

Learning Organizations

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Abstract. The purposes of this paper are to develop a comprehensive understanding of how ‘learning organizations’ can be created and to provide a partial evaluation of the literature with a view to developing propositions for the future research agenda. To these ends, the paper analyzes the components of ‘learning organizations,’ deals with the barriers to organizational learning and several strategies for coping with them, draws upon the works of Morgan—single-loop learning and double-loop learning, of Flood and Romm—triple-loop learning, handles the work of Senge—a case of systems thinking, and then evaluates the ideas of main contributors of chaos and complexity theory from the managerial standpoint. In light of these intellectual constructs, the paper proposes a framework for managers in which the essential properties of complex systems that are capable of learning are set out. The paper also provides new propositions for future research.

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Key Words: chaos, cognitive, complexity, learning organizations, organizational learning.

1. Introduction

The paper aims to generate a wide-ranging appreciation of “learning organizations” and to provide a partial assessment of the literature with a view to developing new propositions for future research.

The first section, titled “the components of learning organizations,” both uncovers the difference between organizational learning and learning

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organizations and shapes the intellectual framework of the argument in this paper.

The second section, titled “the barriers to organizational learning and several strategies for coping with them,” both identifies several cognitive biases of managers composed of prior experience and customary way of thinking that shape their perception and interpretation of problems as decision makers and proposes some of the strategies to challenge these mind-sets in order to promote organizational learning. The aims are to make managers aware of the cognitive biases—embedded beliefs and values by which they are trapped in their decision-making processes and to propose several alternatives for coping with them.

The third section, titled the “works of Morgan, and Flood and Romm,” analyzes the studies of these significant contributors to organizational learning. The work of Morgan is based upon the principles of modern cybernetics that emphasizes the significance of both single-loop learning and double-loop learning. The assumption is that organizations should be designed and managed so that they can cope with the challenges of their turbulent environments. The work of Flood and Romm emphasizes the significance of triple-loop learning or equally important centers of learning—design-oriented, debate-oriented, and power/knowledge-oriented learning in organizations.

The fourth section, titled the “work of Senge,” gives a detailed account of his five disciplines—‘personal mastery’, ‘mental models’, ‘team learning’, ‘shared vision’, and ‘systems thinking.’ The idea is based on the assumption that organizational members constantly intend to expand their capacity to create desired results, to develop new patterns of thinking, and to mutually learn how to learn. To ensure these aims they must use five disciplines at different organizational levels, which govern the behavior of their organizations.

The fifth section, titled “an evaluation of chaos and complexity theory from the managerial standpoint,” analyzes the Chaos and Complexity theory and its managerial perspective on the basis of the works of Gleick, Stacey, and Wheatley. The purpose is to insert the attributes of this thought-provoking theory into the cells of learning organizations at the age of interdependence.

The sixth section, titled “the essential properties of learning organizations,” develops an analytical discussion by making reference to the intellectual constructs revealed in the argument. The aim is to list the essential properties of learning organizations, which might be used by managers.

The seventh section, titled “research agenda,” provides an assessment of Morgan’s and Flood and Romms’ studies and Chaos and Complexity theory.

2. The Components of Learning Organizations

In this section, I shall define the terms called “organizational learning” and “learning organizations”, reveal their differences, and determine the intellectual constructs of the argument.

Organizations need to learn to survive and prosper in changing and uncertain environments. They need managers who make right decisions through skill and sound judgment. Successful decision-making requires an organization to improve its capability of learning new behaviors over a period of time (Hedberg, 1981). ‘Organizational learning’ is a fighting process for organizations in the face of swift pace of change (Senge, 1990). In this battle managers are responsible for increasing the awareness and the ability of the organization members to comprehend and manage the organization and its environment. In this way they can make decisions that continuously secure the organization to reach its goals.

However, most managers know how to ensure the ‘organizational learning,’ but fail to understand how to make their companies ‘learning organizations.’ To appreciate the significant difference between these two terms I shall attempt to critically engage with the deeper aspects of the subject matter below.

In the analysis of the organizational learning, March (1991) handled two types of strategies. The first strategy is the ‘exploration’ in which organizational members seek new kinds of organizational activities and procedures to increase effectiveness. For example, organizations might involve in strategic alliances such as long-term contracts, networks, minority ownership, and joint ventures to manage symbiotic interdependencies. Likewise, organizations might set up new organizational structures for

managing organizational resources. They might develop product team structure, matrix structure, or multidivisional structure. The second strategy is the 'exploitation' in which organizational members modify and improve existing organizational activities and procedures. For example, an organization might implement a total quality management program to improve the existing standard operating procedure or to refine a set of rules and regulations that guide specific kinds of functional activities.

It is clear that the explorative strategy in organizational learning puts emphasis on the 'revolutionary change.' It is sudden, drastic, organization-wide, and brings about a fundamental shift on the base technology that revolutionizes, structures, processes, and products.

The exploitative strategy in organizational learning emphasizes the 'evolutionary change.' It is gradual, incremental, specifically focused, and incorporates the refinements of the existing technology. For example, since 1971, Intel has produced a series of improvements of its original 4004 microprocessor. These subsequent improvements include the 8088, 8086, 286, 386, 486, Pentium chips, and recently Centrino. These are examples of incremental innovations (Jones, 2001).

Some organizations are capable of employing exploitative organizational learning and a very few of them, which have innovative researchers and scientists are able to use explorative organizational learning in the design and the construction of their organizations' structure, culture, strategy, and processes (Dodgson, 1993). In doing so, they assume that their organizations ensure their learning. This is just an organizational learning. However, I argue that in order to become a 'learning organization', the organization should not be constrained by the organizational learning term; rather, it should respect the following five assumptions. In this section, I shall deal with them in some detail respectively.

- The organization should ensure the organizational learning.
- The organization should be aware of barriers of its members in the perception and interpretation of problems as decision makers and of several strategies for coping with them.
- The organization should possess single-loop learning, double-loop learning and triple-loop learning capability.

- The organization should understand the five disciplines of Peter Senge. These govern the behavior of the organization at different organizational levels.
- The organization should learn to live with ‘disorder’, ‘irregularity,’ and ‘randomness.’

The first assumption makes clear the organizational learning that focuses on both explorative and exploitative learning analyzed above.

The second assumption emphasizes the fact that managers should not overlook several cognitive biases they possess. They are ‘cognitive dissonance’, ‘illusion of control’, ‘frequency’, ‘representativeness’, ‘projection’, ‘ego-defensiveness’, and ‘escalation of commitment.’ In general, they affect managers’ information processing capability and distort their interpretation of a problem. The managers should realize that there are several alternatives available for coping with these barriers. These issues will be dealt with in detail in the second section.

In the third assumption, managers have to recognize the five disciplines—‘personal mastery’, ‘mental models’, ‘building shared vision’, ‘team learning’, and ‘systems thinking’ (Jackson, 2000). Senge (1990a) advises managers to promote these aspects of organizational learning at four organizational levels—individual, group, organizational, and interorganizational. The important point in this approach is that managers should recognize the impacts of one level of learning on another. This issue will be analyzed in detail in the third section.

The fourth assumption is the ability of the organization to possess single-loop learning, double-loop learning, and triple-loop learning. Single-loop learning is based on the self-regulating behavior of systems that depends on the processes of information exchange involving negative feedback. This principle of cybernetics emerged from mathematics, communications theory, engineering, and social and medical science. The core insight in the negative feedback principle emphasizes that the system should be capable of detecting and correcting mistakes in relation to a predetermined objective or a set of operating norms. However, the operating norms or objectives might be inappropriate. Therefore, the organization should be able to question the adequacy of their norms and goals and to take corrective action to rectify them. This is double-loop learning (Morgan, 1997b). However, according to Flood and Romm (1997), there are three types of single-loop learning. The first type is design-oriented and asks

'How' should managers do things? The second type is debate-oriented and asks 'What' should managers do? It assumes that there are many different viewpoints on ends and means. Finally, the third type is knowledge/power-oriented and asks 'Why' should managers do things? It assumes that coercive forces can easily distort the debate processes, in which there is no open, participative, and fair conversational setting. Triple-loop learning gives full tolerance between these three centers of learning and preserves diversity therein. This issue will be analyzed in the fourth section of this paper.

The fifth assumption is that the organizations should learn to live with 'disorder', 'irregularity', and 'randomness.' This core insight emerged from the chaos and complexity theory, which is the science of the global nature of systems (Gleick, 1987) and the contemporary representation of General System Theory (GST).

The chaos and complexity theory is the science of such diverse disciplines as meteorology, chemistry, biology, economics, and management. It is also based on the General System Theory (GST). GST derived from Bogdanov's *Tektology* that is related to the 'universal structural regularities, general types of system, the most general laws of their transformation, and the basic laws of organization of elements in nature, practice and cognition' (Jackson, 2000). Bogdanov assumed that both nature and human beings create and build systems ranging from simple to complex in which there are organizing and disorganizing processes among their components. Specific relationships and hierarchical levels among elements generate organized complexity (Checkland, 1981). They exhibit an organized relationship that gives the whole system the capability of being greater than the sum of its parts. As being open systems they also face chaos and randomness, which may appear as undesirable at first. In fact, disorganization is the way for them to consider opportunities for new combinations that would secure their survival and continuity.

Biologist von Bertalanffy (1968) considered the living organism as a model in order to understand all complex 'open' systems. His 'General System Theory' was dedicated to understanding all types of complex systems such as biological, natural, and social. He distinguished closed systems from open systems, believing that in a closed system there was no material exchange and no relationship with the environment. In an open system by contrast, there is a continuing process of input, transformation and output, which enables the system to maintain its existence in a steady state.

So, open systems have a capability of regulating themselves and adapting to the environment by converting their processes and structures. Von Bertalanffy studied living organisms but argued that all complex systems are 'open' to their environments, and must establish an appropriate relationship with that environment if they are to survive.

Katz and Kahn (1978) enumerated ten characteristics of all open systems. With respect to organizations these can be interpreted as follows:

- The importation of energy: Organizations need inputs in the form of energy, people and materials from the environment.
- The throughput: Organizations convert energy into new products.
- The output: Organizations export their products.
- The system as a cycle of events: Organizations produce outputs, export them into the market and gain money.
- Negative entropy: Organizations do not run down because they import and store the energy and resist entropic processes.
- Information, input, negative feedback and the coding process: Organizations select inputs and use them to maintain structure.
- The corrective tool, negative feedback: Negative feedback enable organizations to reduce the difference between actual and desired performance.
- The steady state and dynamic homeostasis: In the process of continuous importation of energy and export of products, the character of organizations and the interactions between sub-units do not change; this is because of the homeostasis, or self-regulation that controls and regulates the organization's activities.
- Differentiation: Organizations as open systems include dynamic sub-units with different roles and greater specialization of functions.
- Integration and Co-ordination: The unification organizations can be achieved by subunits that share norms and values and by different tools that control the tasks and roles of sub-units.

- **Equifinality:** Organizations can reach the same specific final results from different starting points, with different resources, by different ways.

In organizational life, chaos, randomness, and disorganization are triggered by the evolutionary and revolutionary changes taking place in the environment of organizations. Fluctuations and disturbances coming from the external environment such as rapid technological breakthroughs, transient customer tastes and preferences, and changing legal and governmental rules and regulations force organizations to learn about and to live with complexity and chaos. They do not run down and are capable of reorganizing themselves through interacting with the environment. Organizations, being socio-cultural and open systems and having members who possess self-consciousness, can be located at higher levels in Boulding's hierarchy of complexity. These are convincing rationales for my attempt to include this significant theory in the generation of learning organizations. This theory will be dealt with in some detail in the fifth section of this paper.

3. The Barriers to Organizational Learning and Several Strategies for Coping with Them

In this section, the paper identifies several cognitive prejudices that hinder organizational learning and decision-making and implies some strategies to remove these mind-sets in order to promote organizational learning. The aims are, therefore, both to make managers realize the cognitive biases by which they are trapped in their decision-making processes and to show them some of the methods of challenging these fixed mind-sets. Thereby, it is assumed that the managers could overcome their weaknesses and promote organizational learning.

According to Fiske and Taylor (1984), there are cognitive structures that are embedded beliefs, values, preferences; and expectations predetermine managers' perception and interpretation of situations. Managers' interpretation of problems is affected by seven cognitive biases—cognitive dissonance, illusion of control, frequency, representativeness, projection, ego-defensiveness, and escalation of commitment (Jones, 2001).

Festinger (1957) in the cognitive dissonance theory argues that uneasiness arises if there is inconsistency between a manager's beliefs and

actions. Managers take into consideration the information that reinforces their beliefs and disregard the information that does not. This approach might put the organization into a crisis in which managers intentionally misinterpret the real threats in the market and stick to the action that upholds their beliefs. For example, a company may continue to produce videocassettes though it receives information suggesting that DVDs are threatening the viability of videocassettes.

Illusion of control bias emphasizes that managers under uncertainty or risk develop irrational beliefs about their ability and competence to deal with complexity. They assume that they are capable of managing the complex situation. However, they encounter difficulties and realize that they lack ability (Langer, 1975). For example, a manager believes that he has skills in dealing with new ventures and engages in an acquisition program realizing a while later that she or he has to tackle a more intricate organization.

Both frequency and representativeness give rise to misinterpretation of information. Frequency deceives managers into assuming that negative impacts of a single incident become more prevalent (Tversky and Kahneman, 1974). For example, receiving defective materials from a supplier might lead managers to mistrust other suppliers' inputs. Representativeness, on the other hand, leads managers to make generalizations based on insignificant and small incidents. For example, a company achieves a great success with a new product and assumes that this product would bring huge profits. Thus, it devotes all its functional and organizational resources to generating a product line for which there is actually only a small volume of demand.

Projection occurs when a manager attributes his or her feelings of helplessness and powerlessness onto others and blames them (De Board, 1978). Projection allows managers to justify and support their own values by projecting them to others. For example, a manager may accuse of his or her worker as being lazy and useless in a recession. Ego-defensiveness, on the other hand, is a prejudice that leads managers to believing as if their actions are the best ways. For example, a manager hires new workers assuming that the company's profitability will increase in the long run.

Lastly, escalation of commitment is a prejudice that leads managers to be bound to a losing course of action and refuse to admit that they have made an error. Managers try to refine existing decisions to make them suit

the new conditions rather than seeking new solutions (Staw, 1978). For example, a manager expecting a satisfactory outcome decides to globalize the company at considerable cost. If the manager experiences a poor return and organizational ineffectiveness, she or he will persist to mend and improve this bad decision rather than admitting that she or he made a mistake.

Jones (2004) suggests that managers should pursue particular strategies to remove such cognitive biases described above and to promote organizational learning. They should surround themselves with people who hold different and opposing perspectives. They also should have flexible structures and cultures that motivate managers to find better ways of behaving, or new methods, contexts, and alternatives.

The top management team should encourage the interaction of subordinates with each other and with the chief executive officer. There should be a considerable heterogeneity among team members who bring different information and viewpoints to bear on a problem. In this way the organization could avoid conformity that arises when like-minded people reinforce one another's tendencies to interpret incidents in similar ways. Furthermore, the organization can use a 'dialectical inquiry' where decision-making teams develop and assess alternative proposals and courses of action, and then form a final plan consisting of the best parts of the alternative scenarios.

4. The Works of Morgan, and Flood and Romm

The aim of this section is to examine the nature of single-loop learning, double-loop learning, and triple-loop learning. The pioneering work in the single- and double-loop learning conducted by Chris Argyris at Harvard University and Donald Schön at Massachusetts Institute of Technology considered the principles of modern cybernetics as the basis of designing and managing organizations that can cope with challenges of volatile environments. Morgan interpreted the work of Argyris and Schön (1978) and emphasized only single- and double-loop learning. However, the work of Flood and Romm (1997) revealed the significance of triple-loop learning and the inadequacy of Morgan's work. Here I will follow the work of Morgan (1997b) and the work of Flood and Romm (1996a,b; 1997) respectively.

Morgan (1997b) argued that most organizations are proficient at ‘single-loop learning’, generating an ability to scan the environment, determine goals, and monitor the performance of the system in relation to these goals. For example, an organization ensures single-loop learning through monitoring the indicators of performance such as expenditures, sales, and profits within the predetermined limits. This type of learning emphasizes the ability of an organization to detect and correct mistakes in relation to a given set of operating norms.

However, an organization should evince the quality of ‘double-loop learning’, developing an ability to take a double look at the situation by questioning the relevance of operating norms. This process can be implemented through four steps (Morgan, 1997b):

- Sensing, scanning and monitoring the environment
- Comparing this information against operating norms
- Questioning whether operating norms are appropriate
- Initiating appropriate action

Morgan explicitly described that organizations must possess single-loop and double-loop learning capability simultaneously. Single-loop learning allows the organization to correct deviations from ends based on existing norms. In double-loop learning there is a questioning of the norms themselves. Organizations should question the convenience of what they are doing. In this way they will be capable of ‘learning to learn.’

According to Morgan (1997b), an organization will be a learning organization if it is capable of developing the following four guidelines. First, they scan and perceive change in the environment to detect significant variations. This idea enables the organization to discover shifting trends and create new industries and business niches. Second, organizations should be capable of questioning and transforming operating norms. Organizations must appreciate assumptions, mind-sets, mental models, and norms guiding business activity and also challenge and transform them if necessary. Managers should ask such questions as “is our current business the right business? Can we invent new products? Can we create new industries and business niches? Are our business processes based on the customer perspective? Can we find out business processes that increase the production quality and reduce costs?” These questions create an organizational culture that support change and risk-taking, as well as legitimize mistakes.

Third, the organizations should generate an appropriate strategic direction and pattern. This makes room for desirable futures and appropriate strategies to develop. Finally, they should design organizations allowing double-loop learning to evolve and avoiding getting trapped in single-loop learning.

The second significant contribution in this context derived from the work of Flood and Romm (1996a, b; 1997). They argued that single-loop learning has to be considered as means-end thinking. Managers who are single-loop thinkers are obsessed with the best means to meet their preset goals. Therefore, they are task-oriented. They always worry about making clear the best methods to meet their ends. Within this approach, Flood and Romm (1996b; 1997) recognized three major types of single-loop learning.

The first type of single-loop learning asks the question of ‘Are we doing things right?’ It seeks to understand ‘How’ managers should do things. It is highly used within business process reengineering, quality management, and designing structural arrangements. For business process, means are a search for improved business processes. Ends become increased efficiency. For quality management, means are a search for improved efficiency of processes. Ends become satisfied customers. For structural design, means are a search for guidelines of implementation to generate organization design. Ends become effective models.

The second type of single-loop learning asks the question of ‘Are we doing the right things?’ It seeks to understand ‘What’ managers should do to achieve their ends and means. They are obsessed with redefinition of ends and means within a debate process. This type of learning assumes that the definition of ends and means are problematic because there are many different viewpoints on ends and means. Ends become ‘accommodations’ or consensus among people. The means become an open and free discussion. They organize processes and structural arrangements in a participant-driven process.

The third type of single-loop learning asks the question of ‘Is rightness buttressed by mightiness or vice versa?’ It seeks to understand ‘Why’ managers should follow means and ends. It questions the obsession of design-oriented and debate-oriented intervention developed in the first two types of single-loop learning. Within these centers of learning there is an obsession of domination or means and ends serve the interests of powerful. It

assumes that debate processes are problematic and can easily be distorted by coercive forces in which there is no open, participative, and fair debate. Therefore, new ends and means should be set. So ends become forms of more decent practice and means become methods in which more decent practice can be achieved.

The argument of Flood and Romm (1996b; 1997) clearly showed the inadequacy of Morgan's work, which included single- and double-loop learning. There must be 'reconciliation' between the design-oriented and the debate-oriented single loop learning. This is known as double-loop learning. This means that the superiority of anyone should be avoided. Two questions, 'Are we doing things right'? And 'are we doing the right things'? should be asked simultaneously. This puts the manager in a powerful position in which one is conscious of having a free choice between two types of learning at any one time, looping between the two centers of learning. In addition, one is also conscious of clearing one's vision by action on the basis of means and ends of a dominant loop.

5. The Work of Senge

Peter Senge (1990a) suggested that organizations might get rid of certain 'learning disabilities' and become capable of learning if they master the five disciplines. The five disciplines that we have described above in another context are 'personal mastery', 'mental models', 'team learning', 'building shared vision', and 'systems thinking.' Systems thinking is the 'fifth discipline', which provides conceptual framework, and underpins and combines all the others. Organizational learning can only occur through systems thinking.

Before interpreting systems thinking in some detail here, I will first concentrate on four other disciplines of the learning organization—namely personal mastery, mental models, team learning, and shared vision. These disciplines take place at four organizational levels—individual, group, organizational, and interorganizational. To create a learning organization, managers must use systems thinking and recognize the effects of one level of learning on another (Jones, 2001).

In 'personal mastery' Senge (1990a) gives full freedom to the personal vision. The learning organization is shaped by the energies, the visions, and the patience of its members. It is the 'spiritual foundation' of the

learning organization. There are two fundamental aspects of personal mastery. First, an individual who aims at achieving personal mastery must constantly make clear what is significant to him and bear in mind why he is pursuing a particular route. Second, the individual must observe the present reality explicitly. In this way the individual puts 'emotional tension' and anxiety on the shelf and learn to live with 'creative tensions' that make him or her capable of working with the current situation. Personal mastery allows the individual to take part in a continuous creative process. It ensures faster learning, commitment to work, and formation of a learning organization. According to Senge, however, the personal mastery should not be imposed on individuals, rather one should build an organizational climate in which individuals feel secure to create visions, where questioning the operating norms are usual, and where coping with status quo is expected. Developing a sense of personal mastery empowers individuals and allows them to employ and explore what they desire. This is an opportunity to develop an understanding of their work or creating a distinctive competence for the organization. This is an organizational learning at the individual level (Senge, 1990b).

Senge (1990a) argued that in 'mental models' the deeply embedded assumptions and generalizations or models affect how we comprehend the world and how we take action. Such unquestioned models limit individual vision, lead to organizational inertia, and consequently block organizational learning. Thus the mental models should be uncovered and analyzed. Senge (1994) suggests 'creating scenarios' in which very different futures are generated through using maximum imagination. It is not important to predict future accurately, but to be aware of where we are at present in relation to possible futures. This scenario creation allows the organization to modify its goals, to understand the limitations acting upon them, and to learn how well prepared they are for potential futures. This is still an organizational learning at the individual level.

In 'team learning' Senge (1990a) puts emphasis on collective act and enriched debate and 'dialogue.' By dialogue, he means that the members of a team or group should be capable of putting aside their own personal assumptions and entering into a collective thinking process. Various kinds of groups such as self-managed groups or cross-functional teams allow individuals to share and pool their skills and abilities to solve problems. It creates synergism—the idea that the whole is greater than the sum of its parts. This is an organizational learning at the group level.

In 'shared vision' Senge (1990a) refers to the common pictures of the organization. Organizational leaders should be capable of revealing shared pictures of the future that generate genuine commitment. Shared vision usually starts with visionary leadership. Thus, it must turn into collaborative co-creation of the organization future. By building shared vision, Senge means building an ongoing frame of reference or mental model that all organizational members use to tackle problems or opportunities. These are both terminal and instrumental values and norms that guide behavior in a particular setting that affect the way people interact with individuals and groups outside an organization that is organizational culture. This is an organizational learning at the organizational level.

Establishing the shared vision of common assumptions that guide learning inside an organization also determines how learning takes place at the interorganizational level. Organizations with organic and adaptive cultures are more likely to seek out new ways to manage interorganizational linkages with other organizations. However, organizations with mechanistic and inert cultures are slower to take advantage of new kinds of linkage mechanisms (Jones, 2001).

In 'systems thinking' Senge (1990a) emphasizes the underpinning character of the first four disciplines. Systems thinking makes clear the subtler aspects of personal mastery such as our connectedness to the world; helps improve our mental images; enables team learning by allowing to cope with complexity; and provides a stronger foundation for shared vision by uncovering the forces shaping current reality. In fact, Senge's fifth principle of organizational learning, systems thinking, emphasizes that in order to create a learning organization, managers must appreciate the impacts of one level of learning on another. For example, there might be little point in creating teams to facilitate team learning if an organization does not give its employees the freedom to develop a sense of personal mastery.

6. An Evaluation of Chaos and Complexity Theory from the Managerial Standpoint

This section considers the chaos and complexity theory and its managerial perspective that would help build the premises of learning organizations. The idea is based upon the assumption that organizations as 'open' systems face chaos and complexity, which are triggered by the evolutionary and revolutionary changes taking place in their environments. Fluctuations and

disturbances coming from the external environment such as rapid technological innovations, transient customers' tastes and preferences, and changing legal rules and governmental regulations force organizations to learn about and to live with chaos and complexity. The argument in this section will be revolving around the works of the main contributors of Chaos and Complexity theory—Gleick (1987), Stacey (1992; 1993; 1996), and Wheatley (1992).

By and large they argued that the 'irregular' and 'erratic' aspects of nature oblige scientists to get rid of 'fixed laws' and regular patterns of behavior based on cause-effect relationships in the process of making predictions and forecasts. Here two significant points have to be emphasized. First, systems can produce unpredictable outcomes from deterministic equations, and second there is considerable order in disorder. Prigogine and Stengers' (1984) 'dissipative' structures that have chaotic behavior emerging from chemistry, Wheatley's (1992) 'new science,' and Capra's (1996) 'new perception of reality' all put great emphasis on the significance of the maintenance of overall structure while experiencing constant flow and transformation of components.

Chaos theory was the first term used to describe mathematics of non-linear dynamic behavior in natural systems; therefore, it had a narrower scope. In contrast, Complexity theory described the behavior of complex human, social, and natural systems in the long-term; therefore, it had a broader scope.

Gleick argued that unimportant and small changes might give rise to radical transformations in the behavior of the system in the long run. This is called 'butterfly effect.' The flapping of a single butterfly's wings initially produces insignificant changes in atmospheric conditions, but it might generate large-scale consequences overtime. This indicates unpredictability. Furthermore, complex systems have a recognizable 'pattern' in their behavior. They behave in a way that never repeats itself exactly; they are attracted to 'aperiodic' particular pattern of behavior. This is called Lorenz 'attractors.' Edward Lorenz, a meteorologist, found out this breakthrough in his study of weather prediction problem.

From the managerial standpoint, Stacey (1992) argued that organizations should learn to live with disequilibrium and chaos. They always face non-linear feedback loops that lead to unpredictable pattern of behavior. This makes it clear that managers should not make long-term

planning because the future is unpredictable. They have to consider more visible and more predictable short-term planning. Managers have to know the 'butterfly effect' in which small and unimportant changes may bring about significant transformations in the long-term. However, chaos does not imply full randomness. It recognizes the implicit 'pattern'—that is the continuous variation or irregularity. Therefore, chaos presents order within the chaos. For Senge (1990) uncovering these patterns or 'system archetypes' enables managers to initiate change actions. Here Morgan (1997b) emphasizes the strength of the new 'attractor' that can trigger transition in the context. The new attractor should be more dominant than the existing context. However, organizations should be capable of recognizing the patterns that make them evolve through learning. They should develop a way of thinking about the organizational change. They should ask such questions as what are the forces binding the organization into its existing 'attractor' pattern? How does the organization achieve the change from one attractor to another? And what will be the rules of new attractor? (Jackson, 2000).

Wheatley (1992) also recommends managers to learn to live with never-ending change. They should give up strong and complex structures consisting of rigid hierarchical levels and specific task functions. Managers should form the organizations through concepts, not through controls and plans. They should be open to accept 'new contexts' (Morgan, 1997b). Fixed prescriptive models that remove innovation and political interactions should not chain and trap them. In contrast learning behaviors, teamwork, and self-organization should be encouraged. The organization should have the 'dissipative structure' in which the system does not decay, but evolves through greater complexity by requiring energy from the outside (Prigogine, 1984). Dialogue, crisis developing new perspectives, and continuous questioning should be encouraged. At this stage it is essential to preserve the dissipative structure. In other words, the organization would be at the 'edge of chaos' in which it would sustain both the order—such as preset targets and numerical goals and the disorder—such as conflict and dialogue. This is the most desirable state that the organization utilizes its full potential for creativity (Kaufmann, 1995). They should never slip into extreme points—'stable' and 'unstable' zones.

Stacey (1996) gives a detailed account of the edge of chaos through showing the difference between 'legitimate system' and the 'shadow system.' The legitimate system includes explicit rules, structures, procedures, and anxiety arising from creativity. The 'shadow system', on the

other hand, consists of challenge, tension, and chaos. The organization can be placed in the middle between stability and instability or at the edge of chaos when there is significant tension between legitimate and shadow systems. The organization's legitimate system should not be empowered. Otherwise questioning of goals would be inhibited, conflict and change would be removed, and then the organization would petrify in the stable zone. Factors such as fear against change in the organization's members, disapproval of shadow system, avoidance of dialogue, and sticking to bureaucratic routines would make the legitimate zone powerful.

Likewise, if the shadow system becomes too strong, it endangers the pursuit of the organization's primary task. This prevents innovation and double-loop learning and organization enters the unstable zone and disintegrates. Factors such as having too much tension and instability and encouraging conflict, contradiction and change legitimately would make the shadow zone powerful.

According to Stacey, in order to sustain the organization at the edge of chaos the organization should pay attention to the following four factors. First, organization's legitimate and shadow systems should equally have the information about changes in the environment. Second, organization's shadow system should have sufficient diversity encouraging learning without causing anarchy. Third, connections between individuals and groups should be set between weak and strong points ensuring both stability and instability. And fourth, anxiety should exist under the control of legitimate system.

7. Essential Properties of Learning Organizations

In this section, the paper aims to cover the intellectual constructs developed in the argument in an analytical discussion in order to propose the essential properties of learning organizations that might be used by managers.

First, the paper categorizes the main points by making reference to the existing body of knowledge of this paper. Second, for each main point it develops a detailed argument and then draws up guidelines for managers who desire their organizations to be capable of learning. The core ideas can be classified as follows:

- An awareness of the definition of organizational learning

- An awareness of barriers of organizational members in the perception and interpretation of problems as decision-makers and of several strategies for coping with them
- An awareness of differences among single-loop learning, double-loop learning, and triple-loop learning
- An awareness of the significance of the five disciplines and their impact on organizational levels
- An awareness of the significance of living with disorder, irregularity, and randomness for organizations

The first core idea stimulated an awareness of the definition of organizational learning. Organizational learning emphasizes two significant strategies: explorative strategy and exploitative strategy. The former engages with a ‘revolutionary change’ that characterizes sudden, drastic, organization-wide and fundamental change on base technology in terms of structure, processes, and products. The latter involves an ‘evolutionary change’ that characterizes gradual, incremental, specifically focused and modified change on base technology in terms of structure, processes and products.

In the second core idea, I argued that both managers and workers are trapped by embedded beliefs and values—cognitive biases in the perception and interpretation of problems as decision-makers. They might be trapped by inconsistent beliefs and actions (cognitive dissonance). They might develop irrational beliefs about ability and competence to deal with problems (illusion of control). They might misinterpret the information (frequency and representativeness). They might attribute their feelings of helplessness onto others (projection) or may believe that their actions are best ways (ego defensiveness). Furthermore, they might refuse to admit that they made a mistake (escalation of commitment).

I proposed that managers could overcome their mind-sets by building up an organizational climate in which organizational members freely question rules, procedures, processes or goals concerning the work task and guiding business activity. They might use a team approach in which people from different levels and units of the organization share and pool their skills and abilities to bear on a problem. In addition, they can develop a ‘dialectical inquiry’ in which decision-making teams develop and assess alternative proposals, courses of action, and form a plan including the best parts of alternative scenarios. This process should encourage more visible and more predictable short-term planning.

In the third core idea, there were two significant contributions: first the work of Morgan, and then the work of Flood and Romm. Morgan made a clear distinction between single loop learning and double-loop learning. The former emphasizes that the organization members should be capable of scanning change in the environment to detect significant variations. Managers should realize shifting trends and generate new industries and business niches. The latter enables organizational members to question assumptions, mind-sets, mental models, and norms guiding business activity and also to challenge and change them. Furthermore, divergent viewpoints of people should be debated in a collective decision-making system. In this way, errors could be detected and corrected. These two types of learning should be employed simultaneously.

The work of Flood and Romm made clear that managers should seek to simultaneously understand best means to meet their preset goals ('How' should they do things?), the redefinition of ends and means within a debate process ('What' should they do?), and setting new means and ends collaboratively ('Why' should they follow means and ends). These were three types of single-loop learning. The first type of single-loop learning is design-oriented and assumes the design of means to reach ends. The second type of single-loop learning is debate-oriented and assumes the redefinition of means in an open debate to accommodate or reconcile ends. This is double-loop learning. The third type of single-loop learning is knowledge/power-oriented and assumes distorted and unfair nature of debate due to coercive forces. Triple-loop learning gives equal tolerance between these three centers of learning.

In the fourth core idea, I dealt with the work of Senge who paid attention to the hierarchical levels of learning in organizations—individual, group, organizational, and interorganizational. Here, he emphasized that managers should recognize the impacts of one level of learning on another.

At the individual level, there were two ideas: First, employees should make clear why they pursue a particular route; second, they should not be afraid of creative tensions and take part in a continuous creative process in which they feel secure to develop and use different visions or mental models that allow them to find out better paths of performing their work tasks.

At the group level, groups such as self-managed or cross-functional teams allow individuals to share and pool their skills and abilities to tackle problems.

At the organizational level, he suggested two ideas: structure and culture. First, dealing with the structure, different organizational structures encourage different types of organizational learning. The design of a mechanistic structure supports exploitative learning and discourages group interactions. However, the design of an organic structure makes easier explorative learning and encourages intergroup communication and problem-solving. Second, concerning the culture, collaborative co-creation of the organization future through 'shared vision' generates a never-ending frame of reference that all organizational members use to tackle problems or opportunities.

At the interorganizational level, organizational structure and shared vision also determine learning. Organizations with organic structures have a tendency to seek out new ways to manage interorganizational linkages. In order to achieve legitimacy in the industrial sector or field, organizations need to resemble other organizations that face the same set of environmental conditions. DiMaggio and Powell (1991) refer to this as 'institutional isomorphism', a constraining process that creates pressures towards similarity. These pressures could be 'coercive' forcing organizations to take on a certain structure as a result of a political pressure, 'mimetic' where organizations imitate the structure and strategy of successful ones, and 'normative' in which professional ideologies shape the appropriate structure for the organization through courses, associations, networks, and meetings. In this way they speed up the organizational learning process.

The fifth core idea analyzed the significance of living with 'disorder', 'irregularity' and 'randomness' for organizations. Organizations as 'open' systems face chaos and complexity, which are triggered by the evolutionary and revolutionary changes taking place in their environments.

In the analysis of Chaos and Complexity theory, organizations should recognize the unpredictable behavior of the external environment. Therefore, they have to prefer more visible and more predictable short-term planning to long-term planning. In the process of organizational change organizations should not be afraid of facing new problems. They should recognize the continuous irregularity or an order within the disorder. Thus, they should question the existing attractor patterns—structures, cultures,

rules, procedures, political relations, defensive routines, controls, etc. In this questioning process, employees should have the freedom to challenge and transform attractor patterns, to identify forces binding the organization into the existing attractor pattern, to determine the way to change from one attractor to another and the rules of new attractor, and to find out better paths of performing work tasks.

The organization should be engaged with dialogue, crisis, and continuous questioning through preserving a balance between its legitimate system—clear structures, rules and procedures and the shadow system—challenge, tension and chaos arising from the external environment. The organization should be positioned at the edge of chaos. At this stage, the organization should not empower its legitimate system, which would otherwise give rise to the prevention of questioning of goals and the removal of conflict and change. Likewise, if the shadow system becomes too strong, it endangers the pursuit of the organization's primary task. This prevents innovation from taking place.

In order to sustain the organization at the edge of chaos there are certain components to be taken into consideration. The organization's legitimate and shadow systems should equally have the information about changes in the environment. The shadow system should have sufficient diversity encouraging learning but not giving rise to anarchy. Furthermore, anxiety should exist under the control of legitimate system.

Properties that stimulate an awareness of the definition of organizational learning:

- Try to understand the type of change the organization is making—whether it is drastic, organization-wide, and fundamental or gradual, specifically focused and incremental.
- Employ innovative researchers who can initiate both evolutionary and revolutionary changes in the design of the organization's structure, culture, strategy, and processes.

Properties that stimulate an awareness of barriers of organizational members in the perception and interpretation of problems as decision-makers and of several strategies for coping with them:

- Examine managers and subordinates' cognitive structures by which they perceive and interpret problems. Be aware of inconsistent beliefs and actions, irrational beliefs about one's ability and competence to deal with problems, misinterpretation of information, attribution of one's feeling of helplessness and powerlessness onto others, believing as if one's actions are best ways, and refusal of a confession that one made a mistake.
- Build up an organizational climate in which employees feel secure to question deeply embedded assumptions, procedures and norms concerning the work task and guiding the business activity.
- Develop strategies such as listening to dissenters, using dialectical inquiry, encouraging diversity, and promoting an interactive and heterogeneous management teams and groups in which different people from various units share and pool their skills and abilities develop and assess alternative proposals, courses of action, and form a plan including the best parts of alternative scenarios (collaborative creation of shared pictures or visions of the organization future).
- Never overlook warnings of dissenters.
- Encourage more visible and more predictable short-term planning.

Properties that stimulate an awareness of differences among single-loop learning, double-loop learning, and triple-loop learning:

- Train organizational members to scan change in the environment, to realize shifting trends, and to create new industries and business niches.
- Build up a collective decision-making system in which divergent and antagonistic viewpoints of people are debated in order to detect and correct errors.
- 'How' should managers do things? Do they have a desired purpose of the firm? Do they have a sensor who senses the current state of the firm? Do they have a comparator, which compares the current state with the desired outcome? And do they have an activator who makes the decision about any deviation discovered by the comparator in such a way as to bring the firm back to its purpose?
- 'What' should managers do to achieve their goals?
- 'Why' should managers follow means and ends?

- Build up an open debate in which divergent and antagonistic viewpoints of different people are clashed with each other to redefine means and accommodate ends.
- Give full freedom to all organizational members to set new means and ends in an open debate free from coercion.

Properties that stimulate an awareness of the significance of the five disciplines and their impact on organizational levels:

- Encourage employees to make clear what is important to them and why they pursue a particular route in their work tasks.
- Encourage employees to learn to live with creative tensions and to set aside their emotional tension and anxiety.
- Build up a climate in which every individual takes part in a continuous creative process, feels secure to create visions and questions operating norms.
- Encourage employees to develop and use different mental models that allow them to find out better paths of performing the work tasks.
- Build up teams and groups in which different individuals share and pool their skills.
- Determine the foundation for shared vision or organizational values and norms that guide organizational members to tackle problems and opportunities.
- Design an organic structure that makes easier explorative learning and encourages intergroup communication and problem-solving.
- Engage with networks, alliances or mergers to promote organizational learning.
- Pay attention to the sequence of four levels of organizational learning.

Properties that stimulate an awareness of the significance of living with disorder, irregularity, and randomness for organizations:

- Look out for new problems and be open to new solutions, never afraid of being at the edge of chaos.
- Question the organization's existing attractor patterns such as structures, cultures, rules, procedures, political relations, defensive routines, controls, etc.

- Give freedom to employees to challenge and transform attractor patterns.
- Identify the forces binding the organization into its existing attractor pattern.
- Determine the way the organization changes from one attractor to another.
- Determine the rules of new attractor.
- Make dialogue, crisis developing new perspectives, and constant questioning ways of organizational life through preserving the balance between the organization's legitimate system—explicit structures, rules and procedures and the shadow system—challenge, tension, and chaos.
- Ensure that tension and chaos have sufficient diversity leading to organizational learning but never giving rise to anarchy.
- Ensure that the anxiety is under the control of the legitimate system.

8. Research Agenda

This section provides an assessment of Morgan's and Flood and Romms' studies as well as Chaos and Complexity theory with a view to developing new propositions for future research.

I argue that the work of Morgan (1997b) in single-loop learning and double-loop learning is open to criticism. It solely gives tolerance to between design-oriented and debate-oriented single-loop learning. It impairs the quality of learning because it overlooks the significance of power-knowledge connections. Alternatively, Flood and Romm (1996b; 1997) extended this tolerance to the three centers of learning and preserved the diversity within each center of learning. The manager should be fully aware of asking three questions simultaneously: Are we doing things right, are we doing the right things, and is rightness buttressed by mightiness and vice versa? They loop between three questions. This helps managers be aware of dilemmas and develop a discourse for each center of learning or get rid of means and ends that serve the interests of powerful. However, this approach is still open to criticism, because it neglects material conditions in reality. It is completely normative. In other words, it fails to explain how could problematic debate processes distorted by coercive forces be prevented? What is the structure of a collaborative approach? What is the process of a creative dialectic? Who are the participants? Who chairs the process? Are participants only powerful stakeholders? What about the viewpoints of those who are silenced or less

privileged? Equally important, how would you ensure a good idea that arises from a dialectic in which the interests of those who are subjugated reflect false needs and false goals? Seeking answers to such questions could be significant areas for future research.

In the Chaos and Complexity theory there was an assumption that the organization should preserve a balance between its legitimate system—clear structures, rules and procedures and the shadow system—challenge, tension and chaos arising from the external environment. The organization should be positioned at the edge of chaos. At this stage, the organization should not empower its legitimate system, which would otherwise give rise to the prevention of questioning of goals and the removal of conflict and change. Likewise, if the shadow system becomes too strong, it endangers the pursuit of the organization's primary task. This prevents innovation from taking place.

However, the Chaos and Complexity theory from the managerial standpoint does not give any indication of how do managers maintain a certain amount of stress in organizations? What are the attributes of the midpoint between the legitimate system and the shadow system? How do they cope with the symptoms of high stress, such as constant fatigue, low energy, moodiness, increased aggression, excessive use of alcohol, temper outbursts, compulsive eating, high levels of anxiety, and chronic worrying, which would give rise to a colossal collapse in performance and profitability? And how do they help employees handle stress? These issues could be significant topics for future research.

9. Conclusion

The paper has developed a wide-ranging understanding of how learning organizations can be created and partly assessed the learning organizations literature with a view to developing new propositions for future research.

It has proposed that a learning organization is not only a system that purposefully designs and constitutes its structure, culture, and strategy that allow both explorative and exploitative learning, but also one that pays attention to the cognitive biases or mind-sets of its members and several strategies for coping with them, to the single-loop learning, double-loop learning, and triple-loop learning, to the recognition of the effects of

hierarchical levels of learning, and to the importance of Chaos and Complexity theory.

In light of these appropriate and diverse intellectual constructs, the paper has revealed the attributes of learning organizations through outlining specific guidelines for managers and evaluated the part of the literature to determine the research agenda.

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