

Complex System Design: Creating Sustainable Change in the Mortgage-Finance System

JOHN R. LATHAM
UNIVERSITY OF NORTHERN COLORADO

© 2009, ASQ

Society currently faces many complex global challenges, including economic crises, social unrest, and climate change, all of which are interconnected systems that require a different perspective in order to solve. In his article, "Quality Snags in the Mortgage-Finance Supply Chain," Paul Zipkin provides a provocative exploration and discussion, thoughtful analysis, and several recommendations for the application of quality management concepts, tools, and techniques to help improve the quality of the mortgage-finance supply chain (Zipkin 2009). To be sure, there are many design flaws in the mortgage processes and products, and Zipkin provides a new perspective and insights into design quality, management and measurement, and organizational structures associated with the mortgage supply chain. He notes near the end of the paper that it is "hard to imagine" the financial world embracing quality in the way that he proposes. His skepticism is valid, but one should hope that the financial industry, including the larger system participants (for example, Congress, their agents, and borrowers), takes the time to understand the overall system and its role in creating truly high-quality products to meet the needs and objectives of the various stakeholders. This commentary offers several thoughts on some of the systems issues associated with implementing and sustaining the changes that Zipkin recommends.

As Zipkin notes, the "subprime mortgage crisis represents a systemwide failure of quality." The study of systems, including general systems theory (GST)

and systems thinking, are not new to organizational system design. Since the 1960s there have been many articles and books written on the application of GST and systems thinking to organizational issues (for example, Atwater, Kannan, and Stephens 2008; Senge 2006; Kast and Rosenzweig 1972). However, widespread application of systems thinking to the design of products, processes, systems, and subsystems seems to have lagged behind. There are many examples of how the failure to consider the larger system when designing subsystem elements has resulted in unintended and undesirable consequences, including the current climate crisis. This is particularly true when the design of the subelements creates a need for adjustments in the larger system and related components. The lack of "give and take" among a diverse and fragmented group of participants during the design process makes it difficult to align the needs of the stakeholders with the overall outcomes and system design. The lack of alignment and integration has resulted in many unintended and often undesirable consequences. Jacobs (2009, 1) notes that the current financial crisis is characterized by "structured finance products that seemed to be reducing the risks of lending and investing while actually multiplying those risks and spreading them throughout the global financial system." In addition, it is clear that many of the individual design decisions in the mortgage-finance supply chain were focused on optimizing the individual components and participants versus the overall system performance to create value for

the multiple stakeholders and society. Creating sustainable change in the mortgage-finance system will require a thorough understanding of the overall system in order to learn from experience and develop effective design changes in policy, products, processes, consumption, regulation, and markets and to address the challenges facing leaders of a fragmented system.

System Design Issues

In his recommendations, Zipkin points out how “well-intentioned rules can have perverse and unintended consequences.” It now appears that part of the current mortgage problem is a result of well-intentioned interventions over the past few decades by Congress through the revised Community Reinvestment Act (CRA) and other policies intended to create positive social change. The revised CRA attempted to increase home ownership among underserved populations by requiring banking institutions to serve the needs of their entire communities. Freddie Mac and Fannie Mae, as “agents” for the government, were told to loosen credit to help people get into homes. This created an environment in the mortgage industry that resulted in several new products and services (for example, subprime loans). To ensure this objective was met, the banking institutions were evaluated on how well they supported their communities. It is now clear that Congress and their agents failed to heed W. Edwards Deming’s warnings about tampering with systems they do not fully understand and taking actions that do not address the underlying causes of the problem (Deming 1994). Consequently, they failed to predict the response of the mortgage lenders and the associated longer-term unintended and undesirable consequences. In the end, the policies have failed to achieve sustainable results to meet the main objectives of improving the level of home ownership among low-income families and may have actually made the situation worse.

Using an automobile analogy, Zipkin makes several excellent points concerning the design of products based on clear requirements that define

success. The interventions of Congress, and their agents Freddie and Fannie, encouraged the mortgage lenders to develop new and innovative products to serve their communities. Unfortunately, they failed to provide additional parameters to ensure these new products would create sustainable results and avoid unintended and undesirable consequences. To meet this rather narrow challenge, the mortgage lenders developed a portfolio of new products aimed at increasing the number of loans to lower-income borrowers. These subprime products included: low down payment loans (for example, less than 10 percent); negative amortization loans with low interest for the first few years, which actually increases the principal in the early years of the loan; interest-only loans; loans with balloon payments; and no or low “doc” loans (for example, loans with little or no income or credit verification). These products were designed to meet the immediate objective of getting more low-income families into homes but failed to consider the larger system design and the ultimate consequences of these actions. In addition, as the Nobel Prize winning economist Gary Becker points out, “When you have low interest rates, any long-lived assets tend to go up in price because they are based upon returns accruing over many years. When interest rates are low you don’t discount these returns very much and you get high asset prices” (O’Grady 2009, A9). It now seems that Congress and their agents Fannie and Freddie, the Federal Reserve (Fed), and the banks and mortgage brokers were all partially to blame for the poorly designed products. Congress, along with Fannie and Freddie, failed to specify parameters for new product design. The Fed kept interest rates low for an extended period of time, and the lenders failed to consider the larger system design and longer-term consequences that these new products would have on the larger financial system.

To prevent this problem, Zipkin recommends the government set limits on the types of loans mortgage lenders can offer and the ways they are sold. This is good advice but would require the government to possess a greater understanding of the overall mortgage-finance system and be able

to predict how the new products would impact the overall system. If the government had foreseen the mortgage lender's responses to their pressures and policies and the subsequent consequences, they could have established parameters for the design of the new products. It seems the lack of a comprehensive set of requirements was a main cause of new products and services that failed to meet the long-term needs of all the stakeholders or even the intended primary beneficiaries, low-income families.

Zipkin notes that it now seems difficult to believe that the borrowers actually thought they could afford the eventual higher and often unpredictable interest rates. He also proposes that additional information and education might help avoid such decisions in the future. This appears to be particularly true when there is an imbalance of information by the various parties involved in a real estate transaction (Levitt and Syverson 2008). While additional or more balanced knowledge among the various "players" in the process would no doubt help proactively address this issue in the future, research and experience suggest that even with information and education people tend to be poor judges of risk (Levitt and Dubner 2005). It appears that even informed and educated consumers misjudged the risks involved with some of these subprime products and assumed that housing prices would continue to rise unabated. Establishing parameters on the type of products and associated features that mortgage lenders could offer would have helped to prevent such decision dilemmas among borrowers. As previously noted, however, this would have required a much greater understanding of the larger system to inform the determination of appropriate design parameters.

Design issues associated with policy, products, processes, and consumption are not limited to the mortgage-finance system. These issues show up in many other complex systems including issues related to other economic, energy, environmental, and societal systems. For example, Congress was recently pressured to reconsider their policies related to ethanol (Kirchgaessner 2008). Tyner (2008, 647) explores the policies and the external market

influences that resulted in the unintended boom in ethanol production and the unintended outcome of an increase in corn prices. In fact, he notes that corn prices increased from \$87 per metric ton in 2006 to \$217 per metric ton in 2008, an increase of 150 percent. According to Lavelle and Garber (2008, 1), producing fuel from crops in the United States and Europe "accounts for between one quarter and one third of the spike in global commodity prices" contributing to an increase in starvation and poverty around the world. The design of the ethanol products was focused on the single objective of creating more energy but failed to consider the impact on the overall system and society. Not only were there design flaws in the mortgage-finance system policies, products, and consumer decisions, there was also a lack of oversight to detect and respond to these flaws.

Regulatory and Market Failures

As Grant (2008, 76) points out "Businesses and consumers have been seeking 'honest markets' for centuries." However, as he also points out, there continues to be market failures "throughout much of global commerce." Effective and efficient markets require appropriate regulatory mechanisms, transparency and balanced risk, and aligned incentives. The current mortgage-backed securities (MBS) markets seem to have problems in all three areas.

While it is now clear that there were regulatory failures, Zipkin wisely suggests proceeding with caution when it comes to "extensive additional regulation on banks." The lack of oversight played a role in the proliferation of products and practices that were risky and eventually ineffective. In addition, the limited oversight and regulation created many illegal opportunities for brokers and appraisers. Some appraisers and brokers have been guilty of fraud, appraisers providing inaccurate appraisals, and brokers finding "straw buyers" (for example, homeless people) and using their names. While many of these offenders have been caught and a system is in place to correct the situations when they are detected, the lack of oversight and regulation in the industry

created an environment that encouraged this illegal behavior. While Zipkin makes an excellent point that rules should not be created unless people will follow them, there are at least two additional reasons to proceed cautiously. First, as has been previously noted, there must be a better understanding of the system before one can design effective rules and regulations that when followed will achieve the desired results and avoid unintended consequences and outcomes. Second, the oversight and inspection required to ensure compliance are “parasites” on government and industry resources. Oversight and inspection are often the most costly methods for ensuring quality and, while often necessary, the system should be designed to create quality with a minimum of both. Barnett and King (2008) propose that industry self-regulation may be an option for many situations, but for this to be a viable option for the MBS market and mortgage lending industry, transparency would need to increase throughout the system and incentives would need to be aligned with overall system success.

While Zipkin proposes the need for increased transparency to help consumers and investors understand the products they are “buying,” there is a need for transparency throughout the mortgage-finance system. Transparency and balanced risk among consumers, lenders, and investors is required to create and sustain an effective and efficient MBS market. Zipkin notes that the lenders received fees at the beginning and had no stake in the long-term success of the loan—an issue also identified by Warren Buffett in his 2008 annual report to shareholders (Buffett 2009). Without a stake in the long-term performance of the loans, lenders had little motivation to focus on mortgage quality. And without changes to the lenders’ stake in the long-term success loans, they will have little incentive to implement Zipkin’s recommendations. In the past, mortgage lenders focused on their particular region following the five “Cs” of lending: capacity, capital, collateral, credit, and character. Lending agreements were based on relationships between lenders and local business and individuals with each maintaining a stake in the loan, individuals and

businesses through down payments, and with lenders retaining the remaining stake and the associated risk. This somewhat personal approach provided a clear sharing of risk and reward between the participants. As the MBS securities market evolved, some of this risk was shared with investors diversifying the lenders’ holdings and reducing the overall risk of their loan portfolio. As the subprime mortgages became more popular, this eventually evolved into a “shifting” of the risk from the borrower and lenders to the investors (Jacobs 2009, 4).

Unfortunately, due to the complex nature of the instruments and the lack of transparency, this shifting of risk was not completely understood by the investors. With the prospect of high returns and perceived limited risk, the demand for subprime investments grew. As the demand grew, the obligations moved from the lender to the investors, freeing up capital for even more subprime loans and creating what Jacobs identified as a “positive-feedback loop (Jacobs 2009, 5).” The subprime mortgage products resulted in consumers with a very low stake in the loan, lenders with little or no stake in the loans, and the investors taking on the majority of the risk. In addition, the professional investors were buying what many thought were Fannie and Freddie “government” guaranteed mortgages but these eventually turned out to be “phantom” guarantees. The lack of balance combined with the lack of transparency resulted in an ineffective and inefficient MBS market. These design flaws were reinforced by the misalignment and incongruence of the incentives among the various participants.

Zipkin also points out that there are differences in incentives for the borrowers and investors. The lack of a long-term stake in the success of the loans led to incentive schemes based on volume versus quality. With volume as the only criterion for success, it is not surprising that lenders failed to focus on the long-term quality of the loans or, in many cases, even the short-term credit worthiness of the borrowers. A similar incentives-alignment problem occurs in the U.S. utilities industry where, in most cases, revenue (for example, electricity use) is linked to utility profit, resulting in little incentive for the

utilities to help consumers reduce their energy consumption, which is needed to reduce carbon emissions (Lovins 2009). Borrowers were incentivized by the low interest rates and the related and equally ineffective housing market characterized by escalating housing prices. Lange (2008) proposes eight types of corruption control including the alignment of incentives with the overall desired outcomes. While, as Zipkin suggests, it is unlikely that incentives can be “perfectly aligned,” it is clear that closely aligned incentives are a critical component of any well-designed system or process. Incentives would be much easier to align if the various participants in the process were working for a single organization. In this particular complex and fragmented situation, however, there are many organizations involved in the supply chain, each with different objectives and definitions of success.

Leadership and Learning

Zipkin points out that the supply chain is fragmented with “huge numbers of brokers, small lenders, and resellers.” Each of these participants works to maximize his or her success based on the design of the system. Paul Volker and Warren Buffett warned about derivatives and debt and others warned about Fannie and Freddie. Why didn’t anyone pay attention? One possible explanation is no single individual or group was (or is) in charge of the system. Who owns the system? And, who is responsible for the overall success of the system? As Zipkin notes, it is not at all clear who or which organizations should take the lead. What does seem clear is there must be better frameworks to understand the complex financial systems like the one proposed by Levy (2008) for understanding global production networks not only as “both technically and organizationally sophisticated production networks” but also as “political systems encompassing multiple dimensions of power.” In addition, leaders need better frameworks for learning from experience as they develop and implement new design changes.

Zipkin observes that the current financial crisis is not the first time these issues have been

confronted and that people seem to have learned little from the savings and loan (S&L) crisis of the 1980s and 1990s. There are at least three reasons that people have failed to learn from experience. First, the context and issues of the S&L crisis were different than the current situation. During the S&L crisis, lenders were often also the builders and developers with little expertise, so they over built commercial properties. At the core of the current crisis is the “flipping” of assets with poor credit and little transparency to mortgage banks. Second, most of the analyses of both situations focus on the specific actions and subsequent consequences. The lack of understanding and questioning of the governing variables limits the learning that occurs about each specific situation and one’s ability to leverage lessons from one situation to another (Argyris and Schon 1996). Third, people’s understanding of the consequences is limited due to the distance in time and space between action and consequence (Senge 2006). Many of the consequences that result from the various interventions in the system are not known for many years or even decades, and they often occur in tangential systems not directly connected to one’s actions. This lack of learning from the past, coupled with a limited understanding of the overall system, led to interventions by Congress and their agents, that eventually resulted in a larger global financial crisis. These challenges to learning will have to be overcome in order to develop the changes in system design that address the current situation and to prevent similar problems in the future. But who will create and teach such frameworks for understanding and learning to the current and future leaders of organizations?

While they may be in good company, as the “trainers” of current and future business leaders, it seems clear that business education in the United States is at least partially culpable for the current financial crisis. But what should business schools do differently? Several researchers have pointed out the limited impact of business research and education in the United States (for example, Pfeffer and Fong 2002). Zipkin recommends that business school professors teach techniques such as the “5 Whys” as

part of “every investor’s routine.” It might be time, however, to go much further with business school reform and make systems thinking a core component of business education as Atwater, Kannan, and Stephens (2008) suggest. This would certainly help leaders understand the complex system within which they operate, learn more from experience, and better inform how they design products and services as well as the management systems and structures to support the design, creation, and delivery of their products and services. While systems thinking might be essential to help solve the problem, it may not be sufficient to address the current and future economic, environmental, and societal challenges. As Grant (2008, 76) points out, “Innovations in pursuit of an individual’s or organization’s advantage in the marketplace will continuously create situations that have not had time to be assessed and addressed by legislative and regulatory processes.” Consequently, it is critical that ethical principles are incorporated in the decision models of business leaders. In fact, as Khurana (2007) suggests, it might be time for a shift in the management profession itself and the rejuvenation of leaders both “intellectually and morally.” Regardless of the particular education solutions, in order to resolve the current situation, learn from the experience, and put in place the system changes to prevent similar crises from occurring in the future, leaders must evolve beyond being merely leaders of their particular organizations with a few stakeholders to become “stewards” of the system creating value for multiple stakeholders.

Zipkin has a valid concern over well-intentioned but hasty decisions and tampering with the system. Recently, Congress rushed to pass new legislation to tax AIG bonuses. As has been previously noted, incentives are powerful influencers of human behavior. It seems unlikely that Congress has any idea of the longer-term impacts of their legislation on the overall system, and unfortunately, there could be many unintended and undesirable consequences down the road. It seems clear that in order to address the current challenges and prevent future occurrences, people need to revise how they think about, design, and manage complex systems. As Gary Hamel (2007)

suggests, it may be time for bold management innovation to redesign our major systems. In addition, Sachs (2009) notes, “We will also have to remember that our risks go far beyond finance, and the fixes we need go far beyond financial policies. The interactions of the economy and the physical environment are similarly tightly coupled.” The parallels and connections to the current economic, societal, and environmental crises is striking and it will take as Senge et al. (2008) propose, in a book by the same title, a “necessary revolution” in the way people think and act to address the current and future crises in order to survive and hopefully thrive in the coming decades.

REFERENCES

- Argyris, C., and D. Schon. 1996. *Organizational learning II: Theory, method and practice*. Reading, Mass: Addison Wesley.
- Atwater, J. B., V. R. Kannan, and A. A. Stephens. 2008. Cultivating systemic thinking in the next generation of business leaders. *Academy of Management Learning and Education* 7, no. 1:17.
- Barnett, M. L., and A. A. King. 2008. Good fences make good neighbors: A longitudinal analysis of an industry self-regulatory institution. *Academy of Management Journal* 51, no. 6:21.
- Buffett, W. E. 2009. *Berkshire Hathaway Inc. 2008 Annual Report*. Omaha: Berkshire Hathaway Inc.
- Deming, W. E. 1994. *The new economics: For industry, government, education*, second edition. Cambridge, Mass.: Massachusetts Institute of Technology Center for Advanced Engineering Study.
- Grant, J. H. 2008. Ethics across the curriculum: Ethics competencies in undergraduate business programs. *New Directions in Higher Education* (Special Issue).
- Hamel, G. 2007. *The future of management*. Boston: Harvard Business School Press.
- Jacobs, B. I. 2009. Tumbling tower of Babel: Subprime securitization and the credit crisis. *Financial Analysts Journal* 65, no. 2:14.
- Kast, F. E., and J. E. Rosenzweig. 1972. General system theory: Applications for organization and management. *Academy of Management Journal* 15, no. 4:19.
- Khurana, R. 2007. *From higher aims to hired hands: The social transformation of American business schools and the unfulfilled promise of management as a profession*. Princeton: Princeton University Press.
- Kirchgaessner, S. 2008. Coalition calls on Congress to rethink its ethanol policy. *Financial Times*, 13 May, 1.

- Lange, D. 2008. A multidimensional conceptualization of organizational corruption control. *Academy of Management Review* 33, no. 3:20.
- Lavelle, M., and K. Garber. 2008. Fixing the food crisis: There are as many potential solutions to the price hikes as causes of them, and none will come easily. *U.S. News & World Report*, 19 May, 144.
- Levitt, S. D., and S. J. Dubner. 2005. *Freakonomics: A Rogue economist explores the hidden side of everything*. New York: HarperCollins.
- Levitt, S. D., and C. Syverson. 2008. Market distortions when agents are better informed: The value of information in real estate transactions. *Review of Economics and Statistics* 90, no. 4:13.
- Levy, D. L. 2008. Political contestation in global production networks. *Academy of Management Review* 33, no. 4:21.
- Lovins, A. 2009. *The power of scale: The new frontiers of energy efficiency*. Panel Discussion at the Aspen Environment Forum, Aspen, Colorado, 25-28 March.
- O'Grady, M. A. 2009. Now is no time to give up on markets: Interview with Gary Becker. *The Wall Street Journal*, 21 March.
- Pfeffer, J., and C. T. Fong. 2002. The end of business schools? Less success than meets the eye. *Academy of Management Learning and Education* 1, no. 1:78-95.
- Sachs, J. D. 2009. Blackouts and cascading failures. *Scientific American*, January, 300.
- Senge, P. M. 2006. *The fifth discipline: The art and practice of the learning organization*. New York: Currency Doubleday.
- Senge, P. M., B. Smith, N. Kruschwitz, J. Laur, and S. Schley. 2008. *The necessary revolution: How individuals and organizations are working together to create a sustainable world*. New York: Doubleday.
- Tyner, W. E. 2008. The U.S. ethanol and Biofuels boom: Its origins, current status, and future prospects. *Bioscience* 58, no. 7:8.
- Zipkin, P. 2009. Quality snags in the mortgage-finance supply chain. *Quality Management Journal* 16, no. 3.

BIOGRAPHY

John R. Latham is director of the Monfort Institute and a Monfort Executive Professor of Management at the Monfort College of Business, University of Northern Colorado. He has more than 30 years of experience working in and with a variety of commercial, nonprofit, and government organizations from Asia to Europe. He has had a wide variety of work experiences from consulting on organization and management system design and change to vice president of corporate quality and business excellence for a \$1.3 billion manufacturing company with operations in 40 countries. He served nine years on the Malcolm Baldrige National Quality Award Board of Examiners. He earned a doctorate in applied management and decision science from Walden University in 1997 and an MBA from Chapman University in 1992. He is the co-author of the *Baldrige User's Guide: Organization Diagnosis, Design and Transformation*, Fourth Edition and has published articles in *Quality Management Journal*, *Quality Progress*, and others. He is a Senior member of ASQ, a Certified Quality Engineer, and a past section chair. He can be reached by e-mail at john.latham@unco.edu.