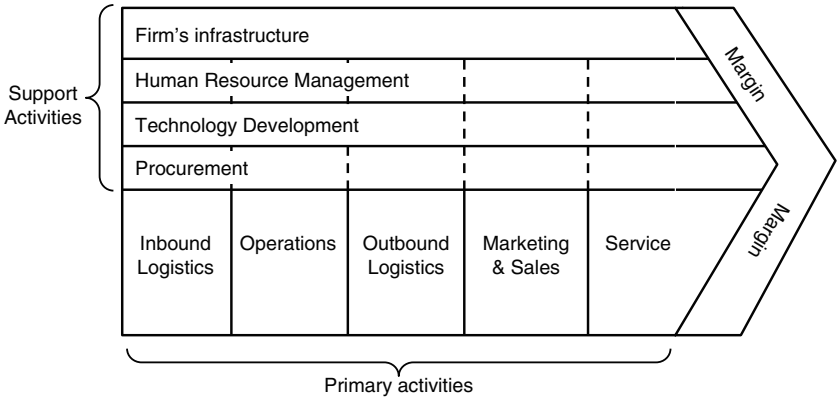

Figure 1.1 The generic value chain

Porter (1985) explains the design and performance of a firm's value chain "are a reflection of its history, its strategy, its approach to implementing its strategy, and the underlying economics of the activities themselves." By not referring to any relative weighting between these elements and not defining any sequencing, this statement suggests these elements equally influence the design and performance of the value chain, as shown in Figure 1.2.

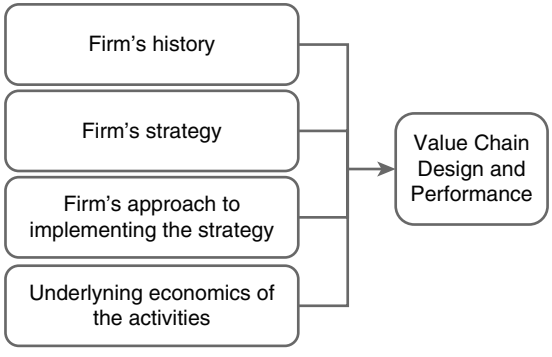

Figure 1.2 Value chain dynamics, 1

The reality, though, imposes different dynamics as there are only two independent variables:

1. Firm's history, which also defines its culture
2. The underlying economics of the activities

These elements influence the others.

The authors believe a third element should be unveiled: the existing strategy. Except for the situation when the organization is first ever in defining a strategy, which is unlikely to happen in most cases, the existing strategy will certainly influence the shape of the future strategy as the effort of transformation has to be considered when managing the value chain redesign. A similar argument was presented by Werner (1984),[4] who questioned the feasibility of evaluating the attractiveness of an industry, independently of the resources a firm brings to that industry.[5] Therefore, there are three independent variables to influence the value chain design and performance:

1. Firm's history
2. Underlying economic activities
3. Existing value chain design

To explain the reasons why the authors believe Porter's theory is unlikely to survive in the existing business environment requires additional consideration of these apparently independent variables.

[4] B. Wernerfelt, "A Resource-Based View of the Firm," *Strategic Management Journal*, 5 (April-June): 171–180.

[5] http://en.wikipedia.org/wiki/Porter_five_forces_analysis, accessed March 2014.

Porter's central questions that underlie the choice of competitive strategy
Interpreted, adapted, and complemented by the authors.

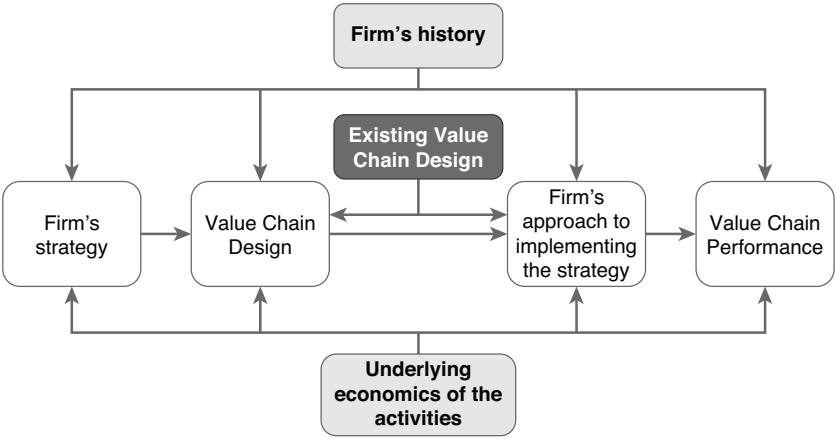

Figure 1.3 Choice of competitive strategy

The firm's history includes the business relationship history (products, suppliers, customers, service providers, internal interfaces), which defines *what* things are done and the culture of this firm, which defines *how* things are done. Gerry Johnson's Cultural Web (Johnson, et al. 1999) model offers a valuable approach to diagnose a firm's culture, observing the following dimensions: routines, rituals, symbols, stories, control systems, power structure, organizational structure, and the paradigm. Therefore, a firm's history influences the following:

- The strategy definition.
- The approach to implementing the strategy.
- The (re)design of the value chain required to meet the strategy's goals.
- The value chain performance. Both business practical attributes and business culture are present during a strategy's lifecycle.

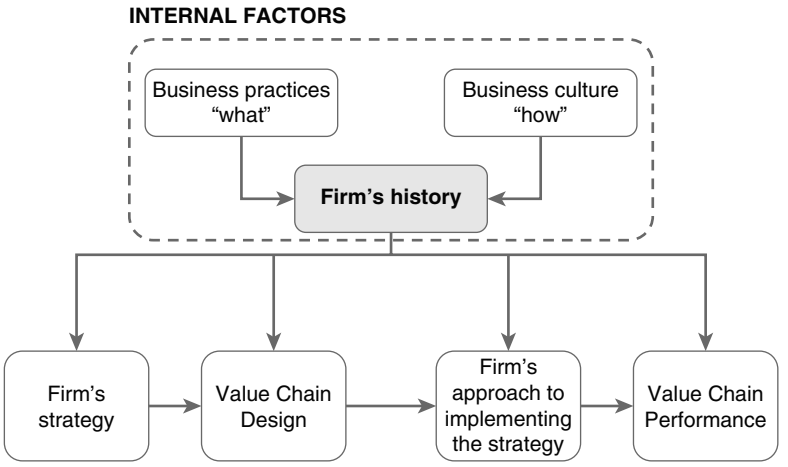

Figure 1.4 Strategy definition, internal factors

As cited, the second independent variable that defines the firm's strategy is the underlying economics of the activities. Using a simple approach to address this variable, it is possible to observe that economic activities lie on two time horizons:

1. A short-term microeconomics scenario, usually subject to national or regional specificities
2. A medium- to long-term macroeconomic structural environment

Porter's value chain theory indicates two attributes that define a firm's competitive strategy:

1. Long-term profitability
2. The relative position within an industry.

   This statement is guided by the premise that the Five Forces Model is only applicable at the line-of-business industry level, which disables industry group or industry sector-level analysis. In other words, it neglects several significant interactions within supply networks. This guideline is crucial to determine the obsolescence of Porter's theory.

Long-term profitability and relative position within an industry are extremely sensitive to different economic horizons. If economic stability horizons shorten, the risk that a given strategy becomes obsolete increases dramatically.

Therefore, it is expected that the economics of the environment influence not only the strategy itself but also the approach to its implementation and in the long run, its performance. Note that we have segmented Porter's suggested "value chain design and performance" into different elements because they do not have a mutually exclusive interaction. It is not possible to define the value chain performance only by its design.

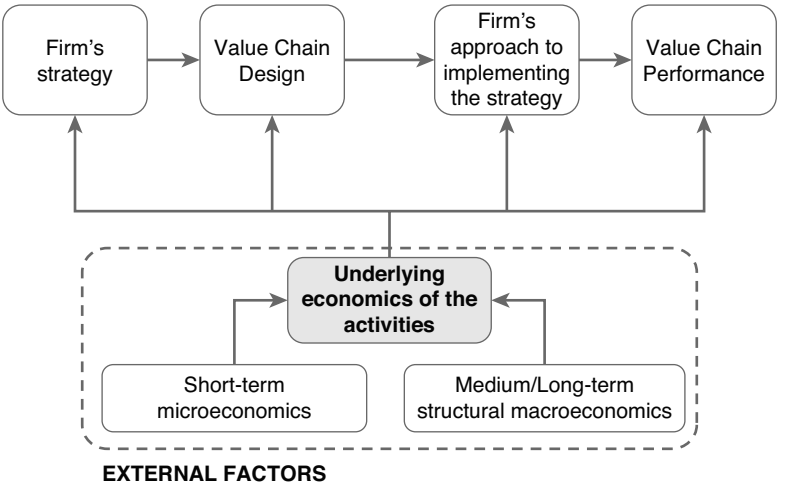

Figure 1.5 Strategy definition, external factors

The selected firm's value chain strategy, influenced by (1) the existing strategy, (2) the underlying economics, and (3) the firm's history, suggests a value chain design. The effort and the roadmap used to move from the existing shape to the proposed value chain are influenced by a firm's culture (the way things are done) and by the external elements which are mostly determined by the industry's economics, as described before.

The speed, quality, and completeness of the strategy implementation define business performance during the transition and when the new value chain foundations have been settled.

This business approach suggests that four elements will drive value chain modifications:

1. Existing business practices (what the firms do)
2. Business culture (how the firms do it)
3. Micro-economics (local/regional business environment with short- to medium-term perspective)
4. Macro-economic (medium- to long-term structural balance with local, regional, and global impact)

While the internal factors are expected to face very limited spontaneous change due to people's unwillingness to do things differently, the external factors have always been more dynamic and uncontrollable by businesses mechanisms.

The Supply Network Alignment Reference Model

Over the years, the common understanding of world-class operations has evolved from the simplistic, focused management of functional silos of isolated knowledge islands (see Figure 1.1) to a comprehensive approach to supply network management as the driver to orchestrate fluid and complex environments in order to deliver ultimate shareholder value (Oliveira and Gimeno, 2014).

Numerous approaches have attempted to describe this evolution, but none has properly addressed the supply chain's fundamental building block: the management of knowledge. Therefore, previous works have also missed adequately referring to the only element capable of delivering long-term sustainable shareholder value: people.

The Supply Network Knowledge Maturity Map (SKMap) is a reference model to understand the intermediate evolutionary stages of knowledge management within the supply network and is formed by five stages:

1. Pre-supply chain stage
2. Supply chain early stage
3. Supply chain maturity stage
4. Supply chain excellence stage
5. Supply chain innovation stage or supply network management

Because organizations are hardly likely to have one single supply chain to support all their operations, it is commonly found that several "supply chains" are managed concurrently and each of these will have a particular moment within the SKMap. The complete model has eight different maturity levels and five key evolutionary outputs. Over time, companies tend to move through the maturity levels, from the functional knowledge silos to the developed supply network management environment:

- Functional silos
- Supply chain building blocks
- Tactic integration
- Supply chain governance
- Integrated business
- Selected supply chain management
- Extended supply chain management
- Supply network management

Even in the past, when the supply chain concepts had not yet been introduced, companies already had policies and routines which were the pillars of today's best practices. But the transition from

disconnected functional silos to the supply chain building blocks can only occur through the proper management of knowledge.

Attempts to communicate how supply chain maturity develops within the organizational structures have failed either due to a limited or incomplete perspective of supply chain management or due to a biased approach focusing on specifics elements of the supply chain. Some of these proposed models are based on a purely academic approach, unable to grasp the flavor of real-world dynamics. Common disciplines, usually forgotten over the years, include governance, risk management, knowledge management, human resources, and project management.

Examples of biased supply chain management approaches include expressions such as *customer-centric supply chains, demand-driven supply chains, lean supply chains,* and *agile supply chains.* All these propose value through arguments structured upon a limited perception of the complexity of supply networked companies. Although relevant, these approaches are insufficient to deliver the real promise of any business: lifelong shareholder value and significant stakeholder value.

Even though several management models have been used to suggest how companies can create and sustain adding value supply chains, none of these has succeeded in properly addressing the basic issue of managing the knowledge and its core strategies. Despite the promise that several so-called *best practices* promote the eventual benefits achieved by using a variety of *state-of-the-art* methodologies, all areas of the organization need a common basic resource: people. *People* represent the only true building block capable of delivering sustainable long-term shareholder and stakeholder values.

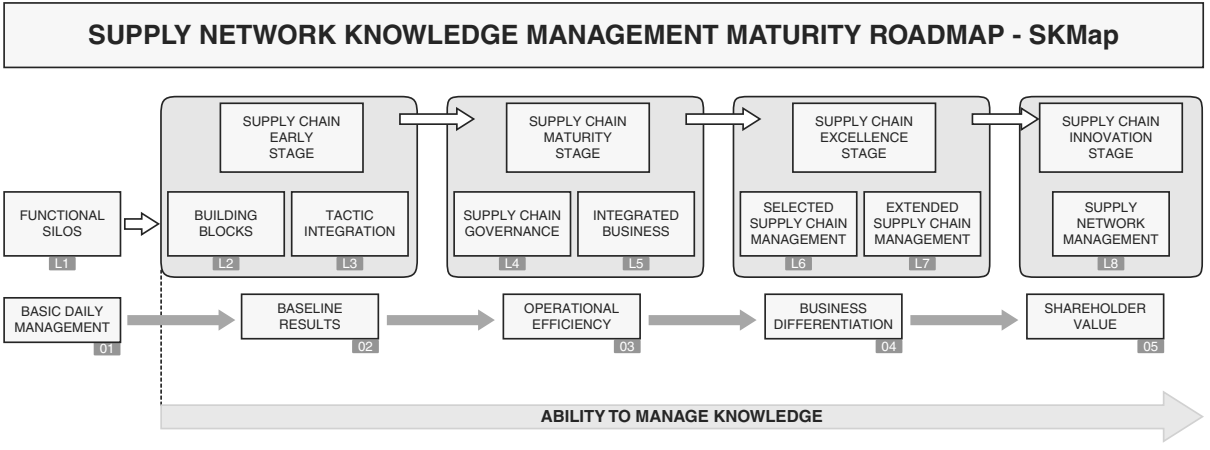

Figure 1.6 SKMap

The knowledge areas that interact in the supply network dynamics are structured according to the Supply Network Alignment Reference Model (SNAR Model). Although the SNAR model is detailed in the section in Chapter 2 called, "SKMap," it needs an introduction at this point to support the discussion in the following pages of the book. The SNAR model organizes all knowledge areas of the business environment and emphasizes those closely related to the value network.

The supply chain building blocks define two important functional areas: planning logistics and synchronous operations. The synchronous operations knowledge area has five pillars:

1. Transportation
2. Warehousing
3. Manufacturing operations
4. Distribution
5. International logistics

To build solid foundations for bold supply chain planning, the company ought to master four key functional areas:

1. Demand planning and forecasting
2. Procurement planning
3. Inventory planning and control
4. Production planning

Tactic integration knowledge areas coordinate the efforts to consolidate the building blocks (planning logistics and synchronous operations) and set up the primary strategic connections. These strategic connections will capture customer signals, to interpret major business needs, to enable knowledge management strategies, and to facilitate information flows. Tactic integration has five pillars:

1. Customer services
2. Project planning
3. Human resources
4. Sustainability
5. Information technology

These structures build the architecture capable of aligning supply chains to other areas within the organization and to external elements, such as suppliers and customers.

Corporate governance is a complex discipline. A didactic approach to understand the concept of governance lies in the principle of balancing performance, risk, and cost. Some examples of recurrent situations that stretch organizations to their limits are as follows:

- Competition and change of players
- Product proliferation and lifecycle reduction
- Improvement of financial performance, including cost reduction
- New technologies
- Changing market regulations
- Increased customer expectations

The following is the supply chain governance group, which has three knowledge areas:

1. Supply chain risk management
2. Supply chain business intelligence
3. Other key knowledge areas of specific interest to the business

These knowledge areas targets are as follows:

- To establish and lead supply chain risk management strategies to supply chain governance

- To define which key knowledge areas must be acquired
- To synchronize supply chain strategies with corporate governance goals

The interaction within the organization determines the creation of a diverse group called business departments that aggregate several knowledge areas such as sales, finance, controllership, quality assurance, engineering, R&D (research and development), HE&S (health, environment, and safety), marketing, IT, human resources, and regulatory. Other areas can be added as business conditions require.

Finally, the SNAR Model considers three stages for the external elements of a firm's supply network. These stages evaluate five elements:

1. Suppliers
2. Customers
3. Service providers
4. Competitors
5. Noncompetitors

The SNAR Model has diverse applications, such as in the definition of strategies and policies that deliver shareholder value (Oliveira and Gimeno, 2014), as well as in the performance management through indicators (Oliveira and Gimeno, 2014) and in the management of customer service strategies (Oliveira and Gimeno, 2014).

To facilitate its applicability in diverse scenarios, the SNAR Model defines a coding system that identifies each knowledge area described earlier. The SNAR Model coding system is illustrated in Figure 1.8.

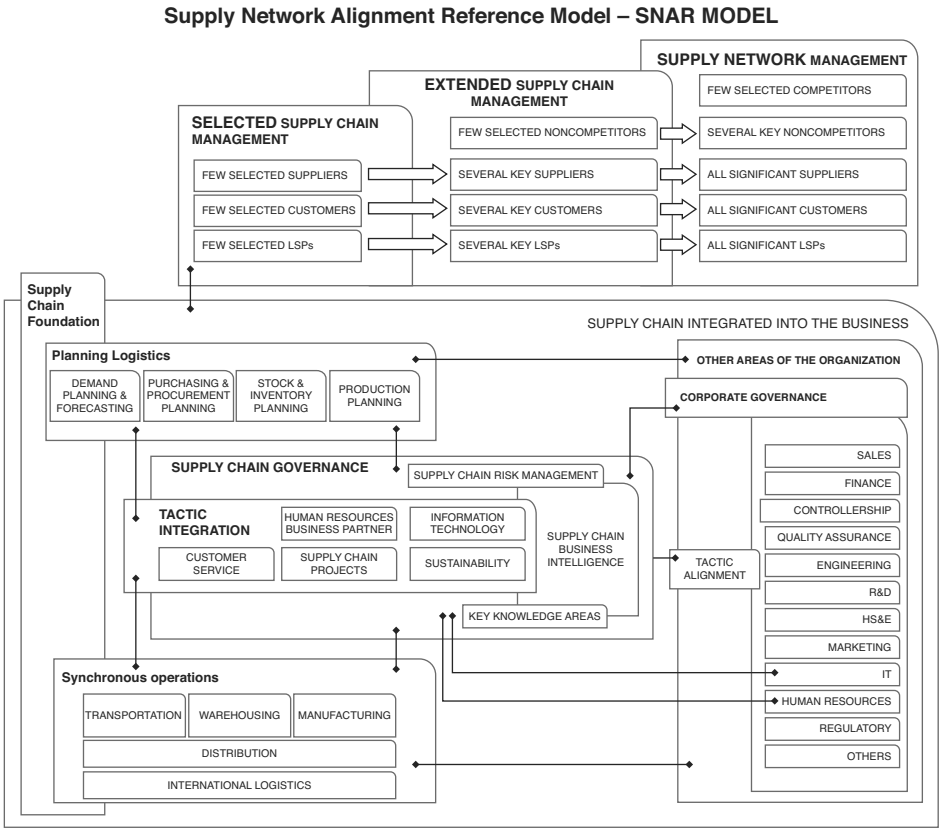

Figure 1.7 SNAR Model

01	INTERNAL NETWORK
01.01	Planning Logistics
01.01.01	Demand Planning and Forecasting
01.01.02	Procurement & Purchase
01.01.03	Stock and Inventory Control
01.01.04	Production Planning
01.02	Synchronous Operations
01.02.01	Transportation
01.02.02	Warehousing
01.02.03	Manufacturing
01.02.04	Distribution
01.02.05	International Logistics
01.03	Tactic Integration
01.03.01	Customer Services
01.03.02	Supply Chain Projects
01.03.03	Information Technology
01.03.04	Human Resources
01.03.05	Sustainability
01.04	Other Departments
01.04.01	Sales
01.04.02	Finance
01.04.03	Controllership
01.04.04	Quality Assurance
01.04.05	Engineering
01.04.06	R&D
01.04.07	HS&E
01.04.08	Marketing
01.04.09	IT
01.04.10	Human Resources
01.04.11	Regulatory
01.05	Supply Chain Governance
01.05.01	Key Knowledge Areas
01.05.02	Supply Chain Business Intelligence
01.05.03	Supply Chain Risk Management

02	EXTERNAL NETWORK
02.01	Preferred Supply Chain
02.01.01	Preferred Suppliers
02.01.02	Preferred Customers
02.01.03	Preferred Service Providers
02.02	Extended Supply Chain
02.02.01	Selected Suppliers
01.02.02	Selected Customers
01.02.03	Selected Service Providers
01.02.04	Preferred Noncompetitors
02.03	Supply Network Management
02.03.01	All Significant Suppliers
02.03.02	All Significant Customers
02.03.03	All Significant Service Providers
02.03.04	Selected Noncompetitors
02.03.05	Preferred Competitors

Figure 1.8 SNAR Model Coding System

The Five Forces Model

The "five forces" theory will influence the firm through the structure responsible for "what is done" within the business (see Figure 1.4). Porter's five competitive forces[6] defined one of the most important

[6] Michael E. Porter, "The Five Competitive Forces That Shape Strategy," *Harvard Business Review* (January 2008): 86–104.

moments in strategic thinking. This model has a deep adherence to some microeconomics principles, such as the supply and demand theory, cost and production theory, price elasticity, customer behavior, market structures, number of players, market size and growth rates, substitution effects, and market-entry barriers, as cited by Recklies.[7]

Objectively stated, Porter explained the dynamics of a theory based on five forces that allegedly shaped strategy and industry competition:

1. The threat of new entrants
2. The threat of substitute products or services
3. The bargaining power of customers (buyers)
4. The bargaining power of suppliers
5. The intensity of competitive rivalry (as illustrated in the next figure)

In addition, most of the premise implicit in this theory suggest that the imperfect competition model is the basis of the five forces methodology.

Contrary to the imperfect competition theory, the perfect competition model suggests an infinite number of buyers (customers) and sellers (suppliers) mitigating any of the bargaining power presented in the Five Forces Model. Sellers and buyers will dispute and prices be reduced to maximize a firm's profitability.

Another clear reference to imperfect competition lies in the dimension entitled "threat of new entrants," which considers eventual barriers to entering the market. In the perfect competition model, there are no barriers to entry and exit, and for this reason, mobility is extremely high; perfect mobility is a premise of the perfect competition theory. Imperfect markets suggest difficulty in entering new

[7] Dagmar Recklies, "Beyond Porter – A Critique of the Critique of Porter," www.themanager.org/strategy/BeyondPorter.htm, accessed March 2014.

markets and facilities to sustain position and retain territory in the market.

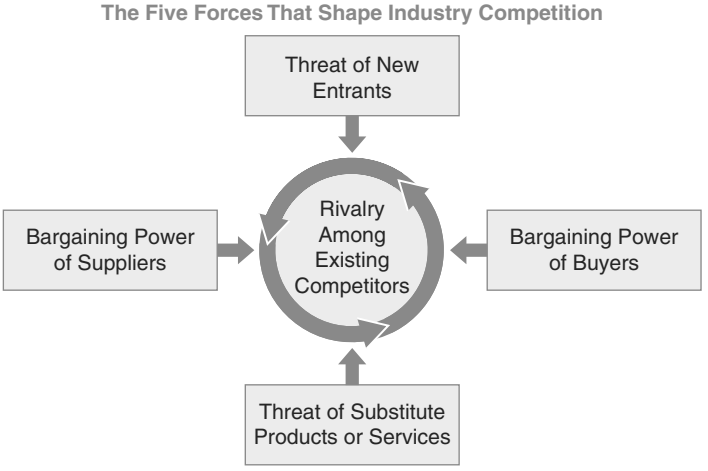

Figure 1.9 Porter's forces

Buyers' and sellers' bargaining power also lies in privileged information that provides competitive advantage during negotiation and other business cycles. The perfect competition model assumes consumers and producers have a perfect knowledge of price, utility, quality, and production methods of products.[8]

Other variables also suggest that the Five Forces Model is based on the imperfect competition economic model, except for the influence of externalities, and this is the subject of criticism from other authors. As mentioned earlier, the limitation not to apply this model to industry group or industry sector-level analysis has determined the theory's obsolescence.

As fluid and complex business environments substituted the traditional dynamics experienced a few decades ago, the management of product or service offered has changed in many ways: Lifecycle, customer satisfaction attributes, profitability, shelf life, value, and

[8] http://en.wikipedia.org/wiki/Perfect_competition, accessed March 2014.

volume are some examples. The deep changes have impacted on the relationships within firms in a supply network, including suppliers, customers, service providers, other competitors (allies or not), and other noncompeting firms (allies). These actors, though external to the firm, are now stakeholders of the business—it is a period where there is no winning competitor but a winning supply network.

Given this theory provides a snapshot of the business environment, it does not establish a long-term active connection with factors internal or external to this environment. A few people, typically managers, directors, or even external consultants, access existing knowledge inventories to assess business risks and opportunities, as the theory suggests "new knowledge and skill is dependent on pre-existing knowledge and skill."[9] The Five Forces Model provides a methodology for this assessment. This assessment influences the firm as it connects to the value chain environment through the gate of the business practices, as illustrated in the next figure.

The five forces theory does not address any cultural aspects of the organization that may influence the definition of the competitive strategy its implementation and its execution. The way people do things is disregarded. Even less does it address the culture and behavior of the supply networks, formed by other noncompeting companies, service providers (different from suppliers), government, political groups, and other external elements.

Being based on the imperfect competition, the Five Forces Model suggests that the market winner is the best competitor among all existing in the dynamic and competitive environment. It expects limited volatilities and believes a periodic snapshot of the business environment is sufficient to assess risk and create a consistent strategy for competitiveness. Porter's model suggests a mechanism to evaluate present knowledge based on the perspective of the firm.

[9] Carnegie Mellon, Teaching Excellence & Educational Innovation, www.cmu.edu/teaching/designteach/teach/priorknowledge.html, accessed March 2014.

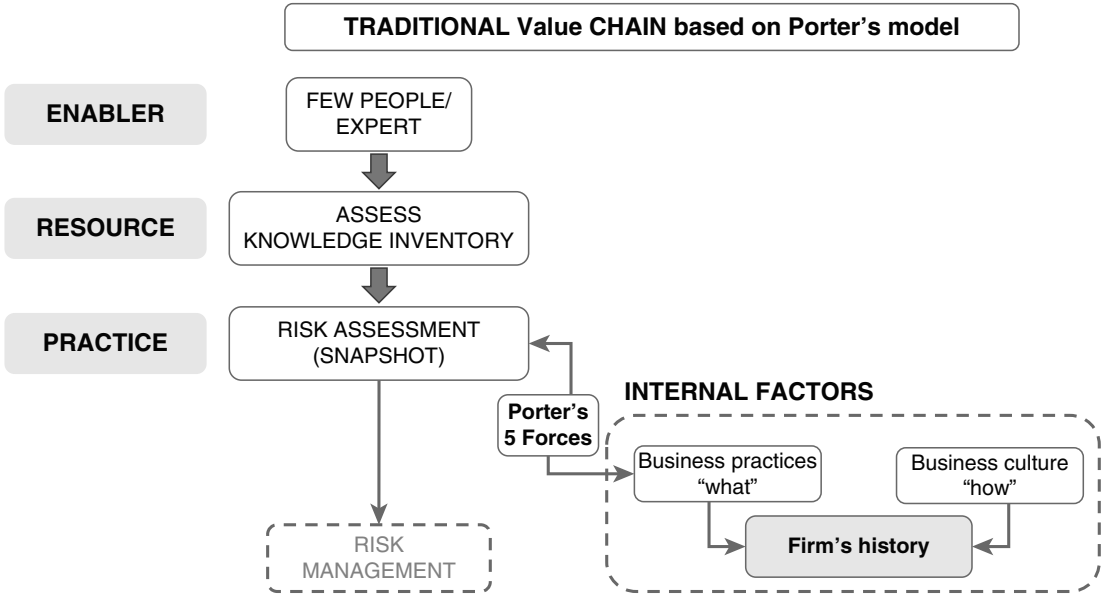

Figure 1.10 Traditional value chain, risk assessment

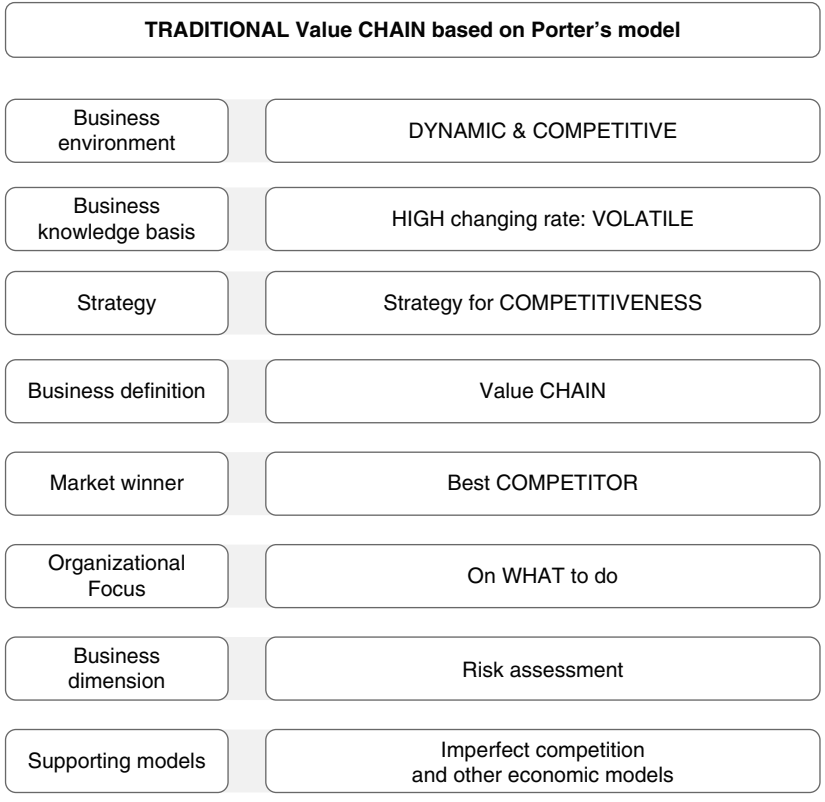

Figure 1.11 The traditional value chain attributes

This environment accepts that the strategy developed for the competition of a firm will last long enough to pay back all investment related to the effort required for its implementation. This is only possible if the business scenario assessed by the Five Forces Model is sustained without significant change for a long period, typically periods that vary from a few years (2 or 3) to a decade. No dramatic strategy is acceptable on a yearly basis.

This mechanism creates a period when a firm's strategy is not adherent to business needs and the substitute strategy has not been implemented yet. The reason why the disruption valley (see Figure 1.12) occurs is the organization's inability to perceive business environment changes soon enough. The disruption valley is an acceptable collateral damage if it represents a very small period in relation to the strategy's lifecycle. For instance, a disruption valley of one or two quarters can be absorbed by the business if it occurs every 3 or 4 years. If the strategy lifecycle reduces to a year or less, this disruption period is unacceptable.

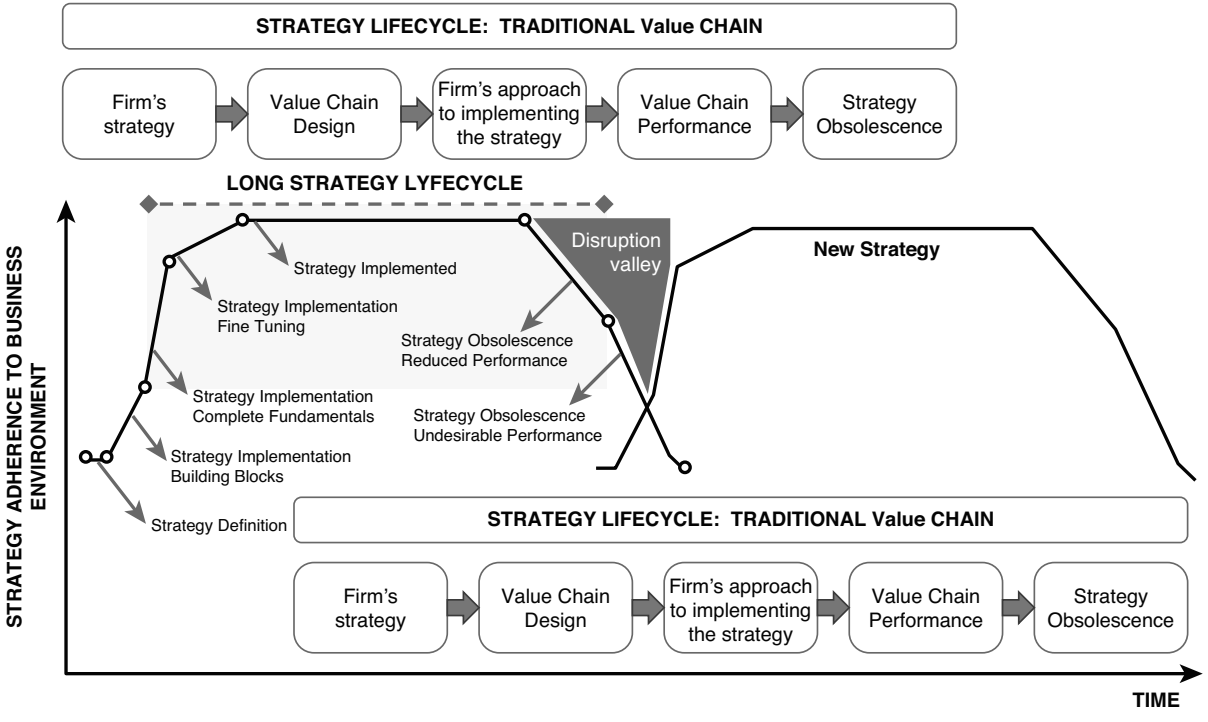

Figure 1.12 Traditional strategy lifecycle

New Business Environment

The global economy has increased the pace of change within factors external to each firm to the point that a new business environment has replaced/altered traditional dynamics present in the mid-1980s. The closeness of these elements defined a new balance in forces that govern the organizations.

The corporate governance structure responsible for delivering shareholder value on the one side and stakeholder expectations on the other includes some of the following mechanisms: the board of directors, board committees, the chief executive officer, executive committees, management committee, and independent auditors. The traditional business environment usually offer a clear imbalance between the relative influence of shareholders and stakeholders in favor of the stakeholders.

A dramatic change in these relative forces is one of the most perceivable effects of the creation of fluid and complex supply networks. This is a consequence of the deep business environment transformation that destroyed the fundamentals of the traditional value chain management and the very basic principles that supported previous strategic thinking. The resulting balance will be presented later in this section but before that some explanation is required.

Several academics and practitioners have debated the impact that technology inflicts on modern economy. The authors believe that technology omnipresence is the underlying mechanism that has enabled this transformation which has altered both the supply and demand sides of the economy. By transforming the dynamics of both supply-side economy and demand-side economy, it has altered the dynamism of the business environment and shrunk both the economic and industry cycles.

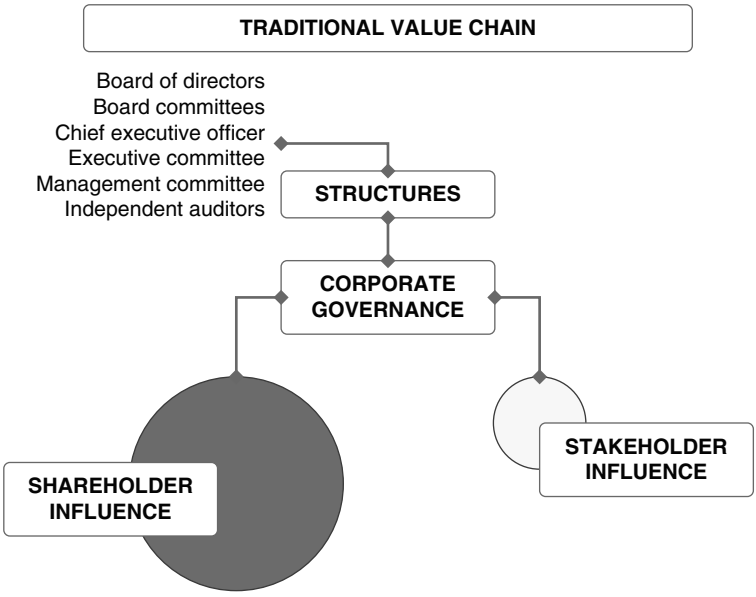

Figure 1.13 Governance relative forces

Barriers to entering new markets have reduced, new entrants have multiplied, and substitution of products and service is customers' expectation in most industries. This has reduced the importance of the direct rivalry among existing competitors as these have developed external alliances in order to survive. Companies no longer compete; supply chains do. In fact, as will be presented to the readers of this book, the supply chains' networks compete with each other. This scenario has distanced the Five Forces Model from applicability as it reduces the effects of each of the forces.

The network effect is a phenomenon, as explained in the economy, that has intensified as the proportion of technology has become accessible to families. The basic mechanism suggests that the more people one potential buyer perceives using a product or service, the more likely this potential buyer is to acquire that item. Although the

network effect was presented in the early 1900s,[10] new economy dynamics with the Internet and massification of social media interactions have enforced its importance and influence.

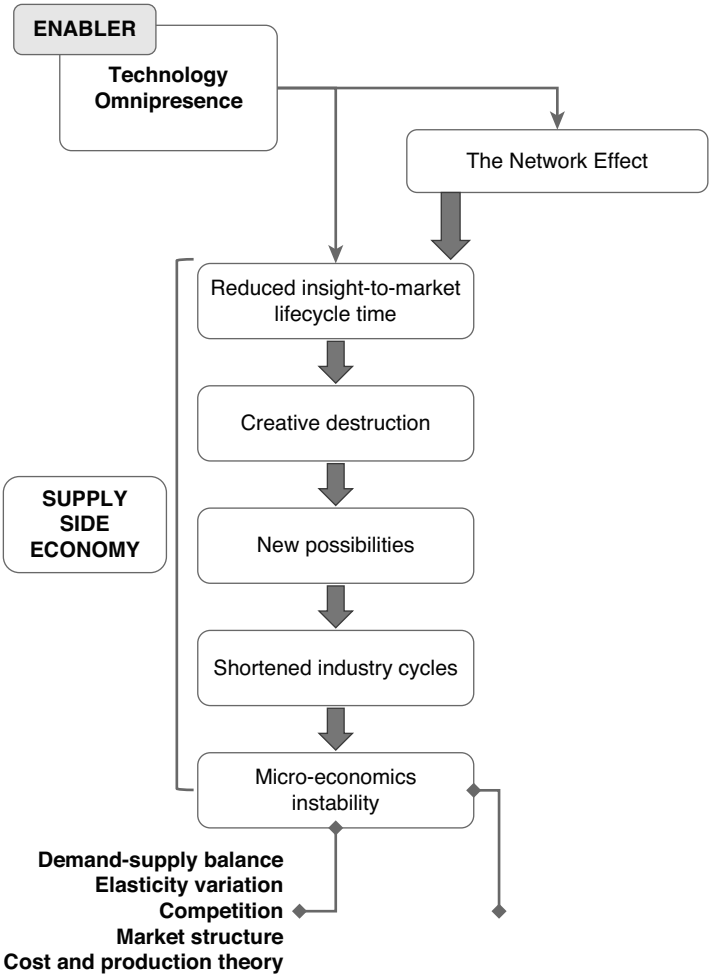

Figure 1.14 New business environment, supply side

[10] http://en.wikipedia.org/wiki/Network_effect, accessed March 2014.

The network effect has some significant influence on the supply side of the economy, providing technology enabled solutions for sharing R&D best practices and tools. Nonproprietary technologies made public in collective practitioners' communities have speeded the pace of change and accelerated the new alternatives' (products and services) introduction rates in different industries.

Technological expansion and diversification have reduced development costs and cycle times, which has enabled the multiplication of offers. Recent technological influence has also reduced product and service introduction cycle times, making them available almost immediately to clients without geographical barriers.

This phenomenon brings us back to the discussion about another economic approach which became very influential as the new business environment substituted the traditional value chain. The creative destruction concept "derived from Marxist economic theory, where it refers to the linked processes of the accumulation and annihilation of wealth under capitalism"[11] but was popularized by Austrian-American economist Joseph Schumpeter who adapted the theory to economic innovation and the business cycle driven by technological innovation (Schumpeter 1994 [1942]).

This new environment faces numerous shorter industry cycles and creates an equally new economic order. Microeconomics models that observe market dynamics are under deep debate as the real side of the economy is under transformation. This affects the demand-supply balance, demand elasticity patterns, competition models, market structure theories, and cost and production theories.

Despite the effect on the supply side of the economy, the network effect has usually been assigned to influencing the demand side of the economy as it reflects the influence one individual can have on the purchasing behavior of other people.

[11] Karl Marx and Friedrich Engels, (2002) [1848]. *The Communist Manifesto.* Moore, Samuel (trans. 1888). Harmondsworth, UK: Penguin. 226. Cited in http://en.wikipedia.org/wiki/ Creative_destruction, accessed March 2014.

From the demand side of the economy, the network effect alters people's awareness about new offers (new products and new service). This transformation occurs in four complementary dimensions:

1. The awareness is faster.
2. The awareness is intense.
3. The awareness is global.
4. The awareness is supported by efficient responsiveness mechanisms.

It means that the cycle from new product or service launch to customer experience has shrunk, that too many people become aware, that there are very limited geographical barriers to this awareness, and that users can converse with each other about their experiences and provide feedback to the supplier almost instantaneously. Usually applied to the positive network effect, technology has now enabled an equally influential negative network effect.

Another significant change opportunity in the global economy is the impact of government regulations. Global organizations now influence markets on a multinational scale and national policies can leverage competitive differentiation to be applied overseas, impacting on competition in other countries.

Because external variables (see Figure 1.3) have now shortened the length of balanced business periods, the need to review a certain existing strategy has become more frequent and intense. The effort to move constantly from a strategy designed to last to a new allegedly long-lasting strategy is prohibitively costly to the organization.

The ability to design businesses capable of elasticity, resilience, and responsiveness requires an environment triggered by constantly updated market knowledge. The only asset that matters is people. The only strategy that delivers long-lasting shareholder value is the innovation-enabled knowledge leadership. The only business model that enables a truly innovative environment is the management of supply chains' networks.

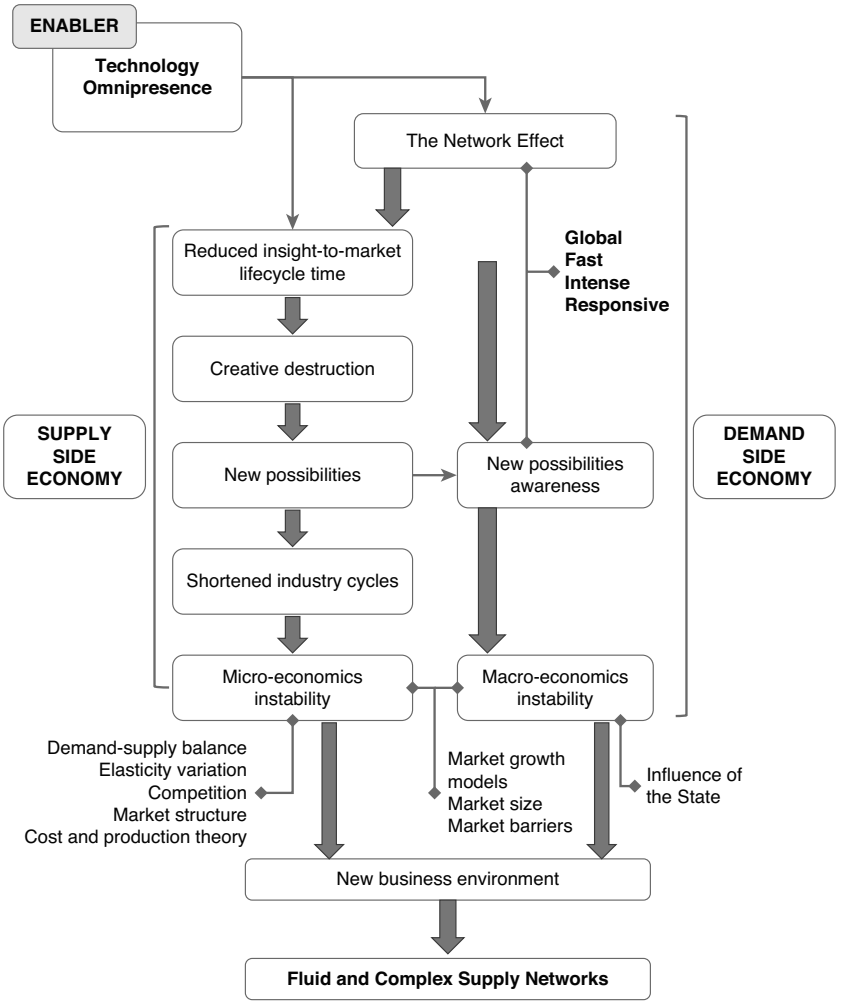

Figure 1.15 New business environment

These changes in the supply and demand sides of economy have destabilized the business environment. The definition of *long-term business cycle* has reduced and now strategies become obsolete much sooner. This eliminates the possibility of long-lasting strategies, as presented in Figure 1.9, due to the devastating impact of the disruption

valleys. The alternative is to adapt strategic thinking to these shorter business cycles. Accumulated knowledge enables the ability to perceive market changes as driver to anticipate the new strategy. Therefore, the *wise competitors*—a conglomerate of complementary business that work together—can deliver value to shareholders and stakeholders.

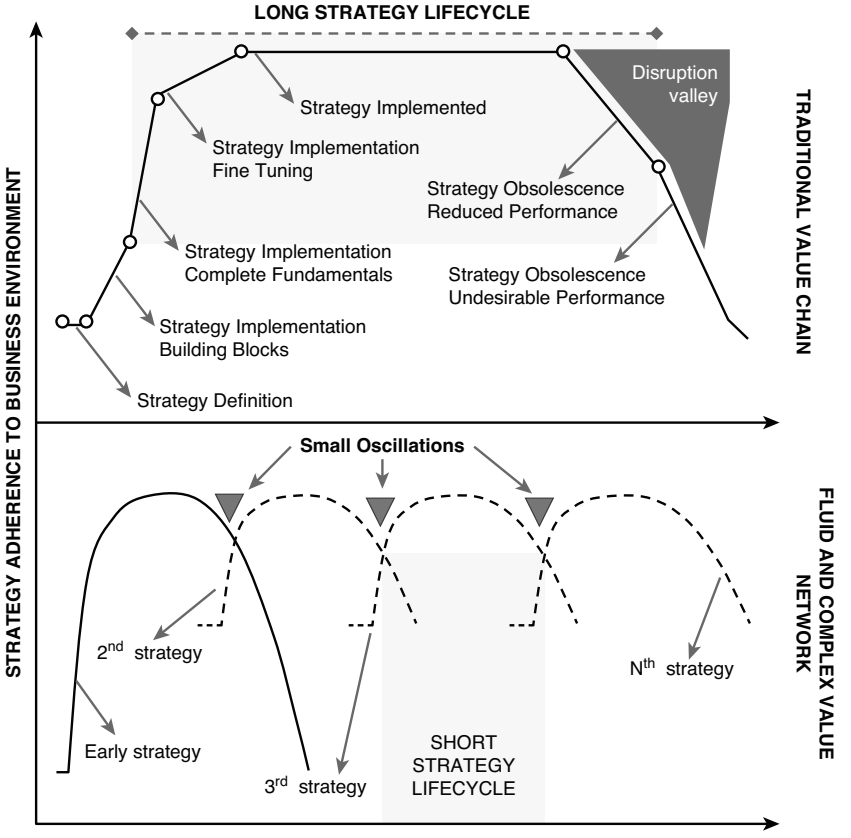

Figure 1.16 Value network strategy lifecycle

The challenge is then to identify the mechanisms that enable market changes' responsive strategies for fluid and complex supply networks. This new business environment has no longer the premises

that sustained the arguments for the traditional value chain. A new paradigm exists. Previous dynamism and volatility has been intensified by market fluidity, complexity, and unpredictability. Forecasting as a single planning strategy is unacceptable as business resource planning must create a resilient environment capable of sensing every recently networked-market trend. The only relevant long-term strategy capable of creating and sustaining shareholder and stakeholder value is knowledge management.

Whereas the traditional value chain approach prepares for competitiveness, the value network prepares for innovation, as detailed in the previous section called "New Business Environment." Innovativeness is the consequence of the wise application of knowledge accumulated over the time. The ability to change and simultaneously add value represents the ultimate competitive leadership dimension.

In addition, there is no room for choice. The organization must be able to concurrently deliver a ground-breaking cost-benefit environment to shareholders and stakeholders. Some firms that previously used to be ignored during strategic thinking are now influential stakeholders. The governance structures that balance shareholder value and stakeholder interest need to review their policies as their relative importance is now very similar.

Once the single firm no longer has the resources to compete in its industry sector and given that only through alliances will this firm shape high performance supply networks capable of beating other equally designed supply networks, it is possible to understand the power these elements external to the firm have.

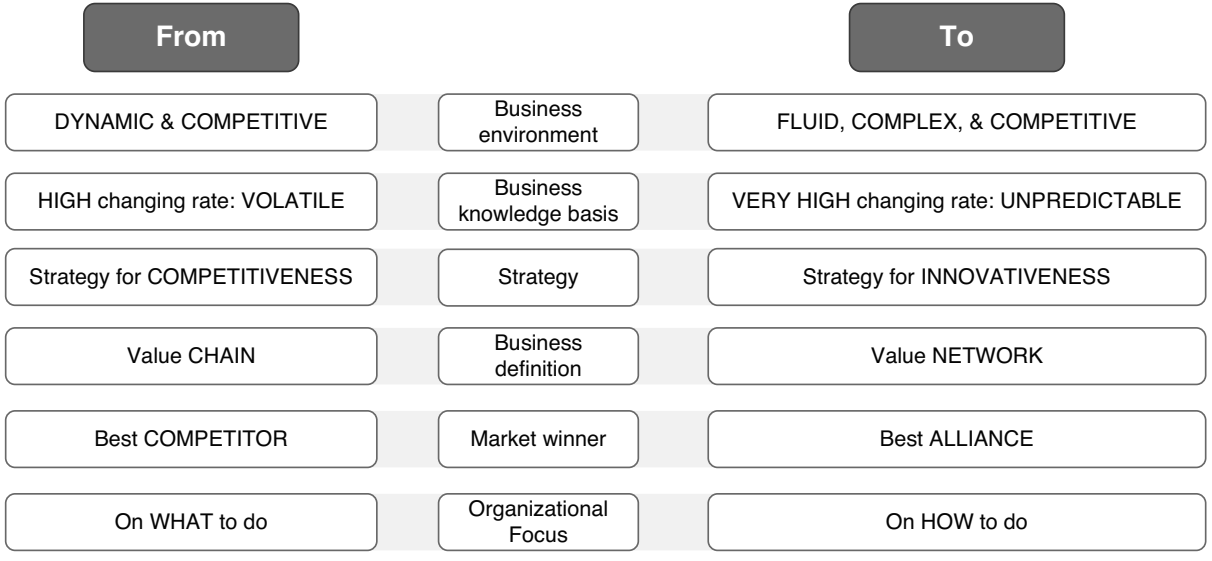

Figure 1.17 From value *chain* to value *network*

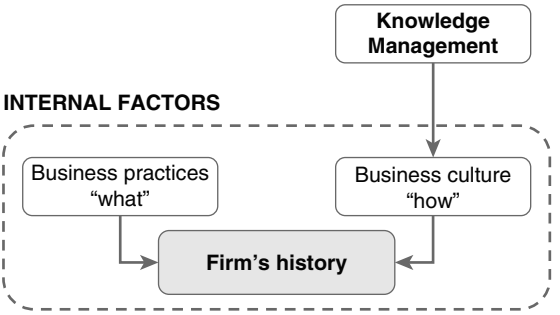

Figure 1.18 Value network knowledge management

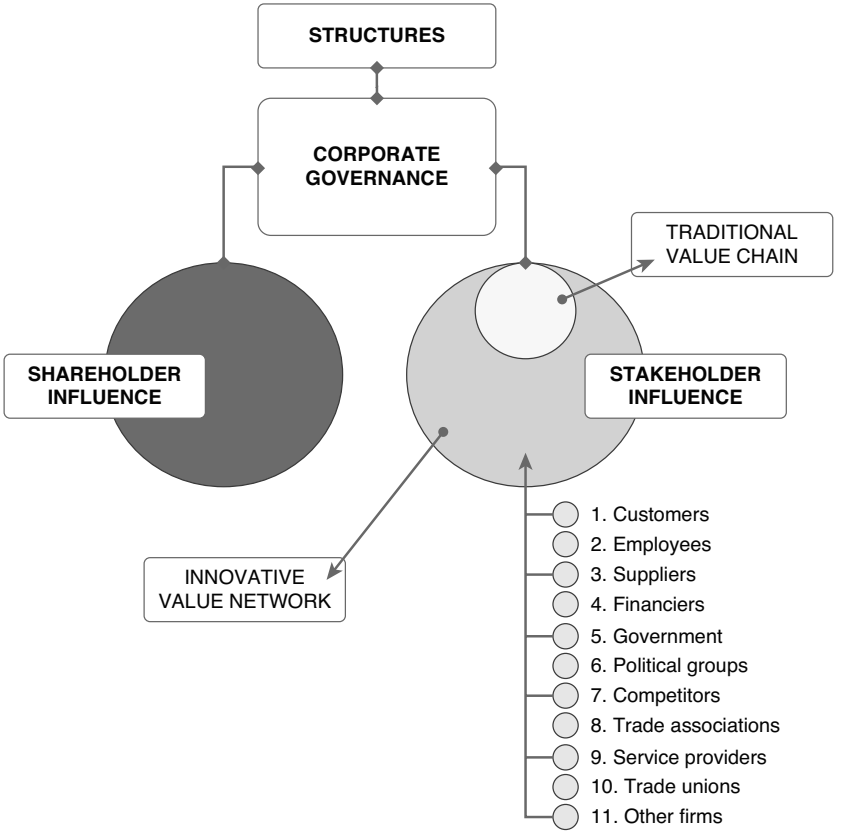

Figure 1.19 New governance balance

The quality of being able to sense is known as wisdom. Excellence in managing supply networks creates wise competitors; wise competitors are those companies that form a conglomerate of complementary business environments that work in a coordinated way and cooperatively to win in the market and deliver value to all their respective shareholders and stakeholders.

Enabling the Supply Network

As discussed before, although traditional value chain strategic thinking is based on the imperfect competition economic model, it neglects at least one element of this model: the influence of externalities. Buchanan defines externality as the cost or benefit that affects a party who did not choose to incur that cost or benefit.[12] Whether casual or not, this made no real difference in the 1980s when the Five Forces Model was proposed or in the following decade. But since the new century, the business environment has seen the intensification of the effect of externalities which has determined shortened economic and business cycles, as mentioned before.

Given the expansion of players that influence the supply network of which a firm is a part, and because many of these players are influential enough to be considered stakeholders, there is a multiplying effect of externalities within the wise competitors. This massive effect of externalities is associated with the reduction of suppliers' bargaining power, the reduction of barriers to entry in the markets, and the reduction of barriers to create substitute products or services, as explained previously, disabling any competition theory (perfect or imperfect) from explaining the new economy business environments.

[12] James Buchanan and Wm. Craig Stubblebine (November 1962), "Externality," *Economica* 29(116): 371–384.

Game Theory

The application of game theory was presented as an alternative to understand the brand new dynamics of supply networks. Game theory is a study of strategic decision making.[13] Specifically, it is "the study of mathematical models of conflict and cooperation between intelligent rational decision-makers" (Myerson 1991). Several types of games address dichotomies, such as the following:

- Cooperative versus noncooperative, which refers to communication between the players
- Symmetric versus asymmetric, which discusses the influence of each player's strategy on one another
- Zero-sum or nonzero-sum, which tests the dispute for resources
- Simultaneous versus sequential, which defines the rules for each strategic movement
- Perfect versus imperfect information, which discusses transparency and visibility

Some applications treated the decision-making process with uncertainty (Neumann, et al. 1944). Other applications include describing, forecasting, and explaining the patterns of the economic behavior of firms, markets, and consumers.[14] The principle behind game theories is "the interactions between individuals or groups of people whose goals are opposed, conflicting, or at least partially competing" (Chinchuluun, et al. 2008).

Although several groups around the globe are studying game theory as applied to supply chain management and despite the fact every day a new algorithm is formulated to explain several interactions within internal and external players, the establishment of a coalition

[13] http://en.wikipedia.org/wiki/Game_theory, accessed March 2014.

[14] http://en.wikipedia.org/wiki/Game_theory, accessed March 2014.

(connection between players) depends on fixed rules defined by logical restrictions. The premise is these rules define the interactions in the long term.

But don't we all know the relationship between supply networks elements are subject to so many variables that cannot be modeled for the long term? Maybe game theory has found valuable applications for several interactions within any two very close elements in the supply network. But, how about the interaction between these interactions? And what if logical rules such as purchasing agreements, service level agreements, and contracts in clauses change? How do I measure the impact on the supplier of my supplier or on the customer of my customer?

The complexity of modern business environments is tremendous and the variables that qualify this complexity are always assuming new shapes. This is an ever-changing complexity that disables consistent forecasting efforts. So, how do we forecast the unpredictable?

Chaos Theory

Not only has game theory been recently tested on the supply chains that form fluid and complex supply networks. The unpredictable nature of supply network interactions attracts chaos theorists too.

Chaos theory studies the behavior of dynamic systems that are highly sensitive to initial conditions,[15] such as the existing value chain design illustrated in Figure 1.1. Small differences in initial conditions yield widely diverging outcomes for such dynamic systems, rendering long-term prediction impossible in general (which leads to the unpredictable nature of the supply networks illustrated in Figure 1.15).

This happens even though these systems are deterministic, meaning that that their future behavior is fully determined by their initial

[15] http://en.wikipedia.org/wiki/Chaos_theory, accessed March 2014.

conditions, with no random elements involved (Kellert 1993). In other words, there are defined strategies, policies, practices, and procedures in any element of this system, yet it is impossible to predict its behaviors in the long time. Does this look familiar to supply chain management professionals?

Lorenz defined *chaos* as when the present determines the future, but the approximate present does not approximately determine the future.[16] Therefore, if the very near future is known to be slightly different from the present, then the future is unpredictable. The authors have selected some processes within the fluid and complex supply network that may eventually show this behavior: supplier's performance, manufacturing yield rate, sales forecast, haulers performance, import cycle time, distribution adherence to delivery schedule, 3PL performance, and IT integrity, to mention a few.

In the long term, any strategy created in recent decades was known to be obsolete. In recent years, any strategy created was known to be obsolete much sooner. In the near future, any strategy created will be known to be obsolete even sooner.

The movement toward the use of game theory and chaos theory in the management of networks of supply chains indicate the global community has understood the real nature of this new environment. Predictability is no longer the most important agenda. Concepts such as responsiveness, resilience, flexibility, and agility must be tangible to the daily management of the organization as the only mechanism to deliver value to shareholders and stakeholders. The ultimate strategy capable of transforming these concepts into executable routines is long-term knowledge management. The introduction of knowledge management redirects organizational behavior and realigns its route toward competitiveness.

[16] Christopher M. Danforth, "Chaos in an Atmosphere Hanging on a Wall," *Mathematics of Planet Earth 2013,* April 2013.

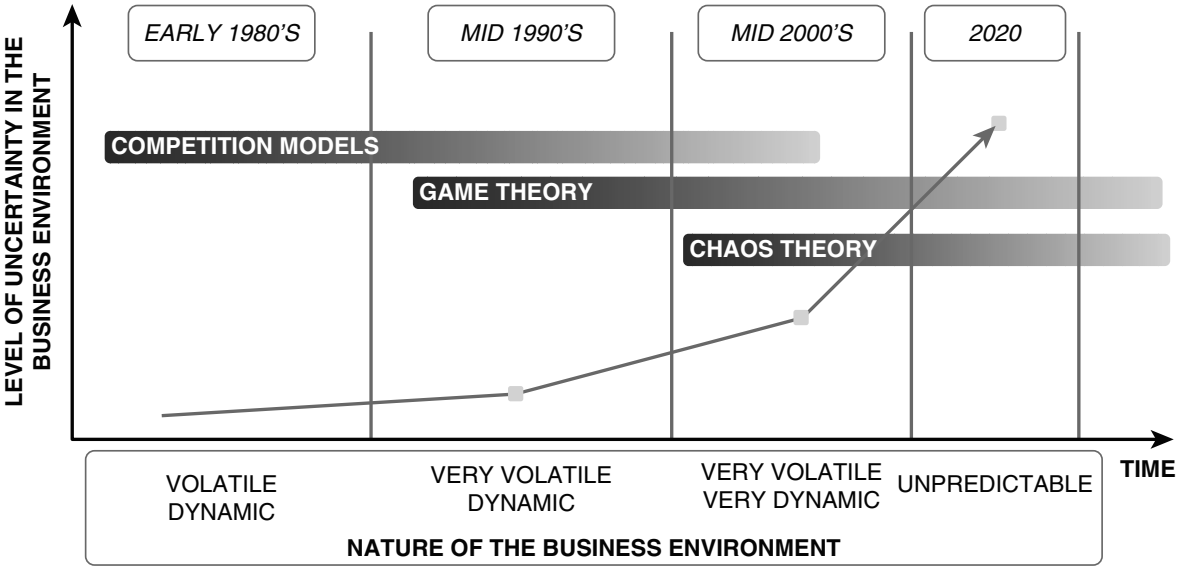

Figure 1.20 Nature of the business environment

Fluid, Complex, and Competitive

Efficient firms were designed to minimize cost, which requires high capacity utilization, minimizing inventory, selecting vendors based primarily on cost and quality, and designing products that are produced at minimum cost. In the early 1980s, when the Efficient Supply Chain Management Model was proposed (Oliveira and Gimeno, 2014), several businesses fit within the following premises:

- Limited range of products; infrequent new product introduction
- Long lifecycle products
- Stable supplier basis
- Small market share variation
- Small demand volatility
- Reliable forecasts
- Small geographical variation
- Capacity optimization

Since then, the interaction with the external operations of multiple interconnected supply chains has created challenging supply networks. Earlier, we discussed the importance of managing these external elements as part of your own business to the point of considering them to be stakeholders. Therefore, the traditional value chain environment, known for the competition between firms, is transformed to fluid and complex supply networks driven by the ability to create enduring alliances. The potential benefits of these alliances include the following:

- **Accelerate the development of products, service, or processes:** This includes alliance with preferred product or parts' suppliers or specialist IT or logistics service providers.
- **Accelerate market entry:** The relationship with key accounts of selected distribution channels, which is detailed in *Customer*

Service Supply Chain Management: Models for Achieving Customer Satisfaction, Supply Chain Performance, and Shareholder Value.

- **Maintain leadership in the market:** Alliances with noncompeting companies may diversify the portfolio of products or service to provide a complete solution for your customer.
- **Set a standard for the segment:** The quality of raw material used in a differentiated product may be the result of a long-term partnership with specific suppliers.
- **Minimize risks of R&D:** Some industry sectors jointly invest to create and maintain research development centers focused on their specific demand. This occurs in diverse industry sectors such as automotive, electronics, pharmaceutical, and banking, although this list is not exhaustive.
- **Acquire complementary resources:** The automotive industry dealers work closely with the banking industry to offer a financial service to the final consumer. Several dealers define long-term exclusivity-basis relationships with finance institutions of different types.
- **Achieve economies of scale:** External manufacturing is the trend in the pharmaceutical industry. Small laboratories outsource parts of the packaging process to larger asset-based laboratories with industrial overcapacity.
- **Avoid or overcome trade barriers:** Local distributors usually eliminate or minimize several barriers found by exporters, in particular in new markets.
- **Share capital resources:** Some industries offer long-term contracts to haulers so these companies can implement a fleet renewal plan. The long-term contract enables haulers plan their cash flow, keep a fleet with reduced average age, and offer a better service level to the customer.

- **Acquire or maintain technology:** Partnerships with IT solution providers include license or version updates for various applications such as warehouse management systems, transport management systems, routing systems, and so on.
- **Access restricted markets:** Local brokers will offer regional knowledge on how to deal with national laws and intrinsic bureaucracy in some countries on even in some regulatory government agents in your own country.

Several questions arise at this point. How do you define the most important connections? What functional architecture should we have? How will functions and people connect with each other? How will they connect to external elements such as suppliers, customers, and service providers? Should we get closer to noncompeting companies for mutually beneficial alliances? Should we extend these alliances to establish relationships with competitors?

By answering these and other questions and by progressing within the Supply Chain Knowledge Management Maturity Roadmap (see Figure 1.6), companies create the necessary environment to deliver business results in different ranges (from the baseline results to sustainable shareholder value):

- **Baseline results:** Internal focus; deliver the minimum.
- **Operational efficiency:** Internal focus; deliver balancing attributes.
- **Business differentiation:** External perspective, search market differentiation.
- **Sustainable shareholder value:** External perspective, long-term value.

Triggering the Transformation

Despite the apparent complexity of building and managing alliances with the supply network players, the beginning of the virtuous

cycle depends on a very small group of people—a group that has the authority and the responsibility to satisfy shareholders and stakeholders: the corporate structures that define business governance such as the board of directors, board committees, the chief executive officer, executive committees, management committee, and independent auditors, as mentioned earlier. These structures must recognize the shift change in the governance model, as illustrated in Figure 1.19.

Although governance structures must be able to concurrently deliver value to shareholders and stakeholders, some firms still ignore influential stakeholders and sustain strategies and policies exclusively in favor of the shareholders. Shareholders and boardroom disputes are not a new theme. Common causes of disputes include "disagreements over the company's strategy, the level of dividends, salaries paid to shareholders who also work for the business, disproportionate contributions of money and/or time from each shareholder, dealings between the company and a private business owned by one of the shareholders, the price to be paid when a shareholder is bought out. The problems can be particularly acute where one shareholder, or group of shareholders acting together, can override the wishes of a minority shareholder."[17]

Friedman's stockholder theory states that a firm's only responsibility is to increase its profits, which is inconsistent with the idea of any level of responsibility for stakeholders (Friedman 1962). According to Smith,[18] "scandals at Enron, Global Crossing, ImClone, Tyco International, and WorldCom, concerns about the independence of accountants who are charged with auditing financial statements,

[17] The Law Donut - Resources for Your Business, www.lawdonut.co.uk/law/ownership-and-management/shareholder-and-boardroom-disputes/shareholder-and-boardroom-disputes-20-faqs, accessed March 2014.

[18] H. Jeff Smith, "The Shareholders versus Stakeholders Debate," *MIT Sloan Management Review*, Summer 2003, http://sloanreview.mit.edu/article/the-shareholders-versus-stakeholders-debate/, accessed March 2014.

and questions about the incentive schema and investor recommendations... have all provided rich fodder for those who question the premise of shareholder supremacy. Many observers have claimed that these scandals serve as evidence of the failure of the shareholder theory - that managers primarily have a duty to maximize shareholder returns - and the victory of stakeholder theory, which says that a manager's duty is to balance the shareholders' financial interests against the interests of other stakeholders such as employees, customers, and the local community, even if it reduces shareholder returns."

However, Freeman (not to be mistaken for the previously cited Friedman) recommends that management can give due regard to the interests of stakeholders[19] to address the "Principle of Who or What Really Counts" (Freeman 1984). Some authors have addressed the influence of stakeholder theory in the management of supply chains. Henry discussed a framework for analyzing stakeholder-management strategies in supply chain collaboration to "to show how prior dyadic relations with a stakeholder and perception of situational demands on the relationship determine the choice of aggressive versus cooperative strategies in managing stakeholder relationships."[20]

Regardless of any theoretical dispute, real-world practice indicates the changing agent should be the company's CEO. The CEO must have the power to influence other governance structures and rebalance the organizational focus to approximate stakeholders as a means of establishing alliances and creating an environment with wise competitors, which are, as cited before, the conglomerate of complementary businesses that work together to win in the market and to deliver value to their shareholders and stakeholders.

[19] http://en.wikipedia.org/wiki/Stakeholder_theory, accessed March 2014.

[20] C. Henry and F. Barro, "Stakeholder Theory and Dynamics in Supply Chain Collaboration," *International Journal of Operations & Production Management*, 29(6): 591–611.

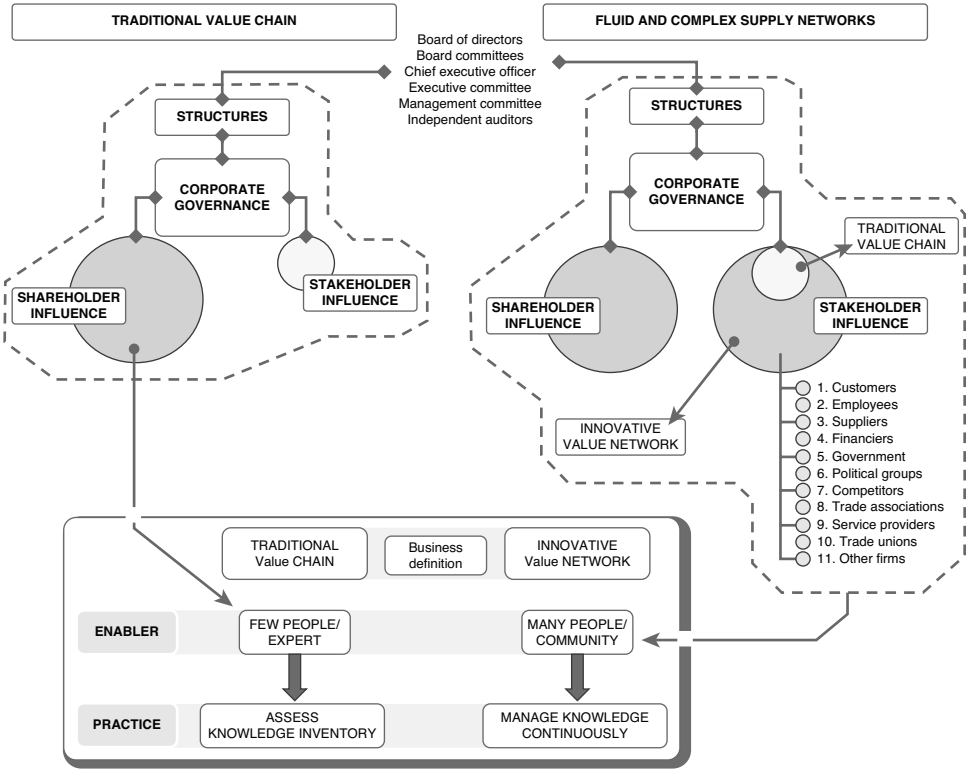

Figure 1.21 Triggering the transformation

Visibility allows organizations to sense market oscillation and anticipate strategies, policies, and practices. The basic knowledge dynamics are founded upon three building blocks (Oliveira and Gimeno, 2014), which are typical of the traditional value chain:

1. Irreversible continuous expansion
2. Reactive segmentation
3. Structured specialization

Knowledge expansion results from everyday interactions within the members of an organization or between them and members of other organizations. This continuous mechanism transforms the cumulative knowledge base. As the organization's combined knowledge is in constant expansion, it requires a more elaborate informational architecture capable of assuring the progress of flows.

Knowledge segmentation is an almost automatic reaction in order to accommodate the immense inflow that permanently influences any business. This unplanned reaction has limited effectiveness to facilitate a value adding decision-making momentum. The blocks of knowledge recently created are quite heterogeneous due to the lack of a precise filtering mechanism.

The immediate consequence of this early knowledge segmentation is the formation of disconnected knowledge islands. The boundaries of these islands are initially defined both by the hierarchical levels (horizontal layers) and the departmental structures (vertical layers) most companies have. This effect is not restricted to a single company's boundaries.

As illustrated in Figure 1.23, there is no difficulty in understanding the multiplying effect as we consider suppliers, customers, logistics service providers (LSPs), and other elements of our immediate supply chain or even our extended supply network.

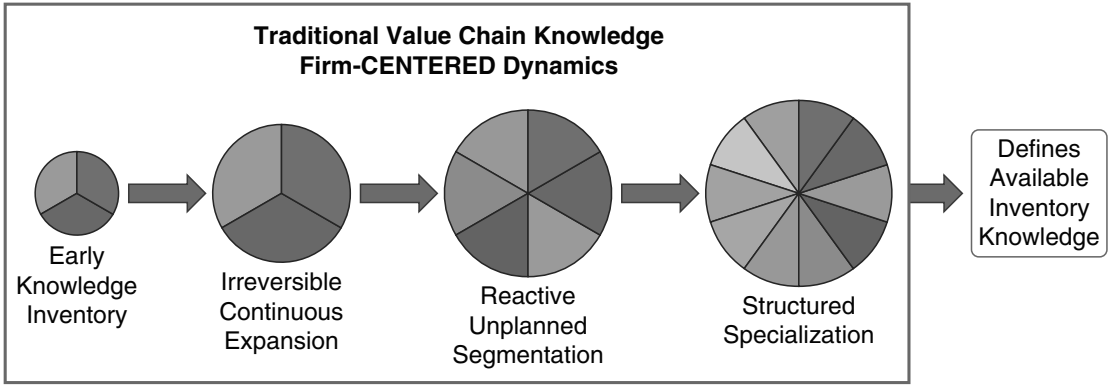

Figure 1.22 Firm-centered knowledge dynamics

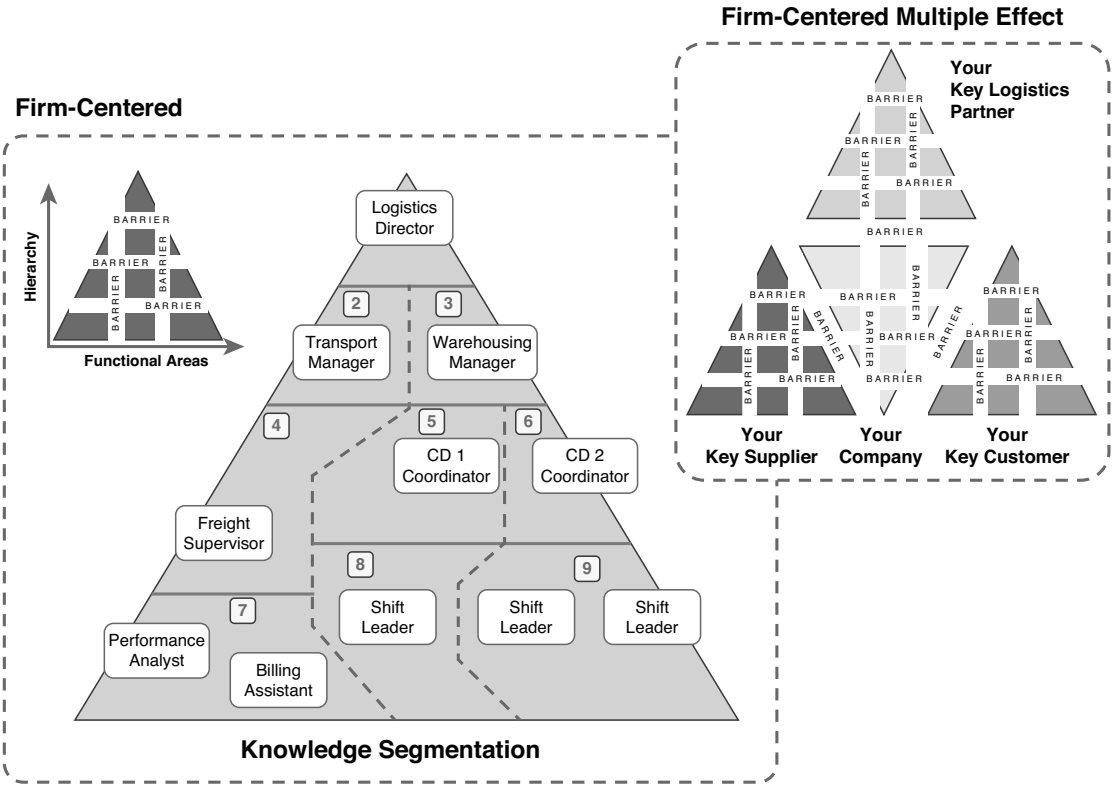

Figure 1.23 Knowledge isolation effect

Knowledge specialization requires a deeper understanding of companies' operations and a clear view on how to adequately allocate people in order to deliver process performance and business goals.

The knowledge specialization process looks at the knowledge structures created during the segmentation phase and adds specific expertise to establish a minimum set of rules for the informational flows.

Once the company has reached knowledge management leadership in its industry or in a given functional area, this position should be preserved for an extended period, nurturing a virtuous cycle that builds well-balanced governance. There are eight strategies that support long-term knowledge management, as shown in the next image. Figure 1.24 shows the basic dynamics of an enduring knowledge management (KM) strategy.

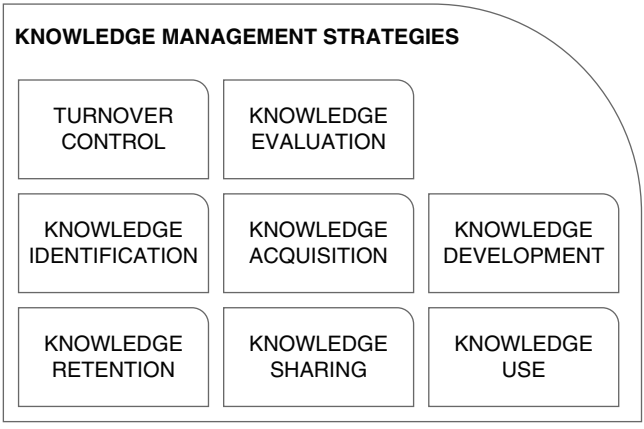

Figure 1.24 Knowledge management strategies

The simplified roadmap for the application of knowledge strategies begins with the evaluation of the environment which is affected by the permanent inflows of information. Usually the evaluation of the environment and the identification of required knowledge the organization needs to respond to the challenges of this environment

are solely led by specialists in their functional areas. More mature companies will offer additional support to these strategies, usually originating in the human resources area or equivalent. As the desired knowledge is acquired, the new challenge will be to retain it.

The second phase of the strategies focuses on knowledge retention. As organizational turnover appears to be the ultimate driver for knowledge leakage, it is addressed in detail in this phase. The third phase delivers the ability for the proper use, development and sharing of knowledge, combined with the enterprise's corporate governance.

The role of the human resource department in the supply chain governance requires specialist attention. The human resources business partner is a professional with specially trained eyes for the supply chain people and processes. In less-mature organizations, this partner will primarily have two major roles: (1) knowledge acquisition and (2) turnover mitigation. In more-mature organizations, they may have an additional role in evaluating the knowledge needs—prior to the definition of the acquisition strategy. Several other dimensions[21] of human resources are applicable to the management of supply networks. These dimensions are as follows: talent retention, career plan, succession plan, performance indicators, mapping competences, mapping abilities, managing change, team design, downsizing, unit relocation, job description, salary and benefits, and business intelligence systems.

It is important to notice that the use of knowledge in traditional value chains is firm centered. In other words, despite any external influence, a few selected people from within the organization are responsible for capturing and interpreting the signals of the business. These signals feed a mechanism based on what to do, such as the previously discussed Five Forces Model, and trigger strategy definition and risk management practices, as introduced in Figure 1.10

[21] Our special thanks to Andre A. Moraes, a highly experienced HR and operations professional, who dedicated his time and patience to several studies that supported the elaboration of these lists.

and detailed in Figure 1.25. Note in Figure 1.25 that the influence of stakeholders is extremely limited.

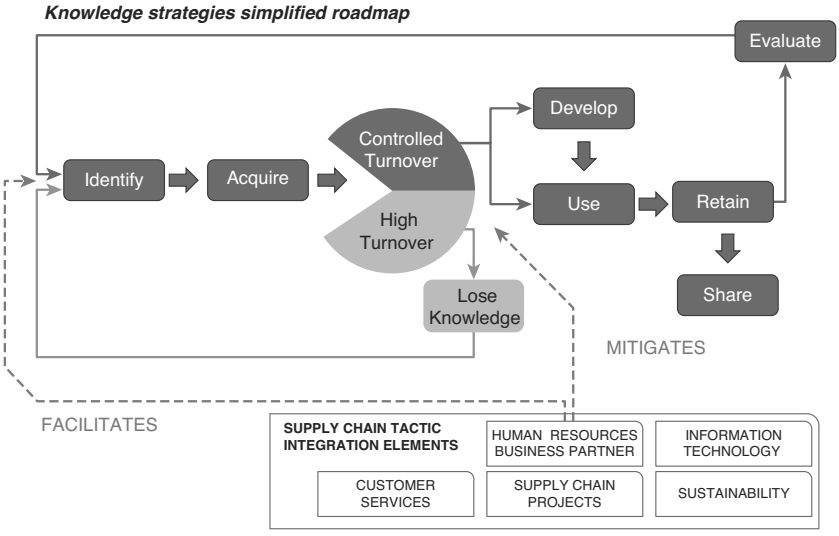

Figure 1.25 Knowledge dynamics roadmap

As the CEO, board, and shareholders accept the fact that sustainable competitive advantage can only be achieved through alliances with stakeholders, a different cycle starts. The commitment to create an environment capable of capturing continuous, massive, and diffuse signals from the firm and the stakeholders is determinant in using knowledge as the changing force that alters the perception of business dynamism and provides unprecedented visibility.

As the initial knowledge inventory defined by traditional value chain dynamics is transformed due to permanent structures that continuously capture the signals from the business environment, coordinated wise competitors can manage knowledge continuously and take advantage of market visibility to create adjusted future versions of current strategy and enable the dynamics illustrated in Figure 1.26.

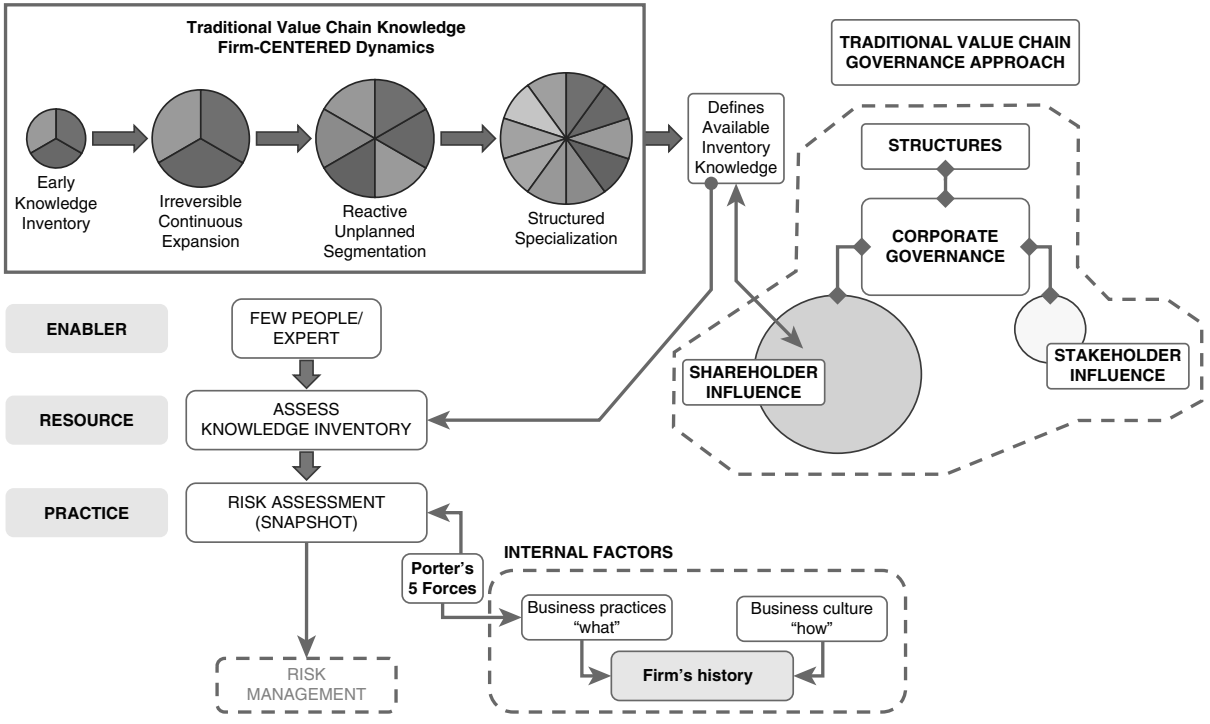

Figure 1.26 Traditional value chain knowledge dynamics

The more diverse the contribution from stakeholders and the more integrated it is with shareholders' value, the more accurate will be the strategies drawn up by the governance structures led by the CEO. Although sustainability (finance, social, and environmental) is one of the five pillars of tactic integration in the SNAR Model (see Figures 1.7 and 1.8), this approach is not related to any initiative that differs from those, which suggest a pragmatic acceptance that the organization should maximize profit for extended periods.

The management of stakeholders does not occur based on any altruistic belief that community matters. It is, in fact, a means to achieve the ultimate goal of shareholder value. It is no longer possible to maximize shareholder value by maximizing its influence in the organization.

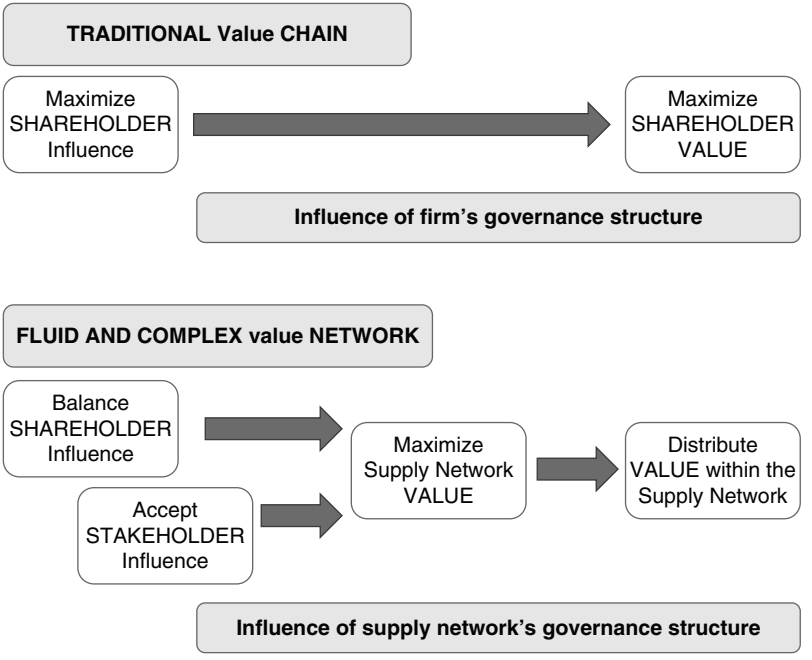

Figure 1.27 Shareholder value creation

These dynamics result from the fact that the winners are the supply networks, no longer the firms. Therefore, by reducing shareholder influence, it is possible to maximize supply networks' profitability which enables each firm's shareholder to increase their gains. The mechanisms that define the rules to share the value created by the supply network must be agreed by the governance structure of each company that is part of the alliance of wise competitors defining, therefore, the need to structure a supply network governance board.

This different approach alters the design of the organization's risk management strategy. The International Organization for Standardization (ISO) suggests[22] the following principles of risk management should:[23]

- Create value (meaning that resources expended to mitigate risk should be less than the consequence of inaction)
- Be an integral part of organizational processes
- Be part of the decision-making process
- Explicitly address uncertainty and assumptions
- Be a systematic and structured process
- Be based on the best available information
- Be tailorable
- Take human factors into account
- Be transparent and inclusive
- Be dynamic, iterative, and responsive to change
- Be capable of continual improvement and enhancement
- Be continually or periodically reassessed

[22] Committee Draft of ISO 31000 Risk Management (PDF). International Organization for Standardization. June 15, 2007.

[23] http://en.wikipedia.org/wiki/Risk_management, accessed March 2014.

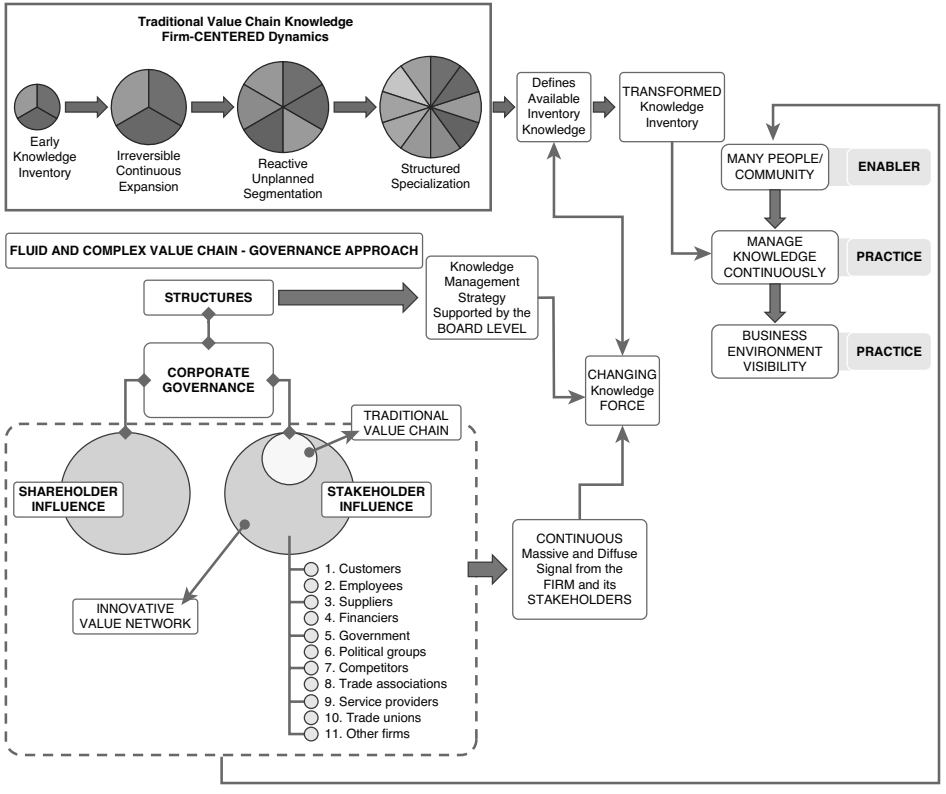

Figure 1.28 Value network knowledge dynamics

The traditional value chain uses the risk assessment snapshot to elaborate a mitigation plan and a contingency plan. Because these plans (1) are designed periodically, typically on a yearly basis, and (2) disregard the contribution from influential stakeholders, it is not possible to state that this approach actually follows risk management principles. Except, eventually, for item 7 (competitors), all others are not fulfilled by firm-centered risk management strategies in supply network environments.

Instead of having yearly-basis frozen mitigation and contingency plans, the supply network must base its risk management strategy on two other pillars:

1. A business continuity plan
2. The management of innovation

The business continuity plan (BCP) focuses on the recent past, on the present, and on the approximate future to guarantee early on a sense of the environmental oscillations based on the inputs from within the firm and from within the supply network (stakeholders). More than a what-to-do methodology as in Porter's five strategies theory, the BCP defines organizational culture as it has no end-to-end defined cycles.

As the organization manages its continuity plan, knowledge from inside and outside its boundaries update the decision-making process and enable frequent, small adjustments to the main business strategy. The BCP is a consequence of how people do things within an organization rather than a risk assessment snapshot. This approach reduces dramatically the occurrence of disruption valleys which are swapped for small business oscillations, as illustrated in Figure 1.16.

The management of innovation anticipates the future and guides the BCP to redirect focus as appropriate. The creation of an innovative planning environment cannot be addressed as an immediate goal. It is the ultimate consequence of long-term multi-contribution-based knowledge management.

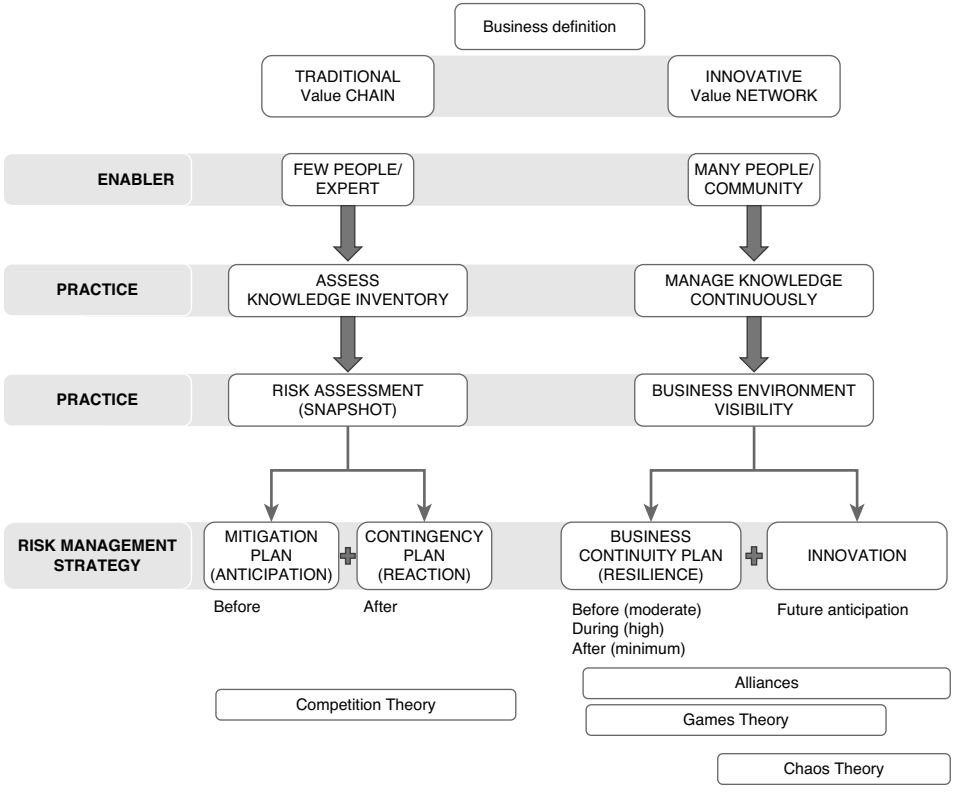

Figure 1.29 Risk management strategies

Innovative Planning

As already explained, the traditional value chain periodically assesses the available knowledge inventory to define its strategy for competition. Through a firm-centered governance model, this organization manages risks using equally periodically updated mitigation and contingency plans that are built from the limited perspective of a few people highly biased by shareholder goals. This governance structure is led by the CEO who aims to increase business competitiveness as a means to deliver shareholder value. It has also been discussed that this alleged competitiveness is in fact limited to the same extent that the influential stakeholders are ignored.

It has been presented that in modern fluid and complex supply networks the formula to maximize one firm's shareholder value depends on the early capacity to create value to all wise competitors within the alliances that form this network. Business competitiveness arises when the firm delivers and adds value to shareholders.

The Supply Network Innovation Roadmap (SNI Roadmap) suggests a three-stage sequence that is triggered by the creation of a collaborative environment originated by the proximity of shareholders and stakeholders of the different companies that form each supply network:

1. Enable
2. Develop
3. Use

The enabling stage observes the interaction between shareholders and stakeholders of each wise competitor to understand the presence of collaborative basic factors, enabling factors and disabling factors. The basic factors include cultural alignment, history coherence, values, and principles synchrony. The enabling factors include

the potential benefit the wise competitors can receive from each other, the commitment each firm's governance structure has with the concept of supply network management and the agreement on the time expected to follow a collaborative learning curve. The disabling factors are compiled into risks, including the risk that trust will not be achieved and sustained in the long term. Depending on how this environment is formed, collaboration is possible, or not.

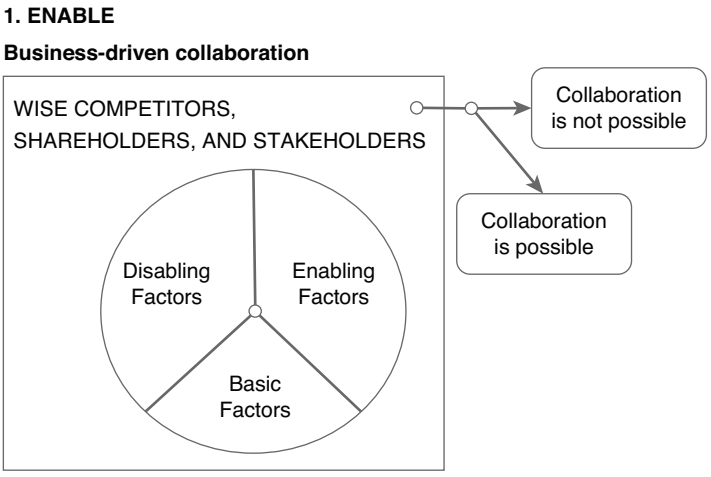

Figure 1.30 SNI Roadmap, stage 1

The second stage of the SNI Roadmap occurs if collaboration is possible within the supply network firms. The maturity learning curve directs wise competitors to an environment where visibility is available. In the early moments of this learning curve, the organizations define limited-scope initiatives to test collaboration. Pilot initiatives increase complexity as trust grows within these firms. Although this process takes a few years to become fully developed, sound results can be delivered through preliminary joint initiatives.

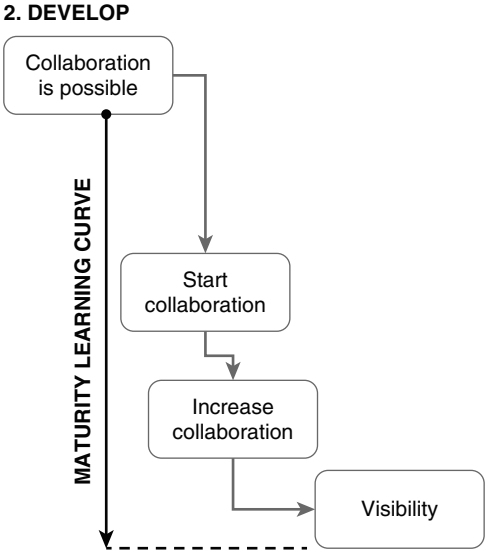

Figure 1.31 SNI Roadmap, stage 2

It is during this period that the wise competitors start to create a common governance structure, represented by the Supply Network Governance Diamond (SNG Diamond) Model. Each firm assigns one or more representatives to build a multicompany structure focused on the long-term success of the entire network environment. The mechanisms that create this governance structure are discussed in Chapter 2, "Managing Supply Networks." The higher the number of firms that belongs to the supply network, the higher will be the number of people in this structure. Governance policies and rules currently applied to one firm's business have to be reviewed, adapted, and then reapplied to this new multicorporate board.

Only through visibility is it possible to deliver innovation. The third stage refers to the use of the business environment visibility achieved in the second stage of the SNI Roadmap to support initiatives for environment visibility to support initiatives for the near future and for the long term. The diversity of ideas forms the premium raw material that produces innovation. The wise competitors collaborate and build a common governance structure capable of promoting

knowledge transfer and strategic decision making. This creative environment continuously produces new ideas to respond to all sorts of challenges that test the performance of the supply networks. Risks, opportunities, problems, and trends are the filters to select the most appropriate ideas that are tested, deployed, and experienced by the wise competitors.

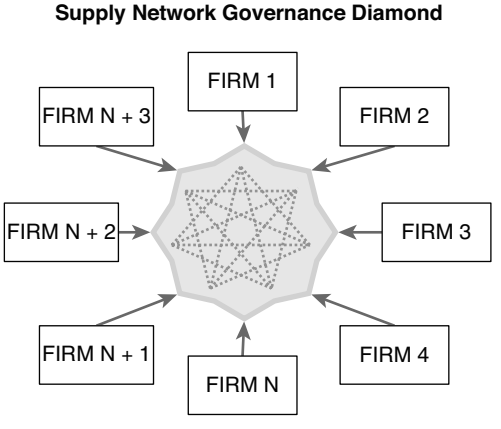

Figure 1.32 SNG Diamond Model

The maturity of the SNG Diamond requires wisdom from the supply network players; this is the reason why they are referred to as the *wise competitors.* The fundamentals of knowledge management suggest an evolutionary path from the capture of unstructured business information to the level of wisdom. Once information captured from diverse sources within the supply network is structured according to syntaxes defined by the organization, it assumes a given shape, typically called *data.* Data usually comes in the format of a report, an organized spreadsheet, or screens in the organization's ERP[24] systems. For example, while random algorithms represent information, a syntax (rule) applied will define that 14:00 is 2 hours after midday (data as result of a rule applied to information).

[24] Enterprise resource planning system.

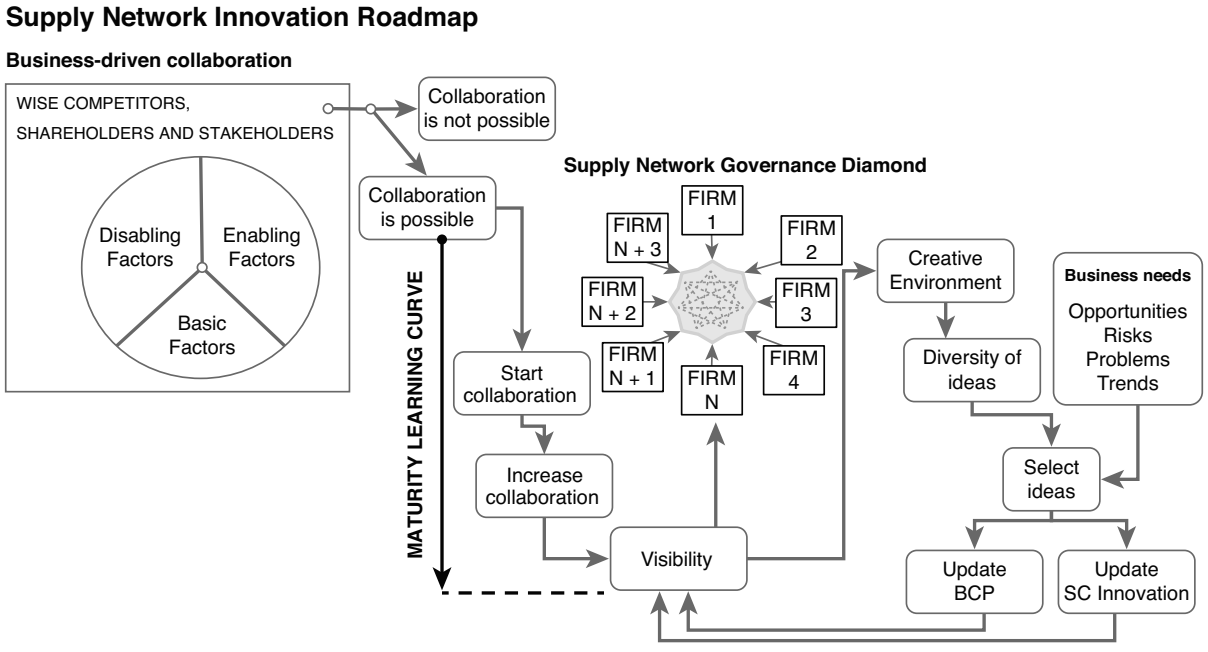

Figure 1.33 SNI Roadmap

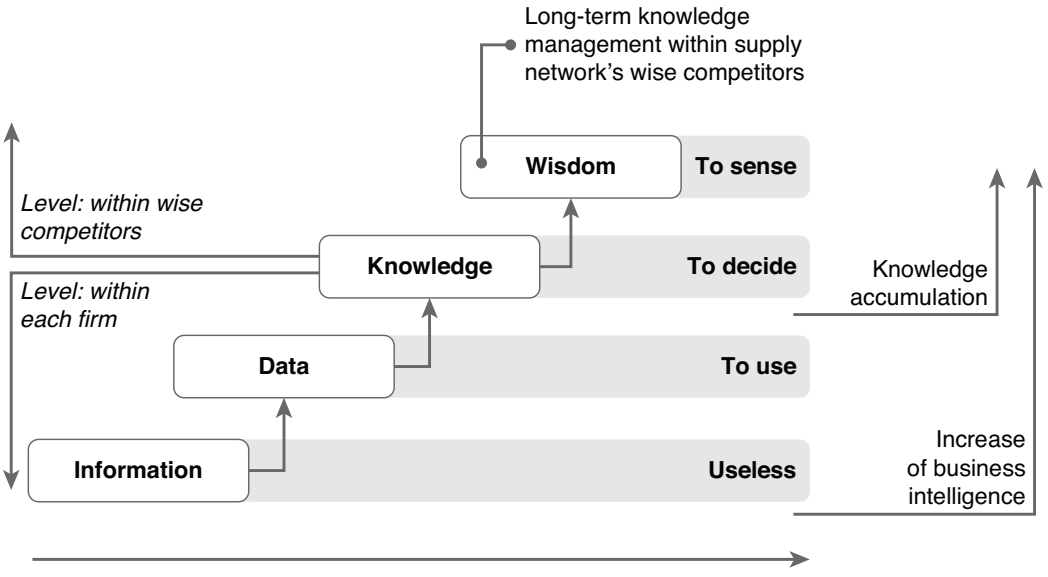

Figure 1.34 Wisdom

The concept of knowledge is associated with knowing "how to do." It is closely related to the capacity for interpreting data in the context of the business to decide what is the best alternative in any specific moment. People acquire and develop knowledge over time by the coordination of skills (how to do), attitudes (wish to do), and by experiencing an ever-expanding collective knowledge environment, which happens to be the firm and the supply network of which this firm is a part.

Looking back at the previous example, how many people will be at 14:00h (data) inside the cockpit of a Formula One car for the next race? While a very few people have the knowledge to be a Formula One driver, millions of people can interpret the data that the race occurs at 14:00h and will watch it from their homes. While data is available to many people, just a few have the knowledge to properly use it. Business intelligence systems propose organizing information into data to facilitate decision-making processes. These systems basically reduce the level of knowledge a person (or organization) needs to have accumulated to interpret data and make decisions.

When the organization is capable of using the knowledge (the sum of what is known[25]) from diverse elements of the supply network to project reliable business scenarios as the trigger for long-ranging decision-making process, wisdom has come (the quality of having experience, knowledge, and good judgment).[26] The wise competitors use wisdom to sense market fluctuations to adjust their supply network strategy as a means of preserving and maximizing its value to be shared within shareholders and stakeholders. It is in this state of a firm's relationship nirvana[27] when knowledge flows are intense, structured, selective, and driven to contribute to the decision-making processes regarding the present and the future of the supply networks, where the innovative environment creates roots.

[25] www.oxforddictionaries.com/definition/english/knowledge

[26] www.oxforddictionaries.com/definition/english/wisdom

[27] An ideal or idyllic state or place; www.oxforddictionaries.com/definition/english/nirvana

The value-added innovation rate is proportional to the ability of transferring knowledge within supply network firms (the wise competitors). To innovate means to "make changes in something established, especially by introducing new methods, ideas, or products,"[28] which is not difficult at all. But to make things differently and simultaneously add value (to shareholders and to stakeholders), this is quite a challenge. The players of the innovative supply network are the wise competitors capable of creating permanent knowledge flows that allow business visibility to the point of sensing even the smallest environmental oscillations. Therefore, innovative supply networks anticipate strategy adjustments prior to the creation of disruption valleys by preserving and increasing shareholder and stakeholder value.

Impacted Knowledge Areas

As fluid and complex environments substitute the traditional dynamic experienced since a few decades ago, the management of product or service offered has changed in many ways: lifecycle, customer expectation, profitability, shelf life, value, and volume are just some examples.

The demand planning and forecasting knowledge areas face new challenges starting from the definition of to which items forecasting will be applied. The pattern of a product's lifecycle in an industry will change—from introduction through growth, maturity, and stagnation, to decline. In fact, the industry cycles themselves have reduced. Demand concentration patterns may change within a short period of time.

From the sourcing perspective, the optimum balance that provides best-possible total ownership cost needs to be reviewed more frequently by the procurement planning and purchasing teams. *Strategic sourcing, global sourcing, offshoring, intercountry sourcing,* and *low-cost countries* are some of the buzzwords that reflect this new business environment.

[28] www.oxforddictionaries.com/definition/english/innovate

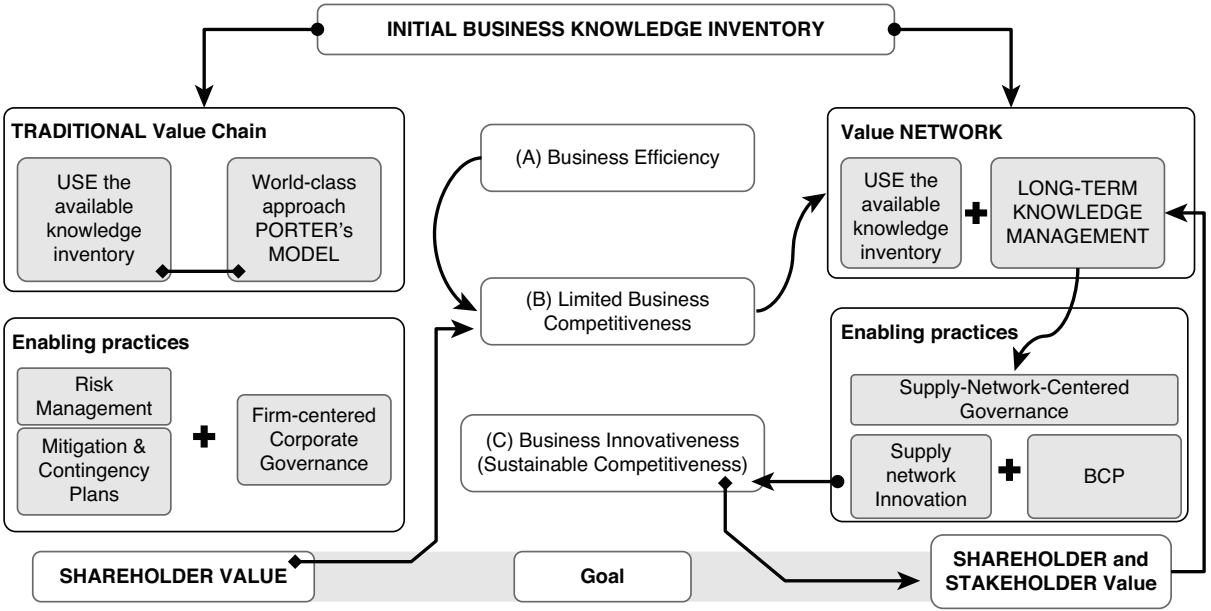

Figure 1.35 New paradigm

The strategic dimensions of procurement organizations are affected as the definition of needs constantly changes and supplier basis volatility requires new evaluations. Cost variables that are subject to frequent oscillation include transportation routes and costs from supplier (domestic or international), terminal handling costs (ports, airports), brokers fees, international taxation, domestic transportation; intermediary warehousing/depot costs; insurance; inventory carrying costs; supplies for quality control (laboratory analysis); and cost of quality (nonconforming items).

The challenge to plan and control inventory demands a redesign of the balance between the different types within the supply chains' networks and through distribution channels. These types include raw material, packaging material, work in progress, MRO (maintenance, repair, and operations), and finished goods.

Production planning will revise strategies considering diverse dynamics: make to order (MTO), assemble to order (ATO), configure to order (CTO), finish to order (FTO), engineering to order (ETO), or queuing.

The impact on operational areas such as transportation, warehousing, manufacturing operations (which differs from production planning), and distribution is significant.

Distribution is a knowledge area closely connected with customer service. The management of distribution channels is a discipline of sales, marketing, and the supply chain. The dilemma between standardization and segmentation must be carefully addressed. Although treating distribution channels with a single a single strategy reduces operational complexity and delivers lower overall costs, it becomes more difficult to respond to customers' requirements and frequently offers average, smaller service levels.

In contrast, highly fragmented (extreme segmentation) models tend to offer higher and customized service levels and create an adequate environment for collaboration between suppliers and

customers. However, operational complexity requires more resources and overall cost to serve increases. The challenge, though, is to build and sustain a balanced scenario to offer some degree of customization at an acceptable cost to serve. This requires profound operational and market knowledge.

The knowledge of customers' preferences and attributes combined with the right perception of market trends enables powerful distribution channels management. Some characteristics of these traditional channels must be mastered by any customer service professional. The following examples do not refer to business-to-business types of operation when, for instance, an industry supplies its customer, which is another industry.

Major changes have impacted on the relationship with customers. This has influenced customer segmentation, distribution channels, and customers' service levels. Other attributes involve the geographical presence of customers, geographical interest of the supplier; customer concentration per product, region, application, and so on; distribution channel's importance today and in the future; product value versus composition in the customer's mix; product volume versus composition in the customer's mix; sensibility to competition in key accounts; product profitability versus customer, distribution channels, and so forth; carbon footprint, customer's sustainability policies; product image versus distribution channels; and customer lifecycle.

Information technology solutions are present in all areas mentioned. Some of the well-known applications include advanced planning systems, bar codes, customer relationship management, demand planning and forecasting, distribution requirement planning, e-procurement, fleet management, freight management, international trade, inventory management, manufacturing execution systems, materials requirement planning, order management, production planning, purchase management, routing, sales and operations planning, simulators, smart tags (EPC), supplier relationship management, transport management systems, and warehouse management systems.

Other areas in the businesses affected by fluid and complex environments are project management offices, sales, finance, controllership, human resources, quality assurance, engineering, R&D, HE&S, marketing, and regulatory. External interactions involve all significant suppliers, all significant customers, all significant service providers, some selected noncompetitors, and a few preferred competitors.

Expert's Opinion

SCM and IT Integration: Key Success Factors and New Trends

Enrique Motilla[29]

"The only constant is change." —Heraclitus[30]

Global and local operations are no longer independent; neither big nor small business processes are supposed to be distant on performance or cost. The influences shaping business and competition in a technology-fueled global environment are calls to action for governments, businesses, and individuals who must stay ahead of these trends in order to remain competitive.[31]

Can technology be considered a key success factor? Sometimes this question can be very obvious and sometimes not. It becomes obvious when there are costs, including total cost of ownership (TCO) and other relevant measures, such as competition response time, volume, and geolocation of operations, that could not be compared in any way to a manual operation.

Everyone has been faced with the complexity involved in the upgrade from old technologies, data conversion, and the problems

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[30] http://en.wikiquote.org/wiki/Heraclitus

[31] www.wikisummaries.org/The_World_Is_Flat

that arose from incompatible platforms, formats, and methodologies yet still expected to continue an operation at the same time. At a corporate level, it becomes clear that technology is only part of the equation, since the human factor can be the most crucial aspect to take into account in order to achieve a successful technology implementation.

The next table illustrates the aspects to take into account from three perspectives: technology/human/corporation.

Factor	Technology	Human	Corporation
Volume (increment)	Consider amount of transactions, centralization of data, data warehousing, backup technologies, multiple servers, replication, downtime, restore time, cloud computing, and security.	Depend on the perceptual or previous level; eg. amount of transactions, sales, or issues per day	Cost increase, investment, expected time of implementation
Location (diversity)	Communications, internet availability, security, private networking (VPN)	Work from home, use of mobile devices, availability during non office hours, availability on vacation time, security issues depending on mobile platforms, emergency response time.	Increased flexibility, need for realtime response and clarity of transaction, tracking, problem solving 24/7, traceability, and effective problems solving on critical events.
Complexity (increase)	Look for open formats, well known technologies, established providers, availability on different platforms. Avoid one-time technologies, untested new platforms, complex user interfaces. Consider open environments and projects but invest on service plans.	Continuous education must become part of the policies of the company. Listen to the final users for suggestions, and their insights on different technologies, or their perspective on how to simplify and avoid duplicated processes.	Evaluate old, current, and new processes. Establish policies to identify and avoid Non-Value-Added-Activities (NVAA), find error prone or human factors that can be simplified or eliminated.
Cost per transaction	Evaluate several options, test, consider solid and long-term solutions. Avoid short term or free untested material such as antivirus, without considering the expiration of trial periods.	Measure according to time, complexity, and peer to peer activities. Avoid comparison when a benchmarking. methodology is not clear or is missing.	Look for cost/volume/benefits ratios. Invest in statistical scenarios, prevent demand. Consider leasing or rent when volume and changing technologies are involved.
Migration from old technologies	Test migration tools, find experts on both technologies, don't expect simple formats to be easily transformed to new transactional databases without errors.	Take enough time with end users to embrace the change. Bring external consultants specialized on change management if needed. Let the users know they are going to be educated on the new technologies. Avoid drastic changes or unexpected removal of tools. Plan accordingly and let the users be the key part of the change. Listen but be clear that there are no step backwards.	Evaluate, invest, and find the perfect timing, define a migration team, use external experience and help, avoid seasonal and critical periods to make changes, establish a communication center, tickets control system, and a responsive unit for early detection and response to newly detected errors. Define strategies such as the WCS (Worst Case Scenarios) and how to repond accordingly.

Figure 1.36 IT factors

It is clear that the human factor and the company commitment will be the breaking point, because technology can be evaluated objectively, and even discarded or changed, but the personnel must be aware of the benefits and act accordingly, embrace the change and move together with the company's mission, and then benefit the organization and its relationships inside and outside the supply chain.

Eventually, once the change is taking place and the users are aware of the benefits of the implementation of any new technology, the success will be determined by the continuity, usage, and maintenance of the hardware/software/telecoms in place on any given project.

The increasing availability of tools, software paradigms, social networking, mobility, and Internet accessibility over the last years has reshaped the supply chain, sometimes even to the point of turning it into a digital supply chain.

There are many technologies to consider, but it is easier to choose when the evaluation is based on the project's needs, current availability, cost/benefit, security, and level of maturity. Sometimes, to innovate and to face current competition, the evaluation must consider the impact of not having a specific technology in place, rather than the direct cost or level of maturity (for example, having a Twitter account for corporate communications). But most of the time, it is not that simple; so let's enumerate and briefly describe recent technologies to consider for the SCM.

SaaS, Cloud Computing, and the SCM

SaaS stands for software-as-a-service, which is regarded as "on-demand software" supplied by independent software vendors (ISVs) or application service providers (ASPs), and is a software delivery model in which the software and associated data are centrally hosted on the cloud. SaaS is typically accessed by users using a thin client via a web browser.[32]

[32] http://en.wikipedia.org/wiki/Software_as_a_service

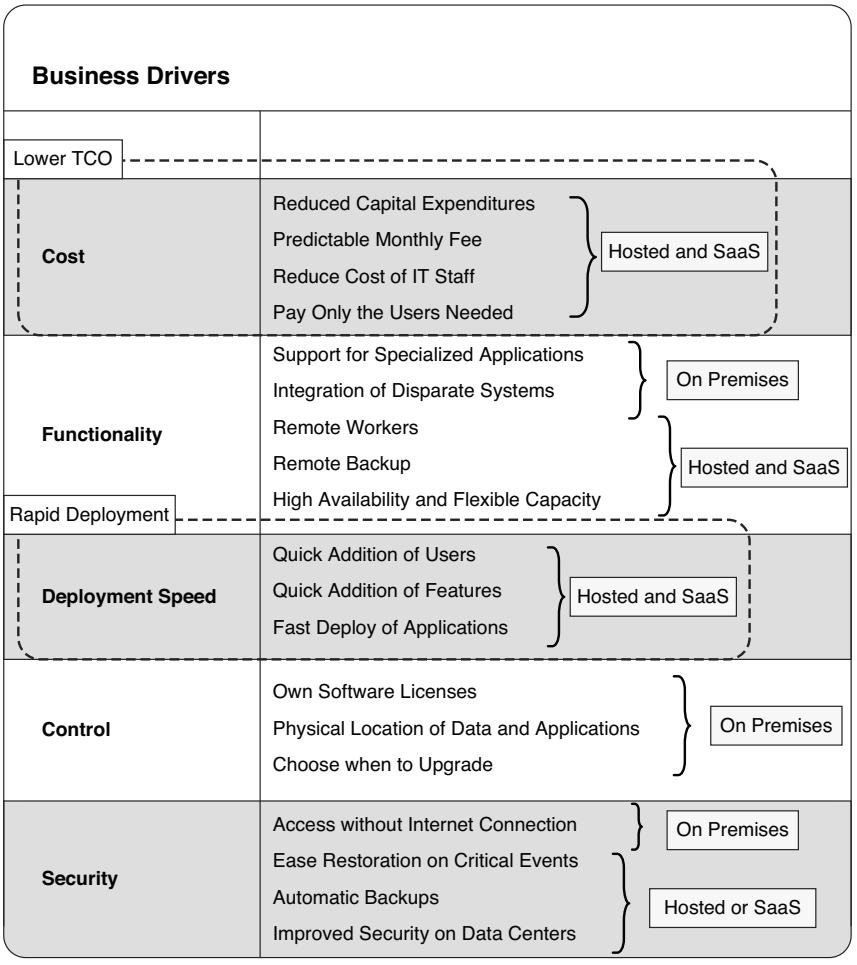

Figure 1.37 Business drivers

This concept is NOT new, and there are numerous options to select from. Hence, the point is to make a wise selection between on-premises software, SaaS, or Cloud based on the TCO, rapid deployment, and improved security, plus functionality and control factors.

Big Data

The definition of big data is as follows: "Extremely large data sets that enable companies to sense, analyze, and better respond to market changes." These data sets are usually larger than a petabyte of data

and involve data from disparate data sources: structured and unstructured data, sensor data, image data, and other forms of visualization.[33]

The opportunity here is to be aware of the potential use of this amount of information that can be used for demand planning, order management, price management, tactical supply planning, and production planning; the supply chain visibility and product traceability, however, are regarded as the most important issues as well as their performance compared to other areas, such as RFID transmission, voice and video data, data from social media, geolocation, and mapping and mobile applications.

As companies are moving into the future, it is better to realize the importance of focusing on the end-to-end transactions and building cross-functional teams to benefit from the use and treatment of big amounts of data, rather than the hype of technology itself, because data remains data, but data becomes information when properly managed.

Conclusions

There are several buzzwords and technologies emerging that appear often in magazines and Internet news, such as The Internet Of Things (IoT), RFID, NoSql and graphical databases, geolocation-based applications, and so on.

Hence, the potential benefits for the supply chain derive from the correct selection of tools and implementation of each technology, a proper evaluation of direct and indirect costs, a high level of integration, and the overall expected performance. There is no simple formula for this, nor is there a common solution for all the cases, because each individual and organization has its own perspectives, level of maturity, and unique vision.

[33] www.bigdatanosql.com/?tag=Industry%3A+Supply+Chain

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