LEARNING FROM KOBE: COMPLEXITY AND URGENCY IN THE HOLISTIC MANAGEMENT MODEL

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Margaret Wheatley argues the vast complexity in the contemporary business environment has forced organizations and institutions to allow for the possibility of "anything" happening.[1] The reality of "anything" happening has given rise to holistic management models requiring a total commitment to the system by all of its individual members and components. The holistic model has proven to be effective in the management of complex environments. The model emphasizes total participation, cooperation and consideration of every possible component. The model considers how the system as a whole can adapt and improve continuous training, learning and sharing of information.

While the holistic approach is often highly effective in enabling organizations and institutions to adapt to uncertain situations, it is questionable whether holistic approaches can effectively react and adapt when there is a vast amount of diversity in a complex environment. The heavy reliance on total commitment, continuous learning and sharing of information makes it difficult for holistically managed crisis control to rapidly incorporate information and resources which are not considered to be "part of the system." This analysis will examine how holistic management systems respond when dealing with the diversity in complex environments by examining the potential flaws which can arise and challenge previously held assumptions. When the environment presents such demands, they generally must be managed by an open approach to varying perspectives and values. As an example, analysis of the responses of Japan's natural disaster preparedness system during the Kobe Disaster will be conducted to show when and how holistically managed systems are not equipped to handle diversity.

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[1] Margaret Wheatley, "Breathing Life Into Organizations," *Journal for Quality and Participation* 18 (1995): 6-9.

The Holistic Management of the Kobe Earthquake

On January 17, 1995, the most powerful earthquake to strike an urban area in Japan in more than 50 years rocked the port city of Kobe, Japan. The Hanshin Daishinsai (Great Hanshin Earthquake) was Japan's first category seven earthquake, responsible for killing 5,300 people, injuring 30,000 and leaving another 500,000 homeless.[2] The disaster relief effort was managed by Japan's natural disaster preparedness system, in which various public and private agencies provide disaster prevention and relief in a holistic manner. The system is driven by Japan's nationwide commitment to make earthquake detection and prevention one of its main national priorities. Because of the dedicated effort, Japan has one of the highest per capita GDP expenditures on earthquake detection and prevention measures in the world. This pledge to be prepared for and manage disasters at the national level can also be seen though the implementation of a rigid building code which emphasizes high strength buildings to withstand low strength quakes. Finally, Japan has held an annual nationwide earthquake drill to simultaneously carry out police rescues, helicopter deployment, seismic monitor testing and emergency train stoppage routines.[3]

Due to this demonstrated earthquake preparedness commitment in Japan, one would have expected Kobe, the "big quake," to be the system's "finest hour." However, the system's response to the Kobe earthquake created the "Kobe disaster." Most notably, in the three days following the quake, thousands of people suffocated under the rubble left by the quake, while thousands more lost their homes to fires.[4] American scholar Gavan McCormack argues as a result of the Hanshin Daishinsai quake:

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[2] Aoki Hidekazu and Kawamiya Nobuo, "Hanshin daishinsai de taoresatta mono," *Tokyo* (April 1995): 97-109; and Glen Fukushima, "Lessons from the Quake," *Tokyo Business Today Special Issue* (April 1995), p. 48.

[3] Kazuo Chinone, "The Tokyo Earthquake: Not 'If' but 'When'," *Tokyo Business Today Special Issue* (April 1995): 8-12; and H. Fukunagawa, "Natural Disaster, Unnatural Consequences," *Tokyo Business Today Special Issue* (April 1995): 4-8.

[4] Sharon Begley, "Killer Quakes: Lessons of Kobe," *Newsweek* (January 30, 1995): 32-33; Michael Hirsh, "Japan: The Agony and the After Shock," *Newsweek* (January 30, 1995): 20-23; "More than 3,000 Dead, Missing: Casualty Toll Rises as Rescue Efforts Gather Momentum, 187,000

> The faith in technology, the trust in the competence of the bureaucracy, the confidence that the authorities would protect people in the event of any crisis, was profoundly shaken. Questions of technology and engineering standards were actually directed toward national identity and direction. The spectacle of bureaucratic and political incompetence was unforgettable, both as to the confidence with which Kobe had been declared earthquake-free and so was unprepared for the catastrophe that struck it, and in terms of the response to the event itself.[5]

Before Kobe, the Japanese government and the Japanese people took pride that the nationwide disaster preparedness system could prevent such a tragedy. After Kobe, it has become apparent that even though Japan's system focuses on a holistic approach to earthquake preparedness, this approach does not necessarily ensure the system can effectively manage a disaster.

Complex Environments

The Nature of Complex Environments

Complex environments are characterized by rapid change, high volumes of information, high levels of uncertainty, increasing interrelatedness of parts within the whole, diverse assumptions and perspectives, and continuous new information driving changes in the fundamental structure of organizations and institutions.[6] A complex environment is the opposite of a deterministic, predictable and controllable state of affairs. Instead, it is a system of relationships which weave together, merge, change, degenerate and evolve.[7] Complex environments are a state

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Evacuated," *Daily Yomiuri* (January 19, 1995): 1-3; and "Quake Kills Over 1500 in Kansai," *Daily Yomiuri* (January 18, 1995): 1-3.

[5] Gavan McCormack, *The Emptiness of Japanese Affluence* (Armonk, NY: M.E. Sharpe, 1996), p. 12.

[6] Richard Cyert and James G. March, *A Behavioral Theory of the Firm* (Englewood Cliffs, NJ: Prentice Hall, 1963), pp. 100-116; and W. Richard Scott, *Organizations: Rational, Natural and Open Systems*, 3rd ed. (Englewood Cliffs, NJ: Prentice Hall, 1992), p. 55.

[7] Frances J. Milliken, "Three Types of Perceived Uncertainty About the Environment: State, Effect, and Response Uncertainty," *Academy of Management Review* 12 (1987): 133-143.

of order within disorder or disorder within order. This concept is based on the assumption that the world has become so complex that regardless of how carefully planning is carried out, unanticipated events will occur that will make long term planning virtually impossible.

Components of Complex Environments

Complex environments produce three types of events: continuous, abstract and stochastic. Continuous events are based on Richard Daft and Karl Weick's concept, the reliability imperative, which emphasizes the "shift from efficiency to reliability."[8] The need for reliability is continuous, in that the overriding requirement is to keep the system doing what it is supposed to do. This focus on reliability shows that while efficiency was the hallmark of the deterministic industrial era, reliability is the hallmark of stochastic, continuous process technology associated with the post-industrial era. People confronted with problems of continuity and reliability must manage the system's processes instead of simply trying to achieve discrete and efficient outcomes.

In addition to the reliability imperative, the explosion of new technology in contemporary society has made abstract events an ever present phenomenon in complex environments. Abstract events are those events which demand a great deal of cognitive effort to manage. With technology, a cognitive demand for inference, imagination, and problem solving has increased. Individuals operating in complex environments, therefore, must maintain a large set of cognitive skills, even though they may only be used infrequently.[9] Operators are kept on standby, giving special attention to start-up and to anticipating faults that may lead to downtime. When dealing with abstract events, the differentiation between operations and maintenance is blurred, while the demand for monitoring and diagnostic skills becomes crucial.[10]

The need for response to abstract events fosters mistakes rather than errors, because the vast amount of information present in the complex

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[8] Richard L. Daft and Karl E. Weick, "Toward a Model of Organizations as Interpretation Systems," *Academy of Management Review* 9 (1984): 284-295.

[9] Ibid.

[10] Louis E. Davis and James C. Taylor, "Technology, Organizations, and Job Structure," in Robert Dubin, ed., *Handbook of Work, Organization and Society* (Chicago: Rand McNally, 1976), pp. 379-419.

environment is difficult to comprehend, and impossible to fully understand. An error occurs when an individual inadvertently strays from the guide or prescribed course of action, and thus is blameworthy for the outcome of their behavior. A mistake, on the other hand, occurs when there is a misconception, misidentification or misunderstanding due to the vast amount of uncertainty faced by the individual. As a result, the system which the individual uses to process this information, rather than the individual, is responsible for the outcome of the individual's behavior when a mistake occurs.[11] In a system which requires an understanding of the "whole," the occurrence of individual mistakes can hinder the effectiveness of the system and limit its ability to adapt to the rapidly changing environment.

The other type of occurrence which is produced in a complex environment is the stochastic, or randomly occurring and unpredictable event. Daft and Weick argue "a world of alchemy is a world of stochastic events."[12] These crisis events challenge the system and the way it has always worked in the past. A crisis, by its nature, requires the system to rapidly produce changes in behavior, decision making, priorities, structure and process and is often a great challenge to the assumptions on which the system is based. These events test the system's ability to deal with uncertainty by providing incoming data which does not fit with current paradigms and by providing data the system has not addressed before. In addition, a "crisis" creates conditions in which systems have an inability to deal with "certainty," in that during periods of crisis, the system will frequently rely on itself to be able to handle change. This self reliance can have deadly consequences if it is based on false assumptions.

The Presence of Chaos and Its Demand for Rapid Change

In addition to the events identified in the literature, it is important to note systems must be prepared to handle the chaos which often ensues when there is a rapidly occurring sequence of abstract and stochastic events. This mix of abstract and stochastic events presents a unique challenge, since the stochastic nature of the sequence produces a great deal of uncertainty, while its abstract nature requires a great deal of attention to diagnostics and monitoring. In short, such a sequence produces a need for rapid change and

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[11] Paul S. Goodman, Lee S. Sproull and Associates, *Technology and Organizations* (San Francisco: Jossey-Bass, 1990), pp. 35-57.
[12] Daft and Weick, "Toward a Model," pp. 284-295.

adaptation. These types of sequences are a reality in complex environments and require rapid change and adaptation to be managed effectively.

Holistic Management in Complex Environments

To manage effectively in complex environments, systems have become holistic, in that they operate with the imperative that the whole is greater than the sum of its parts. Margaret Wheatley believes "we have begun to speak in earnest of more fluid, organic structures, even of boundary-less organizations. We are beginning to recognize organizations as systems, and crediting them with some type of self-renewing capacity."[13] Wheatley adds the only means of dealing with this unsteady state is to design a highly flexible and adaptive decision-making system, while remaining true to the overall mission or goal of the organization.

Ralph Kilmann views the holistic approach as the most effective means of managing the most complex world view of organizations and their environments. He identifies three types of worldviews, the most basic being the simple machine, which argues for single efforts at change, like replacing defective parts. The second, more intricate worldview is the open system, which argues for a more integrated approach in which several parts must be balanced simultaneously to manage the organization. The most sophisticated worldview is the complex hologram, a three dimensional image which includes above and below the surface elements and their integrative relationship. The complex hologram, or holistic system, provides depth and breadth to the environment and organization within which it is a part. Kilmann argues this complex hologram "represents the most compelling approach when complexity, imperfection and uncertainty are the norm – a three dimensional view of life beyond the five senses."[14] The holistic approach is the most sophisticated means of managing complexity in treating the organization and its environment as a complex hologram.

Proponents of the holistic model, including the Japanese, believe the "essence of a thing" is not found in the details but in the "whole." Thus, they are relatively unconcerned about the individual elements of a given

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[13] Margaret Wheatley, *Leadership and the New Science: Learning about Organizations from an Orderly Universe* (San Francisco: Berret-Kohler Publishers, 1992), p. 13.

[14] Ralph Kilmann, *Managing Beyond the Quick Fix: A Completely Integrated Program for Creating and Maintaining Organizational Success* (San Francisco: Jossey-Bass, 1989), pp. 23-28.

system. Holistic thinking, therefore, focuses on the greater good, meaning the organization or the nation, rather than the individual components of these entities. The key elements of a holistic management system are a focus on the whole and an attention to process over content. Ongoing communication, total participation, sharing of assumptions and ideas, consensus decision making and group-oriented learning are hallmarks of a holistic approach. The existing system is the focus of continuous improvement, adaptation and change to be responsive and adaptive to changes in the environment. Coordination and commitment are the underlying assumptions which drive holistic management systems.[15] Table 1 below shows the attributes of a holistic management system.

Learning in Holistic Management Systems

Holistic management systems are especially useful in managing complex environments because they promote organizational learning. Herbert Simon defines organizational learning as "growing insights and successful restructuring of organizational problems by individuals reflected in the structural elements and outcomes of the organization itself."[16] Organizational learning, concisely defined, consists of the set of cognitive, behavioral, and affective processes within an organizational framework which generate knowledge, innovation, and change driven by and resulting in enhanced organizational performance and adaptation to the environment. It represents processes by which organizations identify, interpret, process, and distribute knowledge to adapt to environmental influences.[17]

Ikujiro Nonaka and Hirotaka Takeuchi have since argued knowledge is produced from a dynamic interaction between tacit (informal, personal, contextual, experience based) and explicit (formal, codified, technical, written) knowledge within a framework of four main phases of activity among groups of individuals in the organization. These four phases reflect the dynamic interaction between and among individuals and groups

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[15] Ishikawa H., *Kaizen* (New York: Penguin Books, 1988).

[16] Herbert Simon, "Bounded Rationality and Organizational Learning," *Organization Science* 2 (1991): 125-139.

[17] N. Adler and M. Jelinek, "Is Organization Culture Bound?" *Human Resource Management* 25 (1986): 73-90; and Chris Argyris, *On Organizational Learning* (Cambridge, MA: Blackwell Publishers, 1993), pp. 20-24.

Table 1. Attributes of a Holistic Management System

ASSUMPTIONS:	Continuity & Tradition Loyalty to the System & Harmony within the System Short Term Rigidity & Long Term Flexibility Diffusion of Responsibility Low Uncertainty & High Equivocally
COMPONENTS:	The Whole is Greater than the Sum of Its Parts Deals with Massive Amounts of Information Composed of Generalists
PROCESSES:	Focuses on the Whole in Operations & Maintenance Long Term System Level Learning Training Focuses on Improving the System Inter-Relatedness among Components Adherence to the System When Facing Adversity Minimal Consideration of the Content which Drives Processes
POSITIVE OUTCOMES:	Effective Adaptation & Long Term Evolution Great Capability to Incorporate New Technology High Reliability & Continuity Low Rate of Errors
NEGATIVE OUTCOMES:	Inability to Deal with Problems Not Framed for the "Whole" Inability to Deal with Problems which Require Rapid Change High Rate of Mistakes Escalation of Commitment Due to Total Devotion to the System

at various levels of the organization resulting in a "spiraling effect" of knowledge accumulation and growth from which innovation and learning results.[18]

Holistic learning systems include communities of meaning that allow for common understanding of environmental impacts, enhanced ability to react to changes through rapid sharing of information, diffusion of learning, and quick responses for the system to adapt to new external realities which impact organizational performance. This ability to produce learning when problems occur is one of the most effective ways in which holistic systems manage the complex environment.

Holistic Management in Practice in Japan

The Japanese management model is characterized by the holistic approach, in both business and government.[19] Japan's industrial system is characterized by interdependent relationships among government, private, non-profit and community organizations. The *keiretsu* or "lineage" systems consist of a parent firm and trading company with the main bank as the institutional triumvirate which guides the activities of the entire *keiretsu*. Each of these primary resource and power centers maintains close relationships with counterparts in the non-private sectors. The bank is guided by the Ministry of Finance (MOF), the trading company with the Japanese Ministry of Economy, Trade and Industry (METI, formerly MITI), and the parent firm with other government and non-private institutions (Ministry of Education, major universities, etc.). Companies such as National Telecom (NTT), for example, are closely tied with Ministry of Posts and Telecommunications (MOPT). Other examples of these institutional relationships include the company labor unions and the Keidanren and Nikkeiren (advisory councils) with both public and private sector participants.[20]

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[18] Ikujiro Nonaka and Hirotaka Takeuchi, *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation* (New York: Oxford University Press, 1995), pp. 57-94.

[19] Robert Cole, *Strategies for Learning: Small Group Activities in American, Japanese, and Swedish Industry* (Berkeley: University of California Press, 1989); and Daniel Okimoto and Thomas Rohlen, eds., *Inside the Japanese System: Readings on Contemporary Society and Political Economy* (Los Angeles: Stanford University Press, 1988), p. 254.

[20] Ibid.

In addition to reliance on the interdependencies in the holistic structure of Japanese industry, there are institutionalized practices which maintain the informal ties between government and business. These *amakudari* ("descent from heaven") practices enable government to maintain formal and informal authority and control over business via high level retirement transfers (or *shukkō*) to force transfers out of business and into the public sector.

Japanese organizations of all types are likely to utilize aspects (structures and processes) of a holistic management approach. Some examples include *nemawashi* (the process of preparing others through persuasion and sharing of information for a decision-making process which results in a fait accompli); *ringi* (group decision making through memos, meetings and formalized information and authorization gathering which results in a consensus decision); *habatsu* (informal and formal cliques of people which form to maintain information flows, control and power in stratified cross-sections of the organization); and small group decision making (problem solving via meetings and small group discussions).[21]

The model is characterized by a group oriented learning system called *kaizen*, which consists of continuous improvement and total participation in information gathering and decision making. The *kaizen* approach is based on a long-term commitment to improving organizational performance and a generalist approach to training and development at all levels of the organization.[22] In the holistic Japanese model, successes come from small ideas that are incremental improvements on the existing system.[23]

The Japanese systems of continuous training, education and job rotation provide the "totality" of learning and experience required to survive in a complex environment. Systems are nonlinear and inexact. The more an individual is able to understand the whole by synthesizing the different key

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[21] Thomas Rohlen, *For Harmony and Strength: Japanese White Collar Organization in Anthropological Perspective* (Berkeley: University of California Press, 1974), pp. 236-238; and Cole, *Strategies for Learning*.

[22] Cole, *Strategies for Learning*; and Matthews M. Hamabata, *Crested Kimono: Power and Love in the Japanese Business Family* (Ithaca, NY: Cornell University Press, 1990), pp. 88-94.

[23] Ishikawa, *Kaizen*.

dimensions of a process, the more likely the remedy to a problem will not disrupt the continuity and reliability of outcomes in that process.[24]

Through constant communication, education and training, all individuals in an organization must interpret information with the intent of benefiting the organization, and change their behavior to meet this perception. The necessity of being able to adapt one's individual behavior to benefit the whole shows how the Japanese devotion to determination and commitment underlies the continuous change required by the *kaizen* approach. This group decision-making process then serves as a buffer system to random chaotic events and the uncertainty and stress of the environment. A focus on learning, training, and information gathering provides a solid foundation for learning in complex systems while the need for sensing and redesigning facilitates technological development and value.[25]

The Holistic Management of Diversity in Complex Environments

While the holistically managed organizations and systems can often adapt effectively in complex environments, a further review of the Japanese model reveals a number of flaws which make it unsuitable for dealing with "outside" information and "outside" resources.

Issues of Level in Assessing the Holistic Management of Complex Environments

The system complexity placed similar demands on individuals, organizations and the system as a whole but, an explicit consideration of levels or unit of analysis has intentionally been disregarded. This lack of specification of levels is necessary because each component of the system, regardless of their level within the system, must be able to recognize and respond to such demands. This minimal treatment of levels supports Wheatley, who intentionally does not address level issues in her analysis of leadership and organizations, since she uses chaos theory as an encompassing metaphor for all systems, human and non-human, intertwined within an ordered complex universe.[26]

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[24] Rohlen, *For Harmony and Strength*, p. 238.
[25] Arthur M. Whitehill, *Japanese Management: Tradition and Transition* (London: Routledge Press, 1992), pp. 68-81.
[26] Wheatley, "Breathing Life Into Organizations," pp. 6-9.

Diversity and Holistic Management Systems

Holistic management systems shared traits:

1. An emphasis on sharing information via total participation, the development of shared meanings throughout the system and the achievement of a consensus.
2. A focus on continuous learning for innovation and adaptation.
3. Small group decision making which enhances total commitment to the system.

While these aspects of holistic management systems can help organizations and institutions manage a complex environment, each of these aspects has the potential to have a dysfunctional influence on the system's performance.

Table 2 shows the dysfunctional responses which can occur when holistic management systems face "outside" information and "outside" resources.

Table 2 Normal Responses vs. Responses to Diversity in Holistic Management Systems

Normal Response Information/Resources	***Response to "Outside"***
Sharing of Information via Total Participation, Shared Meanings and Consensus	Slow Response Time and Decentralization of Responsibility in Decision Making
Focus on Continuous Learning for Innovation and Adaptation	Adherence to the System's Unchanging Set of Norms, Values and Assumptions
Small Group Decision Making to Enhance Commitment to the System	Escalation of Commitment to the System's Failing Course of Action

The Presence of Diversity in the Kobe Earthquake

Considering the potential flaws of a holistic management system that have been identified, an analysis of how Japan's natural disaster preparedness system responded to "outside" information and "outside" resources during the Kobe earthquake will now be presented.

Even though Japan focuses heavily on its preparations for earthquakes, the Kobe earthquake was an unusual event which shocked the nation and the world. The Kobe quake itself was a stochastic event, in that most Japanese experts had expected Japan's next major earthquake to strike Tokyo.[27] Because of the concentration on preparing for an earthquake in Tokyo, few Japanese experts considered the possibility of a major earthquake hitting Kobe.[28] The impact of this stochastic event was magnified by misunderstandings of the first seismograph readings from Kobe. Even though the earthquake "only" registered a 7.2, the quake itself was unusually destructive for its size.[29] This aspect of the quake was an abstract event, since it challenged the technical assumptions and conclusions of the experts monitoring it. The earthquake itself, therefore, was the first of a rapid sequence of stochastic and abstract events which made the Kobe disaster an unusual event.

The Holistic Nature of Japan's Natural Disaster Preparedness System

Even though Kobe was obviously an unexpected occurrence, the people of Japan trusted that its world renowned disaster preparedness system could manage the events of the quake and its aftermath. The Japanese people had just cause for this high level of trust, because the natural disaster preparedness system in Japan is designed to involve decision-makers, technicians, and community leaders from the public and private sector in a holistic fashion which encourages total participation. When a natural disaster occurs in Japan, the system's initial response is to gather accurate and complete information while providing efficient and effective disaster relief. Local authorities in the cities, towns and villages where the disaster occurs are to inspect the damaged area and alert the prefectural (state) authorities, who are responsible for collating all of the information from the local sources. Once the prefectures have processed the information, they issue reports to the Ministry of Home Affairs (MHA) and the Fire Prevention Agency (FPA) in the central government. The MHA and FPA then collate the information and report to the National Land Agency (NLA). Finally, the NLA gives a report on the situation to the

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[27] Gregory Clark, "Japan Fiddles While Kobe Burns," *Tokyo Business Today Special Issue* (April 1995): 23-24.

[28] Fukushima, "Lessons from the Quake," p. 48; and B. Powell, "End of the Age of Hubris," *Newsweek* (January 30, 1995), p. 37.

[29] "Killer Quake," *Time* (January 30, 1995): 24-34.

Prime Minister's Office. A parallel reporting channel also runs from local Police Departments to the Prime Minister through similar channels.[30]

This process follows the classic holistic Japanese small group decision making model at the system level. Vital information is collected and analyzed at different levels and stages of the disaster to identify, distribute, share and create a common meaning before it moves up the hierarchy to the top decision making position. This holistic approach to disaster management was something which the Japanese could rely upon to effectively manage such events, since it emphasizes gathering accurate information and achieving shared meanings of the disaster at every level of the system.

When the earthquake devastated Kobe, however, the system failed to produce the necessary and/or appropriate responses to manage the disaster. For example, even though the system stressed how local authorities should establish and maintain the local water, food and emergency supplies, the local police and firefighters needed to carry out these tasks were almost nowhere to be found after the quake hit Kobe. As a result, the water supply was cut off as fires raged uncontrolled for hours. There was an almost immediate shortage of food and emergency supplies. As the disaster preparedness system crumbled, lives were lost, homes destroyed, and families left homeless in the worst disaster to hit Japan in decades.[31] As Gavan McCormack stated, "No measurement, whether of human lives or of physical damage, can represent the scale of the catastrophe, much less the shockwaves it sent through society."[32]

Slow Response Time and Decentralized Decision Making

Holistic management systems rely heavily on consensus decision making when managing complex environments. In the Japanese management model, the vast complexity of organizations and the need to gather massive amounts of information to make decisions has created a heavy reliance on meetings. While this information sharing helps to reduce uncertainty, it also requires large amounts of time and effort. Meetings are held so decision makers can discuss problems and share ideas. The heavy

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[30] Fukunagawa, "Natural Disaster, Unnatural Consequences," pp. 3-5.
[31] Clark, "Japan Fiddles While Kobe Burns," pp. 23-24; "Killer Quake," pp. 32-38; and "Quake Kills Over 1500 in Kansai," pp. 1-3.
[32] McCormack, *The Emptiness of Japanese Affluence*, p. 10.

reliance on sharing of information hinders the system's ability to take swift and decisive actions.

In addition to the heavy reliance on the sharing of information, the holistic Japanese model is also based on the decentralization of responsibility, in which a large number of people have decision making responsibilities in the system. This decision making system is based on the belief that once a consensus is achieved, implementation will be smooth and timely. In the model, the mechanism used to achieve group consensus is designed to absorb the magnitude of the responsibility for data gathering and processing and to act as a buffer to the threat of random occurrences and operator error.[33] This heavy reliance on the sharing of information in a system which depends on the achievement of a consensus before making decisions, will have difficulty responding to a rapid demand to incorporate "outside" information and resources.

When the system faces such a demand, its continued reliance on consensus decision making and sharing of information throughout the system is likely to produce a slow rate of response to the vital need to change and adapt as quickly as possible. The system is also faced with decentralized decision making, which hinders its ability to rapidly consider "outside" information and rapidly employ "outside" resources. In short, the heavy reliance on consensus decision making and the decentralization of the process are barriers to a swift analysis and implementation of "outside" information and resources.

The Slow Rate of Response in Kobe

The reliance on a multi-layered bureaucratic decision-making process made it difficult for the disaster preparedness system to respond quickly and efficiently in the aftermath of the Kobe earthquake. While a number of agencies had authority over the various parts of the system, there was a heavy reliance on shared information. For the first two days following disaster, the only organizations to mobilize and provide disaster relief were the Yakuza crime syndicate, the Buddhist political movement Sōka Gakkai, and some other minor groups.[34]

The local government, police and firefighters of Kobe, on the other hand, were unable to mobilize effectively to provide relief. A key Hyogo Prefectural police facility, including the emergency command and

[33] Cole, *Strategies for Learning*.
[34] Hirsh, "Japan," pp. 20-23.

information operation center, had been relocated to make room for land development, and thus was unable to provide any assistance in the aftermath of the quake. This caused some of the confusion and lack of traffic control in the immediate aftermath.[35] In the hard hit center of the Nada-ward, almost 48 hours had passed after the earthquake before the first troops from the national Self Defense Forces (SDF) arrived. Within those 48 hours, most of the area's houses burnt to the ground, while people trapped beneath building rubble suffocated. Because of this inability and unwillingness to take action, there were even reports of large scale dehydration and starvation.[36]

This Kobe example shows how the information sharing and total participation upon which the Japanese holistic management model depends can produce dysfunctional responses to the demands to consider "outside" information. There is no mechanism in the system for rapid decision making at the proper levels of authority. It is interesting to note that in Kobe, the only rapid decisions were made by people, groups and organizations that were virtually outside the system.

Adherence to the System's Unchanging Norms, Values, and Assumptions

Just as consensus and the sharing of information have potential positive and negative effects when holistic systems manage in complex environments, the emphasis on continuous learning also has a number of potential benefits and risks. While learning enables the system to make continuous modifications in response to the changing environment, the emphasis on learning can be dysfunctional when it socializes individuals in the system to adhere to the beliefs, values and assumptions of the system. [37]

Socialization refers to the processes by which individuals acquire positive affective and evaluative orientations toward aspects of a system while acquiring the necessary knowledge and skills to operate effectively in the system. In holistic systems, it corresponds with the continuous learning process in which a variety of manual, interpersonal, perceptual and problem solving skills are developed. When individuals rely heavily on continuous learning in a system, socialization can lead to a high level of understanding

[35] McCormack, *The Emptiness of Japanese Affluence*, pp. 146-157.
[36] "Killer Quake," pp. 32-33.
[37] Argyris, *On Organizational Learning*, pp. 68-75.

of the system, which in turn causes individuals to adhere to the system's "local" framework of norms, values, and assumptions.[38]

While socialization facilitates a commitment to the system and a commitment to further learning, it can also lead to an inability to properly consider relevant outside information when facing an unusual event. "Relevant outside information" is defined as any information, individual or activity which is not currently part of a system, but relevant to the task(s) faced by the system. This inability to properly consider relevant outside information consists not only of a reluctance to analyze outside information, but also includes a disdain for accepting assistance from actors outside of the system and an aversion to using activities which are not already part of the system.

When the system faces a demand to rapidly consider "relevant outside information," the fact that individuals within the system have been socialized through continuous learning to adhere to the system's local framework of norms, values and assumptions is likely to produce a great deal of reluctance toward the consideration and use of such information when managing the crisis. This negative aspect of a holistic system causes the system to ignore information and/or assistance from sources outside of the system which could potentially help the system respond to the event. It must be emphasized this reluctance exists simply because individuals within the system have been conditioned to adhere to the system's localized framework of norms, values and assumptions.

The Refusal to Consider Outside Information in Kobe

The response of the individuals in the natural disaster preparedness system when presented with "outside" information and the opportunity for "outside" help was predictable in that the system ignored "outside" information and refused "outside" help. Even though there was a tremendous shortage of medical supplies and a great need for medical attention among the victims of Kobe, Japanese bureaucrats refused to accept medicine donated by foreign countries and made it extremely difficult for foreign relief personnel to assist the victims of Kobe. Amazingly enough, as heavily undermanned searches for survivors were being conducted, the Japanese government refused to allow teams of internationally renowned

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[38] Robert J. Smith, *Japanese Society: Tradition, Self and the Social Order* (New York: Cambridge University Press, 1983), pp. 165.

rescue dogs from Switzerland to participate in the relief efforts.[39] In the end, of the sixty-two offers of assistance that were made from foreign governments, only twenty were accepted. As McCormack notes in his assessment of the Hyogo Prefectural government's refusal to accept an Okayama businessman's generous offer of a load of tatami mats for the refugees, this same spirit of refusal to accept "outside" assistance even permeated into local levels.[40]

This refusal to accept "outside" help stems from the deeply ingrained national pride and the ethic of self-sufficiency which decision makers in the natural disaster preparedness system were socialized to adhere to and value. The continuous learning which had been facilitated during the system's previous preparations for disasters created an almost unfailing trust and belief in the system which did not fade, even in the face of disaster. This was especially the case when the Japanese absolutely refused help from countries which the Japanese perceived as "less developed."[41] It appears that even though the system did not produce its intended response, it would have been a greater tragedy to accept help from a source that was clearly inferior to what the Japanese system was supposed to provide.

Escalation of Commitment to the System's Failing Course of Action

In addition to the socialization of a powerful sense of loyalty to "the way things are done" by the system, one of the primary structures of holistic management systems produces a dysfunctional response when the system faces a demand to consider and include "outside" information and resources. One of the most significant components of the informal structure in the holistic Japanese management model is its heavy reliance on group decision making. This model relies on the continuous sharing of information, experiences, and opinions of all group members in the decisions which affect the group and the organization. This group decision

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[39] Begley, "Killer Quakes," pp. 32-33; Fukunagawa, "Natural Disaster, Unnatural Consequences," pp. 4-8; and Robert Orr, "An Eyewitness Account of Relief Efforts After the Great Hanshin Earthquake," *Tokyo Business Today Special Issue* (April 13, 1995), p. 13.

[40] McCormack, *The Emptiness of Japanese Affluence*, pp. 4-5.

[41] Chinone, "The Tokyo Earthquake: Not 'If' but 'When,'" pp. 8-12.

making structure is driven by a sense of total commitment of group members to their leader and vice-versa.[42]

These groups are bound together by highly emotional and personal ties, in which individual identity is shaped by one's group membership. The fact that individuals are intensely committed to their groups, leaders and organizations makes decision making in holistic systems a matter of obtaining and sustaining the support of the small groups which make up the greater whole. Having the support of the small groups within the greater whole is essential, because they drive the holistic Japanese management model.[43] While this level of commitment and loyalty to one's groups within a system is one of the reasons holistic management systems are able to produce such effects as commitment to the whole and consensus decision making, this absolute loyalty to the greater whole also has the potential to hinder the system's ability to identify and to react appropriately when the system is following a failing course of action.

The idea that extreme loyalty and commitment to a greater whole produce a reluctance to identify or abandon a system's failing course of action is based on prospect theory which holds that people will "throw good money after bad."[44] Prospect theory suggests those "sunk cost effects" naturally occur once an investment in money, effort or time has been made, since individuals are reluctant to halt a failing course of action after they have a "personal stake" in the outcome of the action.[45]

This "sunk cost effect" manifests itself in organizations when individual actors become locked into a costly course of action by beginning a cycle of escalating commitment in an attempt to recoup their losses.[46] When individuals become committed to failing courses of action, negative consequences will actually cause decision makers to increase their commitment of resources and undergo the risk of further negative consequences. While escalation starts because of the individual need to

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[42] Ishikawa, *Kaizen*; and Hamabata, *Crested Kimono*.

[43] Whitehill, *Japanese Management*.

[44] Daniel Kahneman and Amos Tversky, "Prospect Theory: An Analysis of Decision Making Under Risk," *Econometrica* 47 (1979): 263-291.

[45] Hal R. Arkes and Cynthia Blumer, "The Psychology of Sunk Cost," *Organizational Behavior and Human Decision Processes* 35 (1985): 124-140.

[46] Barry M. Staw, "The Escalation of Commitment to a Course of Action," *Academy of Management Review* 6 (1981): 577-587.

avoid failure, it actually can evolve into a structurally supported behavior if an individual's group, organization or institution supports their behavior.[47]

While this concept has been studied at the individual and organizational levels, it can easily be argued that the same phenomenon occurs at the system level, particularly when holistic management systems face a demand for the rapid consideration and use of "outside" information and resources. A holistic management system's first response, naturally, is to rely on how the system has worked in the past to deal with such events. This response is natural, because individuals within the system have an intense feeling of loyalty to their groups, organizations, and the system as a whole. As a result, the strong commitment to the whole makes it difficult for the system to change its behavior, even if its response to the presence of "outside" information is a complete failure. Escalation of commitment, therefore, is a naturally occurring phenomenon when holistic management systems must rapidly consider and use information and resources which have not traditionally been considered as "part of the system."

Escalation of commitment is typical to decision making in a number of circumstances. When people make choices under risk and find themselves losing initially, they may tend to choose riskier actions that may even have negative expected gains if there is a chance to make up for some prior losses.[48] For example, this behavior has been documented with losing stock market investors,[49] troubled firms,[50] gamblers,[51] software projects,[52]

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[47] Joel Brockner and Jerry Z. Rubin, *Entrapment in Escalating Conflicts: A Social Psychological Analysis* (New York: Springer Verlag, 1985), pp. 247-266; Jerry Ross and Barry M. Staw, "Expo 86: An Escalation Prototype," *Administrative Science Quarterly* 31 (1986): 274-297; Barry M. Staw and Jerry Ross, "Understanding Behavior in Escalating Situations," *Science* 246 (1989): 216-220; and Glen Whyte, "Escalating Commitment in Individual and Group Decision Making: A Prospect Theory Approach," *Organizational Behavior and Human Decision Processes* 54 (1993): 430-455.

[48] See Irving L. Janis and Leon Mann, *Decision Making: A Psychological Analysis of Conflict, Choice and Commitment* (New York: The Free Press, 1977), pp. 208-216; and Barry M. Staw, "The Escalation of Commitment: An Update and Appraisal," in Zur Shapira, ed., *Organizational Decision Making* (Cambridge, MA: Cambridge University Press, 1996), pp. 577-587.

[49] Asghar Zardkoohi, "Response: Do Real Options Lead to Escalation of Commitment?" *Academy of Management Review* 29/1 (2004): 111-119;

workers facing a wage cut,[53] and purchasers who pay full price (or a "sunk cost") for theatre tickets.[54]

Escalation of Commitment in Kobe

The response of Japan's Prime Minister and his cabinet to the initial reports that the disaster preparedness system was failing in its management of the Kobe earthquake is an excellent example of how a holistic management system produces escalation of commitment. A report by the Japanese newspaper, the *Daily Yomiuri*, suggests the cabinet ministers became aware that an earthquake had struck Kobe from television reports during a previously scheduled cabinet meeting which took place shortly after the quake hit Kobe.[55] It is important to note the Japanese television reports, at this time, were emphasizing the mass destruction which had occurred in Kobe, as well as ongoing suffering due to the

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Hersh Shefrin and Meir Statman, "The Disposition to Sell Winners too Early and Ride Losers Too Long: Theory and Evidence," *Journal of Finance* 40 (1985): 777-790; Terrance Odean, "Are Investors Reluctant to Realize their Losses?" *The Journal of Finance* 53/5 (1998): 1775-1798; and Martin Weber and Colin Camerer, "The Disposition Effect in Securities Trading: An Experimental Analysis," *Journal of Economic Behavior and Organization* 33 (1998): 167-184.

[50] Edward H. Bowman, "A Risk/Return Paradox for Strategic Management," *Sloan Management Review* (Spring 1980): 17-31; and Edward H. Bowman, "Risk Seeking by Troubled Firms," *Sloan Management Review* (Summer 1982): 33-42.

[51] William H. McGlothlin, "Stability of Choices Among Certain Alternatives," *American Journal of Psychology* 69 (1956): 604-615; and Mukhtar Ali, "Probability and Utility Estimates for Racetrack Bettors," *Journal of Political Economy* 85 (1977): 803-815.

[52] Arjen Wassenaar, "A Cross-Cultural Study of Escalation of Commitment Behavior in Software Projects," *MIS Quarterly* (June 1, 2000): 31-37.

[53] John Shea, "Union Contracts and the Life-Cycle/Permanent Income Hypothesis," *American Economic Review* 85 (1995): 186-200; and David Bowman, Deborah Minehart, and Matthew Rabin, "Loss Aversion in a Consumption-Savings Model," *Journal of Economic Behavior and Organization* 38/2 (1999): 155-178.

[54] Arkes and Blumer, "The Psychology of Sunk Cost," pp. 124-140.

[55] "Quake Kills Over 1500 in Kansai," pp. 1-2.

inadequate disaster relief efforts. It can be argued, therefore, that the ministers were receiving information which strongly suggested that the earthquake preparedness system was not responding properly. While the situation in Kobe was not the focus of the meeting, the discussion of who was responsible for handling the disaster suggests the existence of escalation of commitment to the system's failing course of action.

Vice Chief Cabinet Secretary Ishihara Nobuo argued that the direction of relief efforts following an earthquake came under the authority of the Anti-Disaster Bureau of the National Land Agency, which was under the control of Ozawa Kiyoshi. Ozawa's response to Ishihara's claim, as well as the suggestion of another minister who felt that Ozawa ought to be sent to inspect the damage, was "I don't think it's necessary for me to go that far just yet. We have to watch the situation for a little while."

While Ozawa's reaction may be dismissed in other circumstances as an exercise of caution and judgment in support of the way the system works, it is indicative of the manner in which Kobe was handled by the group of leaders who had the most power and authority to make a difference in how it was managed. When Secretary Ishihara revealed the governor of Hyogo Prefecture, where Kobe is located, had issued a request for a dispatch from the Self-Defense Forces, Defense Agency Chief Tamazawa Tokuichiro simply stated he was not concerned about the matter since his agency has not yet received any report. Tamazawa argued "The earthquake occurred at about 6:00 a.m. Why has the notification been delayed for so long? Maybe it's not such a big thing. Can we really dispatch men from the SDF?"

It can be argued the ministers had fallen into an escalation of commitment to the failing effort of the natural disaster preparedness system since Ozawa's evaluation of Kobe essentially became the conclusion of the Cabinet meeting. Even though they had witnessed the mass destruction that was ongoing in Kobe, none of the ministers exhibited a sense of urgency in regard to providing a proper response to the situation. The ministers apparently decided to maintain their belief and trust in the system, even though the system was not providing effective relief as more people were dying and homes were destroyed. Although he was aware that Kobe was in the midst of a terrible disaster, the Prime Minister refused to divert his attention from his normal schedule. Over the course of the day of the earthquake, he canceled only one of his regularly scheduled appointments to deal with the earthquake, apparently preferring to let the system take care of

the disaster, even though it was obvious that the system was not responding properly. By the end of this first day, the death toll in Kobe exceeded 1,000.

The End Result of the Holistic System's Response to Kobe, an Unusual Event

The natural disaster preparedness system's response to Kobe, in which the system faced numerous demands to consider and use "outside" information and resources, shows how and when holistic management systems have difficulty managing in complex environments. Table 3 below shows the types of responses which were both necessary to manage a disaster like Kobe and expected from the holistic natural disaster preparedness system, as well as the system's actual response.

Table 3 An Overall Evaluation of the System's Response to Kobe

What Was Needed to Manage the Disaster	***How the System Managed the Disaster***
Proper Identification of the Impact of the Earthquake and a Swift and Decisive Response at the Local Level	A Mis-diagnosis of the True Magnitude of the Earthquake and an Inadequate Response at the Local Level in Regard to Securing and Maintaining Necessary Supplies
Willingness to Accept All Sources of Aid, Particularly When the Outside Sources Provided Items and Services Which Were Scarce in Japan	Reluctance to Consider "Outside" Sources of Aid and Assistance, Particularly if It Was Offered by a Nation Which Was Perceived as "Inferior" to Japan
Willingness by Decision Makers at All Levels, Particularly at the National Level, to Critically Evaluate the System's Response to the Disaster and Make Necessary Adjustments	Continued Trust in and Commitment to the Natural Disaster Preparedness System at All Levels, Even Though Its Response to the Disaster Was Obviously Inadequate

The system's slow response time and failure to take swift and decisive actions led to mass death and destruction in the aftermath of the

Kobe earthquake. The system's refusal to accept help from any source "outside" of the system caused the Japanese to forgo the use of a vast amount of supplies and services which could have been a tremendous help to the disaster relief effort in Kobe. Finally, the system's refusal to admit the failure of the disaster management effort and make changes led to the unnecessary loss of lives and homes. Quite simply, the holistic natural disaster preparedness system was ill-equipped to handle this demand to rapidly acknowledge and use "outside" information. While the Kobe case and Japanese management models have been emphasized, the theory behind the failure can be generalized to predict and explain how holistic management models produce inadequate and/or inappropriate responses when facing these situations.

Potential Challenges to the Analysis

Due to the intricacy of complex environments and the vast number of interpretations of the Japanese management model and Hanshin Daishinsai, there will naturally be a number of challenges to the claims made in this interpretation. For example, a challenge could possibly be made on the grounds that the use of the Kobe case as an example of a management failure which is the product of an inherent flaw of the holistic management approach was actually the result of a failure in the political leadership of the Japanese politicians and bureaucratic officials. Another lens which could be applied both to our critique of the holistic management model, as well as the Kobe case, is that of administrative ethics. This theory implicitly considers the fair and/or legitimate use of resources; and the Kobe case, in particular, deals with a situation where human life was lost as a result of administrative failure. These are interesting and important ethical concerns to be considered.

An alternative explanation to the idea that escalation of commitment in holistically managed systems leads to paralysis in times of crisis is the phenomenon of "bystander" behavior. According to this approach, an inability to respond in time of crisis is not the product of devotion to the system, but rather the result of an ignorance of or an unwillingness to take responsibility to intervene. In fact, the inaction could be part of the neoclassical behavior of individuals, who in group settings have a diffusion of responsibility for helping along with a diffusion of blame for not helping so they do not behave altruistically. Another possibility is someone unperceived has already begun a helping action so the individual will conform to the group by not helping. In addition, the

conformity to the group can be explained from an economic viewpoint in terms of maximizing individual utility by not going against the group norms.[56]

Differing national culture may also be a reason for agency effects and escalation of commitment. Stephen Salter and David Sharp agree that case evidence indicates apparently small cultural differences, even between the United States and Canada, is noted, and the effect of adverse selection conditions was stronger among managers from the more individualistic U.S. society.[57] Scott Geiger, Christopher Robertson, and John Irwin also studied the impact of cultural values on escalation of commitment and called for further research to study the relationship between cultural dimensions and determine which cultures are more likely to experience escalating commitment.[58] Sharp and Salter point to Daiwa (a Japanese bank in the U.S.) as an international example of escalation of commitment,[59] while other studies provide evidence that Asian subjects demonstrate higher levels

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[56] See for example Bibb Latane and John M. Darley, "Group Inhibition of Bystander Intervention in Emergencies," *Journal of Personality and Social Psychology* 10/3 (1968): 215-221; John M. Darley and Bibb Latane, "Bystander Intervention in Emergencies: Diffusion of Responsibility," *Journal of Personality and Social Psychology* 8/4 (1968): 377-383; Bibb Latane and Judith Rodin, "A Lady in Distress: Inhibiting Effects of Friends and Strangers on Bystander Intervention," *Journal of Experimental Social Psychology* 5 (1969): 189-202; and Marilyn M. Helms and Ziad Keilany, "Beyond Self Interest: A Reexamination of Neoclassical Economics in Group Settings," *Journal of Economic Behavior and Organization* 15 (1991): 187-200.

[57] Stephen B. Salter and David J. Sharp, "Agency Effects and Escalation of Commitment: Do Small National Culture Differences Matter?" *The International Journal of Accounting* 36/1 (2001): 33-45.

[58] Scott W. Geiger, Christopher J. Robertson, and John G. Irwin, "The Impact of Cultural Values on Escalation of Commitment," *International Journal of Organizational Analysis* 6/2 (1998): 165-176.

[59] David J. Sharp and Stephen B. Salter, "Project Escalation and Sunk Costs: A Test of the International Generalizability of Agency and Prospect Theories," *Journal of International Business Studies* 28/1 (1997): 101-121.

of overconfidence in general knowledge tasks and might be expected to be more willing to escalate commitment to risky projects.[60]

Finally, our assessment of the Kobe case did not explicitly consider the behavior of business factors in response to Hanshin Daishinsai. There were a number of examples of businesses which responded in a similarly inappropriate and ineffective manner. For example, a large Japanese bank with outlets in the affected areas implemented relief operations in Osaka dispatching volunteers to Kobe to offer assistance to bank employees affected by the quake. This contributed to the massive delays and gridlock on the national highways going into Kobe that prevented relief workers and supplies from entering the area. In addition, the bank (and numerous other firms) set up phone relays between Osaka and Kobe to achieve constant communication via cellular phone between both offices. This contributed to the already overloaded phone lines and severely hindered communication among relief organizations. The bank even attempted to provide housing and food and medical care for employees affected by the quake. The problem with this well-intentioned effort was that the main Osaka office was located several kilometers away, making it nearly impossible for the employees to reach the desperately needed supplies. This shows how holistically managed business organizations faced the same types of "management problems" as the Natural Disaster Preparedness System in responding to the Kobe quake.

Lessons from Kobe: the Need to Incorporate "Outside" Views

The effective management of diversity is imperative if an organization or system wants to operate effectively in the global business environment. Today's organizations face many difficult and complex issues to reduce uncertainty, to change and adapt rapidly and to increase the organization's ability to compete globally. To survive in such a diverse environment, organizations must be equipped with a management system to

[60] J. Frank Yates, Ying Zhu, David L. Ronis, Deng-Fend Wang, Hiromi Shinotsuka and Masanao Toda, "Probability Judgment Accuracy: China, Japan, and the United States," *Organizational Behavior and Human Decision Processes* 43/2 (1989): 145-171; and J. Frank Yates, Ju-Whei Lee and Hiromi Shinotsuka, "Beliefs About Overconfidence, Including its Cross-National Variation," *Organizational Behavior and Human Decision Processes* 65/2 (1996): 138-147.

support learning and facilitate continuous growth and development, as well as promote flexibility when managing diversity.

The increasing interdependencies among all components of a system in complex environments, has created a management imperative toward more holistic models of management. Recent research, theory development and model application have pointed toward the many advantages of holistic management approaches with a focus on total participation, information sharing, continuous learning, and commitment to the system as ideal for "matching wits" with the complex environment. Margaret Wheatley, Peter Sense, Karl Weick and others have all called for the increased diffusion of information and participation in contemporary organizations, so the effects of the complex environment can be efficiently and effectively managed in a manner which leads to competitive advantage.

The ideal model of holistic management, however, may be unattainable. The Japanese management model presents an excellent example of the practical application of many of the fundamental elements of a holistic model. Yet, the model's application to the Kobe earthquake, revealed certain aspects of the holistic model that hindered, rather than helped, the system's ability to produce rapid change and adaptation. In attempting to achieve totality, sharing of learning, and commitment to the system, the Japanese model actually resulted in a disastrous outcome. Clearly, this holistic management model was not only unable to absorb the initial shock, but was also ill-designed to function effectively in its aftermath.

In theory, a "total" approach to issues of uncertainty may logically make sense. If a system considers and prepares for all possible contingencies, then nothing will be left to chance. The danger in this thinking lies in the belief there is a way to consider and prepare for all possible contingencies. As the Kobe disaster has shown, the misguided belief that the system can and will manage anything can lead to disastrous results.

Areas for Future Research

A comparison of other disasters and large-scale events is needed to further validate the bureaucratic models of management that rely on commitment and the forces that contribute to the escalation of commitment. The war and U.S. occupation in Iraq may be another example of a bureaucratic system with an escalating commitment to a course of action. The September 11 events of 2001 on the surface seem to exhibit an example

of an opposite or entrepreneurial system, which absorbs shock events better. The September 11 events, characterized by fast action, 24 hour work, planning meetings between shifts, central control augmented with volunteers, and control centers to focus briefings as well as debate led to more effective decision making and action than is typically seen in a rigidly controlled system. Also, with no real centralized planning in place for such an unexpected terrorist attack, the response had to rely on entrepreneurial systems and to take gambles and strive to improve upon ongoing conventions. Further study into such events, particularly the idiosyncratic innovative activities, is needed, particularly in times of intense crisis when stochastic events bombard a system.[61]

[61] See Aviad Heifetz and Yoram Hamo, "An Evolutionary Perspective on Goal Seeking and Escalation of Commitment," *California Institute Of Technology, Division of the Humanities and Social Sciences* 1109 (2001): 1-17.