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Advanced strategic thinking; how to apply chaos and complexity theories in strategy? In order to answer this question, an explanation of the terms ‘ strategy’, ‘ chaos theory’ and ‘ complexity theory’ is needed.

Strategy One of the best definitions of strategy is provided in Ghemawat’s book “ Strategy and the Business Landscape” is a quote from Alfred D. Chandler, Jr: “ Strategy can be defined as the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out those goals”. To complement this definition, Johnson and Scholes define it as follows: “ Strategy is the direction and scope of an organization over the long term: which achieves advantage for the organization through its configuration of resources within a changing environment, to meet the needs of markets and to fulfill stakeholder expectations”. The principal of strategy is very well described in Michael Porter’s Activity System. According to Porter, “ strategy is the creation of a unique and valuable position, involving a different set of activities”. This means that strategy is about combining activities in order to create fit between an organization’s activities.

Strategic fit creates competitive advantage and superior profitability. Also Porter states that an organization has to make choices in what business it is in and who its customers are: “ the essence of strategy is choosing what not to do”. Since strategy is always a combination of analytical thinking and intuition, there is no magic set of knowledge that can help managers to create the perfect strategy. Chaos TheoryChaos theory looks at how very simple things can generate very complex outcomes that could not be predicted by just looking at the parts by themselves.

The theory attempts to explain the fact that complex and unpredictable results can and will occur in systems that are sensitive to their initial conditions. An example of this is known as the Butterfly Effect, described by meteorologist Lorenz. It states that, in theory, the flutter of a butterfly’s wings in China could actually effect weather patterns in New York City, thousands of miles away. In other words, it is possible that something very small can produce unpredictable and sometimes drastic results by triggering a series of increasingly significant events. Another example of the chaos theory is the patterns of birds flying together in the sky.

One would think that birds are very intelligent to figure out how to fly in such a formation and that there would have to be a leader giving the instructions to fly like that. Research into swarms however, has shown that all that is needed for each bird to maintain the distance between itself and its neighbors and fly in the average direction of its neighbors. Simple rules can generate complex behaviors that just seem to emerge out of nowhere. Complexity theory Complexity theory looks at how complex systems can generate simple outcomes, it is used to understand how an organization adapts to its environment. It treats organizations as a collection of strategies and structures.

An example of such a complex system is the human body: billions of cells all work together in such a way that the body works as a single unit. Our body works to keep us alive. We get hungry when we need food; we get thirsty when we need water. We can think and we have a distinct personality. Something happens when large numbers of individual units come together

and interact intensely with each other. New levels of operating just emerge through what is called self-organization.

By looking at a single human cell, you could not tell that it would be able to operate with other cells to form a human body. As Rutger Spreij states in his lecture: “ one of the insights of chaos and complexity theories is that complex behavior can be driven by relatively simple rules. Many of the irregular shapes that make up the natural world, although seemingly random – chaotic – in form, have a simple organizing principle”. A good example of such a ‘ simple organizing principle’ is the Ant Colony Optimization, studied by Marco Dorigo of the Universite Libre de Bruxelles. The ant seems to wander randomly, finds food and returns to its colony. By doing so, it leaves a pheromone trail which prevents other ants from wandering at random, but to follow the trail, returning and reinforcing it if they eventually find food.

Chaotic and complex systems When systems behave in a linear fashion, they are easy to describe, define, and predict. But many systems behave in ways that are unpredictable with linear method. Sometimes, small changes in system patterns result in a massive change in the entire system (Lorenz’s “ butterfly effect”). At other times dramatic changes result in insignificant systemic effect.

Complex and chaotic systems can be attracted to a certain form, self-organizing through random behavior. With self-organizing, the internal organization of a system increases in complexity without being guided or managed by an outside source. In strategy, in order to compete in a competitive environment, an organization has to be flexible, innovative,

creative and able to grow. It has to be able to respond to changes in an intelligent way. Organizational intelligence occurs when an organization is able to adapt and responsive to changing conditions, but is still able to maintain its own unicity and purpose.

The accepted model for organizational intelligence is a ‘ complex adaptive system’ (CAS). John H. Holland, who, with others, invented the term CAS, defines a CAS as follows: “ A Complex Adaptive System (CAS) is a dynamic network of many agents (which may represent cells, species, individuals, firms, nations) acting in parallel, constantly acting and reacting to what the other agents are doing. The control of a CAS tends to be highly dispersed and decentralized. If there is to be any coherent behavior in the system, it has to arise from competition and cooperation among the agents themselves. The overall behavior of the system is the result of a huge number of decisions made every moment by many individual agents.

” (source: Complexity: The Emerging Science at the Edge of Order and Chaos by M. Mitchell Waldrop). Complex adaptive systems provide a tool to obtain all the knowledge and intelligence in an organization and it creates new shared understanding of more innovative solutions to problems. An example of a CAS is navigating a boat on a river. If you are in a boat on that river, you have no influence on the way the river is going and very little influence on what it will do to you, where it will take you or at what speed you float.

But, you do have control over your boat; a little bit of steering here, go with the flow there, paddle a bit or not – you will find that it is quite safe, quite predictable and that you are in control of that you need to be in control of to

get where you want to go. Chaos and complexity in StrategyAn organization’s strategy can be based on a vast range of useful models. A few of them are: ? Porter’s five-forces framework, is used to determine how strong the position of an organization is within its market. Five forces are appointed that decide the organization’s position. Based on the analytical outcome, actions to strengthen the organization’s position can be defined. The 5 forces are: the degree of rivalry, the threat of new entrants, the threat of substitutes, the bargaining power of buyers and the bargaining power of suppliers.

Those forces close to the organization can affect its ability to serve its customers and make profit. ? BCG’s growth-share matrix, which is used to help an organization to analyze its business units or product lines and categorize the BU’s or PL’s in 4 categories: cash cows, dogs, question marks or stars. The matrix is used to manage cash-flow by getting to know an organizations successful BU’s or PL’s by defining its market share. ? SWOT analysis- a strategic planning tool used to evaluate the strengths, weaknesses, opportunities and threats that an organization has or can come across. Of course there are many more models to help an organization define a strategy.

But to enumerate them all would not help to give an insight in applying chaos and complexity in strategy. There is one more model that I would like to use a little more in depth, as I do believe it helps looking at the question of how to apply chaos and complexity in strategy: Hugh Courtney’s model of levels of uncertainty. This model can help managers to determine the level of uncertainty their organization is in and, based on that level, what strategy

to use. Looking at Level 4: True Ambiguity made it clear to me that applying chaos and complexity in strategy is much more difficult than I thought; in Level 4 situations multiple dimensions of uncertainty interact to create an environment that is impossible to predict. And traditionally, strategy in most organizations is based on the idea that to a large extend the world is predictable and therefore controllable.

So, level 4 situations, in traditional strategy, are rare and tend to migrate to other levels over time to be able to control them and align them with the organization's strategy. While talking about chaos and complexity with my respected colleague Rob Wetzels, co-author of the book " Niets nieuws onder de zon en andere toevalligheden. Strategie uit chaos", he asked me the question whether the traditional way of developing strategy can be used if one is talking about chaos and complexity. He showed me a model that looked pretty much like this: This model indicates that, how successful they might be, life cycles begin, decrease a little, increase and in the end decrease again. In the traditional way of strategic thinking, organizations might deny the fact that this is happening and resist the process by ' optimalization' or ' improvement' of the operating process (for instance by using different strategic management models, by mergers or acquisitions, by casting off businesses that are not core).

This is a reaction that is typical for the ' mechanical' way of thinking in traditional organizations. By operating on ' the edge of chaos' or, as an organization is in the middle f it ' the eye of chaos', an organization operates in such a way that it is not completely in control, but neither in complete chaos. It operates there where complexity is maximal and where new life

cycles begin. If an organization operates in such a way and current cycles begin to decrease, it will start a process of ‘ change’ or ‘ transformation’ which starts with self organization. What does an organization has to do to apply chaos and complexity to its strategy? The answer to this question is not easy. It needs a different way of thinking and with that a different way of managing.

The complexity theory challenges an organization’s traditional view of strategy and management and demands significant changes in operating. Some changes that would make a shift to chaos and complexity could be: ? Change is threatening to people, especially if the changes involves a switch to unclearness and uncertainty. In order to change to chaos and complexity, change is needed, so it is key to reduce the level of anxiety to a minimum and involve all levels of the organization into the process of change. ? Avoid the traditional search for fit between the organization and its environment. An organization has to be able to respond in a flexible and creative way to developments and too much fit can be a limiting factor. ? Leave room for people’s creative ideas by giving them freedom in the way they work and communicate with each other.

Informal meetings with no specified agenda can help to come up with innovative solutions to complex problems. ? Invest in development of all levels of people in the organization. This will generate a group of dedicated staff, which is capable of operating in every department in the organization. One could even think of making sure that people do not stay in one job or department for too long, in order to avoid them to get too attached to this job or department and traditionally build an ‘ empire’ around it. ? Stimulate

experimenting and learn from failures, more than punish initiatives that failed.

In order for an organization to learn, one must be able to make mistakes and draw lessons out of those mistakes. Conclusion First, let’s not confuse the meaning of the word chaos in this sense. Often the word has quite a negative sound to it, as it is often used in the sense of disorder. Chaos in this case means creativity. Traditional concepts like strategic models and competitive advantage are implying that the future is predictable and that as long as influencing the environment is possible, an organization can stick to its strategy as planned. In a world that is continuously changing and those changes are not predictable, a shift in thinking is needed in order for organizations to operate in such a way that it outperforms competition.

Applying chaos and complexity to strategy means to let go of the traditional, linear, way of thinking. One has to accept that developments are not predictable and that even a minor change, something that seems insignificant, can create a major change in the entire systems. Finally, applying chaos and complexity means changing the system. As an organization consists of people working in that organization, those people need to make the changes, so people need to be involved in and stimulated to make the changes necessary. The one who sows order will harvest chaos.

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