

# Complexity Theory and Pricing Management



The recent surge of organizational complexity has prompted large consulting organizations to start paying attention to it and to research how it has been institutionalized in organizational life. In this paper the author selects some of the most relevant dimensions of complexity theory and investigates pricing management in their context. This article also reports on these dimensions and grounds them in practice by offering some practical recommendations to organizations that need guidance. Stephan Liozu, CPP, is President & CEO of Ardex America Inc ([www.ardex.com](http://www.ardex.com)), a CPP Faculty Member and a

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Organizations pursue intelligence (J. G. March, 1999). In that pursuit, they process information, formulate plans and develop aspirations, interpret environments, generate strategies and decisions, and design structures and programs. As they do so, they strive to achieve superior competitive advantage and economic rent versus competitors (Wernerfelt, 1984), and, ultimately, to generate superior performance. But in doing so, they also continuously introduce incremental complexity at the individual and organizational levels.

“Complexity theory is everywhere and is destined to be the dominant trend of the 1990’s,” predicted Manson (2001:405). The recent surge of organizational complexity has prompted large consulting organizations (Deloitte Touche Tohmatsu, IBM, BCG, McKinsey & Co) to start paying attention to it and to research how it has been institutionalized in organizational life (Birkinshaw & Heywood, 2010). Scholars have also studied the foundation and dimensions of complexity theory and have applied them to organizations and to the practice of management.

Marketing and pricing literature have looked at some of the complexity characteristics of the pricing process but have never formally connected it to complexity theory and to how executives manage pricing in organizations. Scholars and practitioners do agree that pricing is a complex process (Monroe, 1990; Nagle & Holden, 2002). Many industry managers consider pricing to be a headache, and many firms have “thrown in the towel” on pricing. They complain that they have no control over prices because “the market sets the price and (they) have to figure out how to cope with it” (Dolan & Simon, 1996). Lancioni et al. (2005) proposed that pricing strategy has implications for stakeholders both within and outside the firm. For them, pricing is a difficult and complex process because of the plethora of internal and external economic and political influences that shape the firm’s pricing decisions. The tasks of price setting and implementation have numerous implications throughout the organization. These tasks involve “multidimensional processes affecting customers, products, cost recovery efforts, product margin levels, customer retention, market share, and domestic and international sales”

(Lancioni, et al., 2005, p. 125). Pricing and value management also create issues related to communication systems inside and outside the firm (Cyert & March, 1992) when agents interact and use different internal languages. The activities related to pricing are lived differently by sellers, buyers, and intermediaries, and conflicting meanings often ultimately lead to different experiences (Diller, Shedroff, & Rhea, 2005).

In this paper we select some of the most relevant dimensions of complexity theory and investigate pricing management in their context. We report on these dimensions and ground them in practice by offering some practical recommendations to organizations that need guidance. Our ultimate objective is to understand and shed light on what makes pricing so complex, on why pricing management should be considered as a complex system, and on how firms can manage the complexity generated by the multidimensionality and multi-levelled-ness of pricing management and transform it into a differentiating force.

## Complexity Theory & Managing Organizations

Complexity is everywhere. The definition proposed by March and Simon (1958: 2) of an organization says it all: “Organizations are systems of coordinated actions among individuals and groups whose preferences, information, interests, and knowledge differ. Organization theories describe the delicate conversion of conflict into collaboration, the mobilization of resources, and the coordination efforts that facilitate the joint survival of an organization and its members.” Add to this definition that an organization is also an assemblage of roles, rules, behaviors, cognitions, and identities, and you have managed to define the organization as a complex system. In light of these definitions, managers in organizations can only hope to design strategies for coping with complexity that can be deployed to optimize tasks and processes (Moldoveanu & Bauer, 2004).

This initial introspection forces us to ask whether organizations are assembled mechanisms, or uncontrollable organisms (R. D. Stacey, Griffin, & Shaw, 2000) that strive toward an elusive

goal of economic maximization. Looking at the levels and intensity of complexity that organizational actors face, one wonders whether organizations can be managed purposively. One of the significant issues with complex organizations is the delineation of boundaries. Physical boundaries are fairly simple to define, whereas moral, legal, behavioral, or philosophical boundaries are not clearly delineated and are subject to interpretation. The emergence of co-creation marketing strategies, co-development of technologies, commercial and innovation exchanges, participative management approaches and collaborative strategies have blurred firm boundaries, created a need for more system thinking at the organizational level (R. D. Stacey, et al., 2000), and prompted the emergence of “evolutionary complex systems” (Érdi, 2008: 19) that integrate new partners or so-called attractors. Middle managers in organizations try to respond to high levels of system complexity by designing organizational processes to manage it. In the face of complexity, rational behaviors call for simplified models that capture the main features of a problem without capturing its complexity (J. March, et al., 1958). The simplifications have a number of characteristic features: 1) optimizing is replaced by satisfying, 2) alternatives of actions and consequences are discovered sequentially through search processes, and 3) repertoires of action programs are developed by organizations and individuals, and these serve as the alternatives of choice in recurrent situations.

Complexity theory also helps explain the dynamics of organizational life. Organizations are living organisms that evolve and learn. Not only are organizations complex systems, but they are complex adaptive systems in constant search of improved efficiency, continuous learning, and superior interactions with their “supra-system” (R. Stacey, 1996: 183). Complexity-adaptive systems are very much influenced by humans in organizations that are injecting desires, emotions, perceptions, perspectives, and philosophical preferences (Richardson, 2008) into decision-making schemas. This human dimension of complex adaptive systems creates an interesting connection between change management and leadership.

Organizational agents inter-

act, communicate, and exchange meaningful data and engage in relationships that enable learning and group evolution (R. Boyatzis, 2006). They thus create shared beliefs and norms. They also seek consensus through conversation, conflict resolution, and problem-solving interactions (Cyert & March, 1992). The result is the integration of knowledge, and the development of dynamic capabilities (Teece, Pisano, & Shuen, 1997) that stick in the organizational memory (Walsh & Ungson, 1991). In the end, agents in complex adaptive systems learn how to learn in novel and dynamic environments (Dosi, Nelson, & Winter, 2000) through experimentation (R. E. Boyatzis, 2008) and both exploration and exploitation of knowledge (J. G. March, 1999).

Much more can be written about complexity theory and its application in the management of organizations. In this first section, we focused our high-level discussion on the links between this emerging theory and organization theory, the bounded rationality concept, evolutionary and change theory, and the phenomenon of organizational learning.

### Complexity Theory and Pricing Management

We focus our exploration of the connection between complexity theory and pricing management practices to three important dimensions: system multi-levelled-ness, the dynamic nature of

Figure 1: Complexity in Pricing Management



systems and subsystems, and the complexity of communication systems.

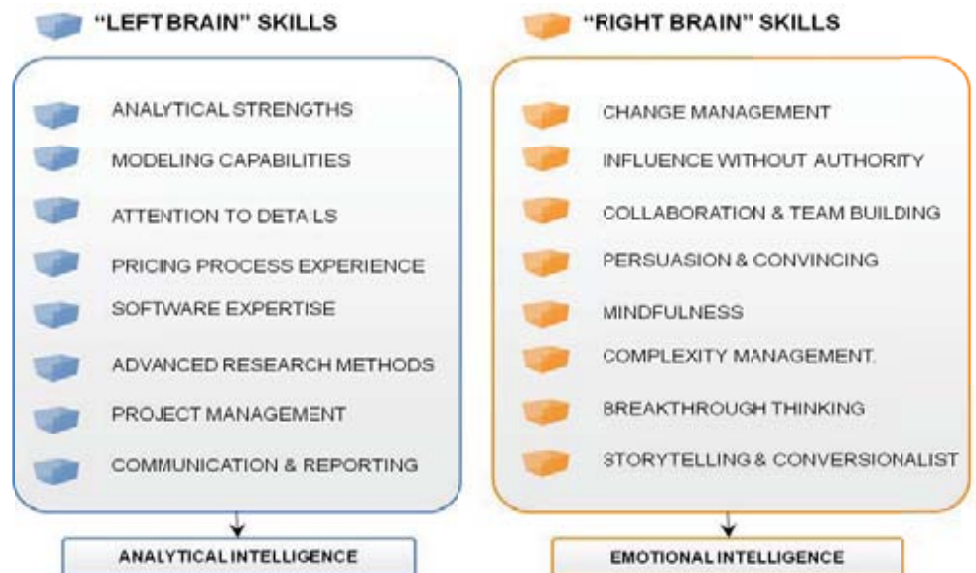
### Pricing and Multi-levelled-ness

Our research work in the area of pricing management led us to conclude that one of the critical elements of the organizational journey towards pricing excellence is the organization's capacity for change. Moving from a formula-based pricing orientation to a customer-value orientation requires deep changes and an overall organizational mobilization to achieve desired goals (S. Liozu, Boland, Hinterhuber, & Perelli, June 2011). This combination of change and complexity dimensions in pricing led us to the work of Richard Boyatzis (2006) and especially to his paper on intentional change theory from a complexity perspective.

Boyatzis refers to a complex system as a "multi-level combination of systems that may behave in a way independent of any one of the component systems" (2006, p. 608). Later in his paper, he explores aspects of his change management theory that make it a truly complex system: its multi-levelled-ness. We adopt these dimensions of system combination and multi-levelled-ness and apply them to pricing management in organizations. We go one step further by stating that pricing is much more complex. As shown in Figure 1 (see previous page), complexity in pricing management is nested in various levels across multiple dimensions and cultures and requires the convergence of multiple languages. It is the result of complex interactions between internal subsystems (functions and departments) exposed to internal/external ongoing opposition.

We conjecture that pricing management is multi-functional, multi-dimensional, multi-cultural, multi-lingual, and multi-leveled. Pricing requires the careful management of the multitude of agents involved in pricing decisions and the plethora of

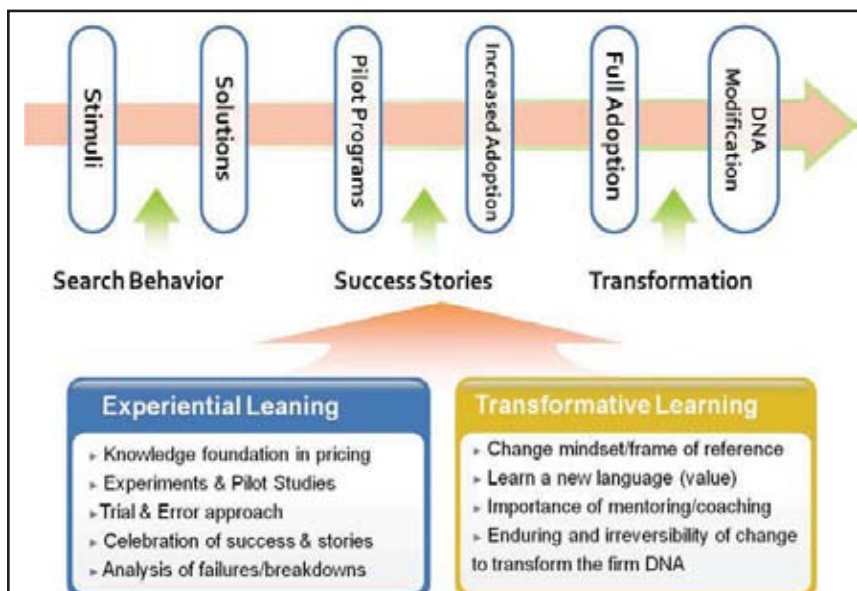
Figure 2: Pricing Skills of the Future



information that must be considered in order to set price levels. Because all agents and actors act independently, tensions, conflicts, misunderstandings, negotiations, and arguments are part of this complex price-setting process. There is plenty of room for failure, for poor decision making, for irrational behaviors and for breakdowns in the process. That is perhaps why most managers "throw in the towel."

Firms that are more competent in pricing deal with this complexity in superior ways (Dutta, Bergen, Levy, Ritson, & Zbaracki, 2002). First, they adopt a pricing orientation and engage in pricing practices. These practices refer to the set of well-orchestrated activities and behaviors executed by an organization's managers that lead to the pricing decision. Furthermore, organizations need to create a special zone where relevant pricing decision-makers and agents can converge in order to start collaborating around a value and pricing conversation and reach consensus. We call this zone the C4 Zone. It is imperative that all necessary parties are brought to this special place to have value conversations that will create organizational buy-in and generate positive energy around it.

Figure 3: Complex Pricing Transformational Journey

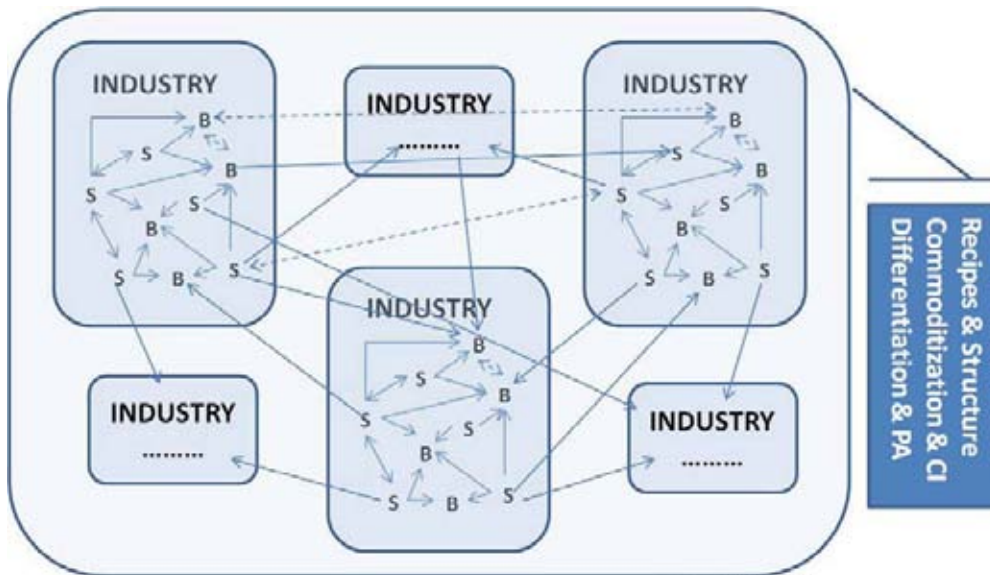


So, faced with this complexity, pricing leaders must act as resonant leaders (R. Boyatzis & McKee, 2005) and work across the multi-levels, the multi-functions, and the multi-dimensions to create the necessary productive interactions. They are responsible for capturing the influence and power of the various groups involved in pricing (Lancioni, et al., 2005) and for creating coalitions across what Boyatzis (2006) calls social identity groups. Building consensus and positive energy to support pricing activities will lead to greater collective confidence in implementing the pricing vision and the change agenda and in reaching greater outcomes (Bohn, 2002; Kanter, 2006; S. Liozu, et al., June 2011). Figure 2 shows the skills that future pricing professionals must wield in dealing with organizational complexity in pricing.

The journey to pricing—and it is a journey, not a



Figure 4: Dynamic Business Ecosystems



and acquisitions, new market entrants, aggressive penetration strategies, and government regulations. These elements inject phenomenal levels of turbulence into business ecosystems, as shown in Figure 4.

The inherent complexity created by dynamic, complex systems forces organizations to constantly challenge their organizational architecture to adapt to change. Pricing and value functions cannot escape this phenomenon as industry structure changes, commoditization accelerates, and innovation penetrates industry fabrics (Matthysens, Vandembemt, & Berghman, 2006). Many industries (e.g., airlines, e-commerce, hospitality) have reacted to this level of dynamic turbulence by investing heavily in dynamic pricing approaches and advanced revenue- and yield-management programs. Here the question is not so much how to control the system but how to anticipate system dynamics and proactively adapt to them.

destination—is a complex transformation that requires experimentation, teamwork, difficult decisions, and significant investments and that potentially never ends (see Figure 3 on previous page). Along the way, pricing professionals must become agents of change, driving transformation by managing successes as well as failures. They must be able to sort through complexity and, without behaving in a reductionist way, translate difficult tasks and projects into simpler propositions. Therefore, the capacity to mindfully translate complexity into simplicity represents a required pricing skill of the future.

### Dynamic Systems Dimension

Markets are not static. They are very dynamic and require organizational adaptations and a certain capacity to absorb, react, and change (Meyer & Stensaker, 2006). The porous boundaries of these industries and market sectors are affected by mergers

and acquisitions, new market entrants, aggressive penetration strategies, and government regulations. These elements inject phenomenal levels of turbulence into business ecosystems, as shown in Figure 4.

### Complex Communication and Interpretation Systems

Individuals in organizations are continuously called upon to make decisions based on insufficient information (Tushman & Scanlan, 1981). Whereas cost and competitive information is more objective, information relating to customer value is subjective (Hinterhuber, 2008b) and ambiguous. Gathering value information requires the use of market research techniques such as focus groups, surveys, field value-in-use assessments and conjoint analysis (James C. Anderson, Jain, & Chintagunta, 1993), and environmental scanning. Empirical studies have suggested that difficulties in gathering customer information are related

Figure 5: Difficulties in Value Assessment

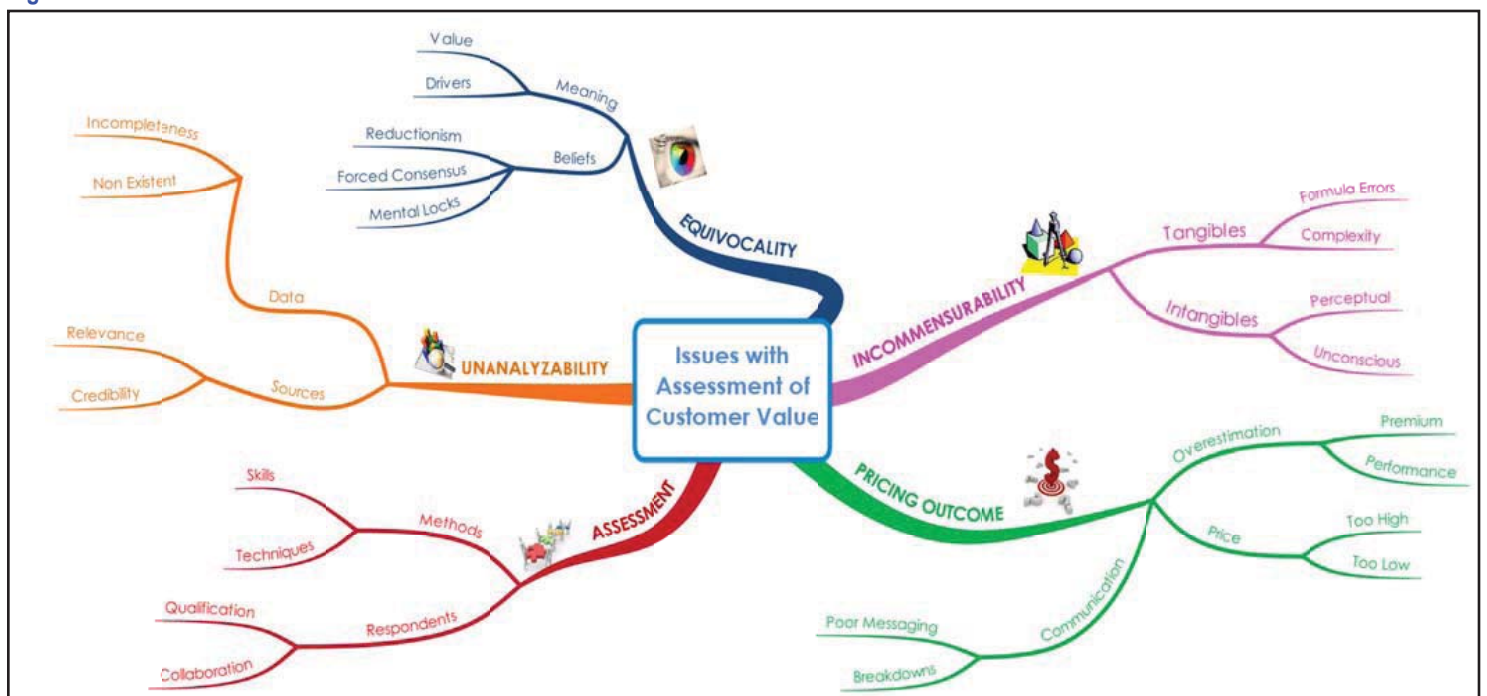
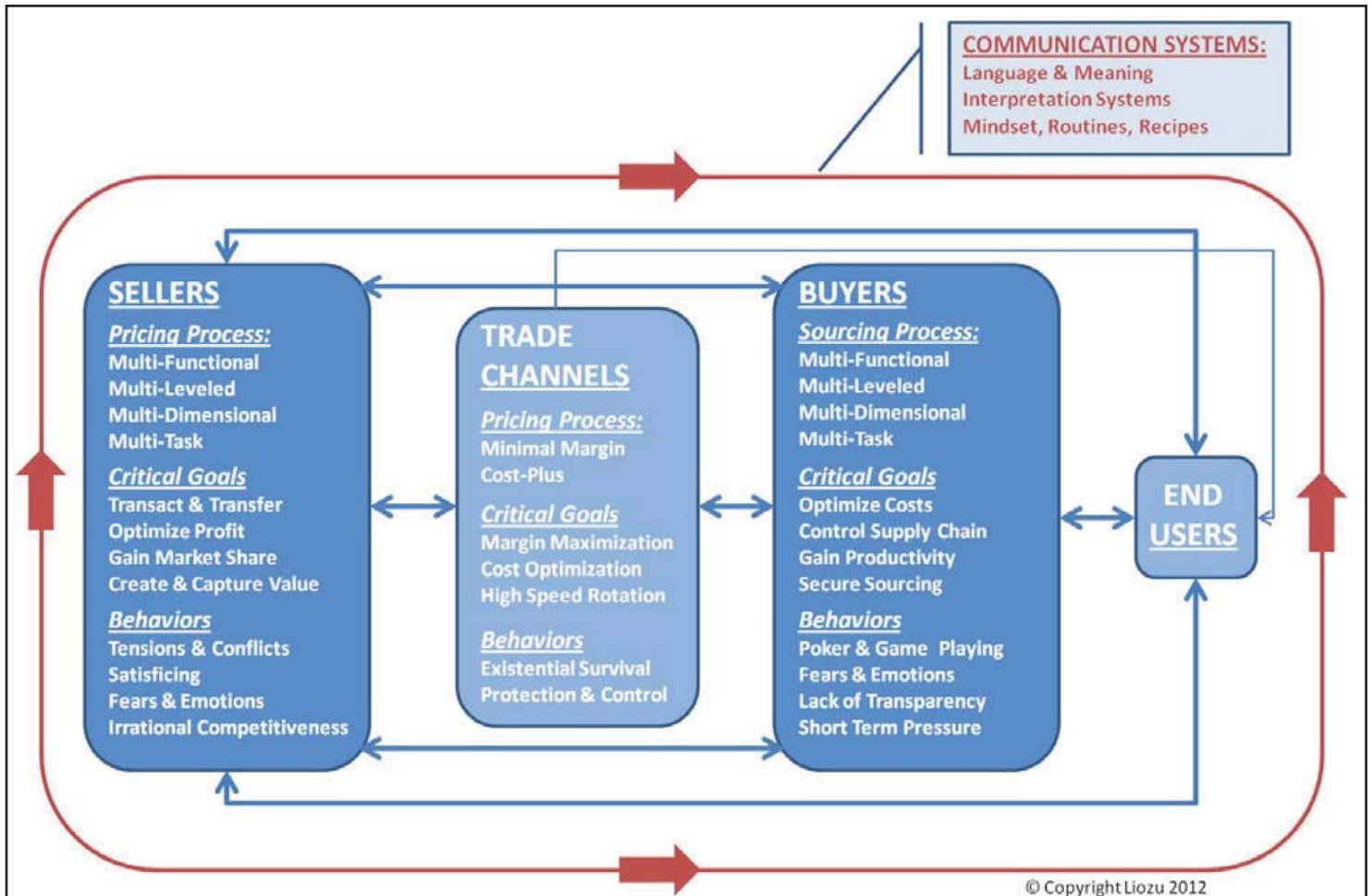


Figure 6: Language and Meanings in Price Interactions



to finding the right respondents and their ability to effectively handle “soft” attributes (James C. Anderson, et al., 1993; Hinterhuber, 2008a). Difficulties in conducting value assessment create uncertainty (Hinterhuber, 2008a). The lack of clarity of market information, rather than a lack of data, is a major problem (Daft & Weick, 1984).

The availability of customer value information alone does not guarantee success. How information is transmitted throughout the organization (Cyert & March, 1992:79), how it is interpreted (Daft & Weick, 1984), and how it is used (Ingenbleek, 2007) are also important considerations. As Daft and Weick (1984) observed, interpretation gives meaning to data, and data is translated into knowledge. Several factors may affect the levels of complexity in information interpretation, as shown in Figure 5 (on previous page). First, information equivocality, defined as “the multiplicity of meanings conveyed by information about organizational activities” (Daft & Macintosh, 1981), may lead to different and conflicting interpretations. Second, information assembly rules will guide the organization to process data into collective interpretation (Daft & Weick, 1984). As critical pricing information about costs, competition, and customer value circulate in the organization and reach decision-makers, interpretation filters and information-handling rules will affect the way it is finally assembled to support key pricing decisions. Third, incommensurability of information raises the level of uncertainty in the decision-making process (Spender, 1989:188). Of the five elements included in the definition of customer value, only three

have direct commensurability: benefits expressed in monetary terms, costs expressed in monetary terms, and price. The other two, perceived benefits and costs, lack in commensurability of measurement units, thus rendering the customer value assessment a complex exercise (J.C. Anderson, Kumar, & Narus, 2007:23). Fourth, the analyzability of the external environment is a factor influencing the level of interpretation in firms. The degree of complexity and analyzability of dynamic environments will affect the levels of uncertainty and ambiguity in the decision-making process (Duncan, 1972). As the environment grows increasingly more complex, managers will shift their assessment from objective parameters to intuitive and subjective ones such as judgments, inventions and manipulations (Daft & Weick, 1984).

Figure 6 depicts the language and meaning interactions among various actors in modern commerce. Even though transactions are at the center of exchanges, multiple breakdowns in communication systems may affect interactions. The meaning of value and price in this context is critical. Suppliers must be able to re-code their language in terms that customers need and expect to hear. Their sales force must adopt a different language based not on product features and attributes but on customer benefits and emotional attractors. The multiple interactive loops in the system require a strong alignment of language to avoid giving birth to multiple and conflicting interpretations among actors.

Ultimately, pricing and value functions must focus more on languages and meanings than on actual price levels and conditions.

Articulating pricing offerings based on the customer's meaning leads to augmented customer experiences (Diller, et al., 2005).

## Materialization of Pricing Complexity in Practice

Organizations add more and more complexity to their processes and to their business practices without taking a step back from time to time to assess the constructive or destructive nature of incremental complexity. Of the four types of potential complexity (imposed, inherent, designed, and unnecessary) facing managers in firms (Birkinshaw & Heywood, 2010), designed and unnecessary elements of complexity are the two they can exert some control over. They can do so by conducting careful complexity audits, internal stakeholder surveys, and customer surveys aimed at reducing or redirecting complexity.

In the field of value and pricing management, complexity lies at many levels and in many dimensions of the pricing process. Here are a few practical examples of how organizations experience pricing complexity in practice and how this complexity has an impact on a firm's efficiencies:

1. **Inefficient organizational structure:** In many firms, pricing is a fragmented process that is divided among various departments. The result is a constant state of interaction and discussion between finance, marketing, and sales departments without clear responsibilities and accountability (Lancioni, et al., 2005; S. Liozu, et al., June 2011). The inherent power discussions and struggles impede the pricing process and lead to consensus based on conflict avoidance (Cyert & March, 1992; Pfeffer, 1994) rather than on market needs.
2. **Fragmented systems:** The emergence of integrated pricing-optimization systems has reduced the emerging issues of connectivity and interface between enterprise resource software and pricing management software. However, many firms still suffer from complex software infrastructures that do not communicate well among each other. The emergence of big-data analytics has made the situation worse. Sub-optimal software reduces the ability of managers to make appropriate pricing decisions based on integrated and logical data consolidation. The result of this phenomenon is the creation of manual complex workarounds to support pricing decision making.
3. **Big data in pricing:** Pricing transactions and data points can be counted in the millions. Organizations must manage and maintain millions of price data and pricing conditions. Some are created automatically through the generation of pricing conditions during order entry. Others are inputted manually during the construction of competitive pricing databases. This creates a complex analytical challenge for pricing professionals as they conduct exploratory and explanatory models to generate optimal pricing levels by combining and

linking large-scale, system-generated databases and manually inputted ones.

4. **Micro-segmentation:** The adoption of value-based pricing requires a very strong up-front focus on the segmentation process in order to gauge the customer's willingness-to-pay in the individual need cluster (James C. Anderson & Narus, 1998; Hinterhuber, 2004). Proper segmentation analysis might require drilling to a granular level that is not manageable and sustainable for an organization. In business-to-business markets, this type of granularity may result in thousands of price segments and conditions, adding extensive complexity in the management of pricing. This is a potential dark side of a successful segmentation process and of the intent to capture the value worth for each micro segment.
5. **Pricing "Turkish bazaar":** The management of pricing through multiple channels requires adequate organizational structure and advanced price management systems. Previous research revealed that the complexity of managing price conditions through multiple channels acts as a stimulus to change the overall pricing orientation (S. M. Liozu, Hinterhuber, Perelli, & Boland, 2012). Informants likened this complexity to negotiating prices in a Turkish bazaar. When prices are not structured and consistent across channel segments, customers can take advantage of the situation as well as feel extreme frustration and dissatisfaction with the supplier's pricing strategies.
6. **Organizational inertia:** Organizational inertia in the face of dynamic environmental changes creates a serious disconnect between what is needed to respond to change and what is actually done. Inertia, and the general unwillingness to change, creates an environment of quick fixes, manual workarounds, and organizational bricolage (Duymedjian & Rüling, 2010), adding greater complexity to pricing tasks and routines.
7. **Meaning of value and pricing:** Very few firms invest in foundational training programs in pricing and value management. Those that do not introduce strong language barriers in their organizations as leaders and decision-makers exchange specific terms related to business matters. The most common language barrier is the confusion between cost, value, and price in business discussions. The lack of a common language creates disconnects in meanings and interpretations, hindering the reaching of constructive consensus.
8. **An issue of control:** The debate over the delegation of pricing authority rages on. Academic studies are divided on the subject (Frenzen, Hansen, Krafft, Mantrala, & Schmidt, 2010) of what positively influences pricing realization. What is well known is that pricing authority cannot be fully delegated to

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sales personnel without some type of controlling structure in place and without strong investments in training and capability-building activities (S. Liozu, et al., June 2011). Giving sales personnel full pricing authority would potentially lead to the creation of numerous pricing and service conditions. The resulting incremental complexity might not be easily managed in existing information systems and could quickly deteriorate margins while draining administrative resources.

## Leveraging Organizational Complexity for Differentiation

Embracing and leveraging complexity will be increasingly required of organizations as the pricing and value management fields integrate more technologies, capitalize on big data, and rely on intelligent systems to derive optimal pricing decisions. Strategic pricing in that context becomes a strategic differentiating weapon leading to superior competitive advantage. Being able to embrace, integrate, and leverage complexity in pricing creates organizational capital (social, systems, and human) (Dutta, et al., 2002). Therefore, the future of the pricing profession lies in the achievement of superior organizational intelligence in pricing that combines the strength of human behaviors and the power of intelligent systems.

Faced with this increased complexity in pricing and value management, managers in firms can abdicate their pricing power and try to apply organizational bricolage with the resources and skills at hand (Steffens, Senyard, & Baker, 2009), or they can take the more proactive and dynamic approach to embrace and leverage it to create differentiation. Here are a few recommendations to support the latter approach.

**Identify the “Hot Spots” of Pricing Complexity:** As part of a regular pricing capability assessment, we recommend conducting a pricing complexity audit. This audit is aimed at capturing the “hot spots” associated with wasted resources, manual workarounds, inefficient processes, inconsistent data analysis, and irrational pricing patterns. Such an audit can only be conducted as part of an annual business audit. By capturing the hot spots of pricing complexity, leaders can engage in deeper discussions about how to transform that complexity into a productive force for the organization.

**Remove Legacy and Unnecessary Pricing Complexity:** Addressing complex issues has to be a priority for top leaders, especially when these come from legacy management practices that represent organizational sacred cows. Building pricing capabilities atop broken legacy processes or principles can be counterproductive. Legacy or inherent complexity must be removed in large chunks to address organizational bottlenecks that create inefficiencies. A pricing capability audit combined with supportive internal and customer surveys of how a firm’s pricing strategies are perceived will quickly uncover unnecessary and unproductive pricing complexity hidden in pricing sub processes, rules, and guidelines.

**Embracing Designed Complexity to Create Differentiation:** The real challenge of complexity management in pricing is to turn this complexity into an organizational strength to increase pricing power and pricing performance. Productive designed pricing complexity might include creative pricing strategies that help capture more value, better systems that intelligently integrate

and optimize all available data, and an organizational structure that appears to be counter-intuitive but that supports commercial personnel more effectively. Pricing and value professionals can also create differentiation by designing unique pricing tools, interactive models, value models, pricing conditions, and messages that will create excitement with their commercial personnel and their customers and that generate greater pricing power. The critical dimension here is to create complexity that generates value rather than complexity for the sake of increasing analytical or technical power.

**Developing Sustainable Pricing Capabilities:** Complexity management must be part of the pricing and value management training curriculum. Explaining the fundamentals of complexity management, change management, and organizational ambidexterity can certainly resonate with people who are less troubled by complexity. Ambidextrous capabilities—the ability to tolerate ambiguity and actively manage complexity—enable employees to create and use networks within organizations to build relationships and help overcome poor processes, bridge organizational silos, or manage whatever value-creating pockets of complexity their companies decide to maintain (Birkinshaw & Heywood, 2010). As complexity continues to increase decade after decade with the further globalization of business and the emergence of superior technologies, investments in complexity-related training must be maintained over time in order to build long-term sustainable capabilities.

**Encouraging System Thinking and Superior Design:** Managing complexity is a real design challenge for leaders of organizations as marketers and business strategists incorporate more system thinking and co-creation programs. As marketing strategies include more innovative value creation and collaboration, pricing and value-capture strategies also need to include system thinking dimensions. Pricing systems might include advanced bundling options; creative pricing menus combining products, parts, and services; dynamic pricing algorithms; and new pricing and value models based on customer research. There is no reason why creativity and design in pricing cannot be as good or as powerful as the creativity and design employed in product and packaging programs. The limit is the “iron cage” around the field and skills of pricing. That cage needs to be broken, mimic behaviors eliminated, and copy-and-paste pricing strategies removed from strategic planning sessions.

The field of pricing is ready for a design revolution that will capture and leverage productive complexity, the power of creative marketing, and the potential of system thinking. Be bold—join the pricing revolution!

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