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Back in The Dark Ages: Role of Intuition in The Decision-Making Processes

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Abstract

Cornucopia of emerging information far exceeds any one's ability to confront the emerging issues today. Isaac Newton's emphasis on linear clockwise universe in which all principles of the known world could be understood through rational faculties pushed subconscious intuition to the side as superstitious not worthy of academic pursuit. Merely three hundred years later, digital revolution embraced intuition's long-lost appeal. Today's technology granted humanity the opportunity to collect infinite amount of information. Again, intuition is being espoused as an alternative to a rational decision-making model. Following science three-hundred-year-long love affair with reason and logic, humanity is back where it started– in the dark ages. Albert Einstein's theory of relativity associated with complexity and use of nonlinear concepts such as intuition and emotions have become a common corporate practice. Even though human mind retained its rational capacities, the world in which decisions are made today has changed.

Keywords: Historical Overview, Management Theory, Linearity, Nonlinearity, Intuition, Complexity

Introduction

The purpose of this article is to conduct a critical review of the literature on the role intuition plays in managerial decision-making processes today and determine emerging theories and issues. At the outset, the author provides an outline for the relevant theoretical background of the older management models and contrast them with the current issues underlying decision-making processes. The author concludes the article with recommendations for managerial decision-making.

Literature Review

Linearity: Isaac Newton's (1687) Clockwise Universe

"Nature and nature's laws lay hid in night: God said, 'Let Newton Be!' and all was light."

–Alexander Pope, 1727

Throughout his life Isaac Newton (1687) searched to fathom the "machinery" through which God created, designed, and sustains the world. He believed, in the "God the Creator" of all dominion who continuously preserves His creation to avert deterioration due to natural processes of decay (Ramati, 2001). Shaped by rational principles governing universe, Newton delineated formula of the universe controlled by a set of precise physical laws which he named the "clockwork universe." The knowledge opens a path through which it can come closer to the incorporeal and spiritual perspective of God (Principia, 1687). The clockwise properties of the universe reckon gaining requisite knowledge of the world sufficient to clearly predict future events (Principia, 1687). Such conceptualization was given various names: "mechanistic," "reductionistic," and "deterministic" (e.g., Dreyer, 1953), among others. Newton had every expectation that the observations made by other scientists in related disciplines would over time be reduced to the simple *Laws of Mechanics*. Although that has never been realized, other disciplines, such as biology, psychology, or economics did nevertheless adopt a general mechanistic worldview to their respective fields of study (Singh et al., 2002). Its simplicity accounts for its popularity. Later theories of mechanics, such as *Relativity Theory* or *Quantum Mechanics*, while also successful in the realm of applications, lacked that simplistic appeal. Mathematics and physics have always tried to describe the changing world around us. Newton developed his mathematical theories to understand the basic motion of all objects in the universe: "Equations that involve rates of change are referred to as differential equations and the word differential resonates throughout mathematics: differential calculus, differential equation, differential coefficient, and even just differential. Solving these equations gives us information about change in our physical world" (Singh et al., 2002, p. 25).

Up until the latter part of the twentieth century, mathematicians and physicists alike dealt mainly with linear differential equations: "An equation is linear if the sum of two solutions is again a solution. Linear equations express relationships that are proportional" (Singh et al., 2002, p. 26). However, "The mechanistic and deterministic philosophy of Newtonian physics representing order, stability, and world equilibrium, that led later to Einstein propounding a unified field theory, have largely given way to the philosophy of open systems that emphasize

nonlinearity, complexity, disorder, *inequilibrium*, inequality" (p. 27). The reason Einstein originally failed to formulate his theory, was precisely because "there is more to the universe than the linear, deterministic equations known to mankind. Like to Newton, the science of chaos was unacceptable to Einstein who believed that God does not play dice with mankind" (p. 27). The deterministic philosophy of Newtonian physics, representing order and stability, led subsequently to Einstein's *Unified Field Theory*, which largely gave its way to the systems theory today with its emphasis on nonlinearity, complexity, and disorder. We can see that most profoundly while studying entrepreneurship today: "Creative industries, of which crafts is a dynamic sector, are gaining attention due to their resilience to economic downturns, the ability to promote inclusive development and overall community well-being, and for stimulating growth in other industries such as telecom" (Katre, 2020).

Linearity: Frederick Taylor's (1911) Scientific Management

Popular management literature of Industrial Revolution espoused a traditional linear approach to organizational planning (Chames & Cooper, 1957; De Cock, 1996). Echoing Newtonian's conceptualization of the universe, a prominent management thinker–Frederick Taylor (1911)–theorized that organizational processes can be managed by following a simple cause-and-effect logic–"if…then"–in which events follow a pre-established sequence of routine steps in a clockwise-based discipline. *Scientific Management Theory* of early 1900s was designed to replace the "rule of thumb" by introducing what became known as four principles of Frederick Taylor:

> 1) Replacing rule-of-thumb work methods with methods based on a scientific study of the different tasks to be done; (2) Scientifically selecting, training, and developing each employee rather than passively leaving them to train themselves; (3) Providing detailed instruction and supervision of each worker in the performance of that worker's discrete task; (4) Dividing work equally between managers and workers, so that the managers apply scientific management principles to planning the work and the workers actually perform the tasks. (De Cock, 1996, p. 234)

Frederick Taylor presumed workers to be sufficiently "unrefined" to justify transfer of control from workers to managers and clearly distinguished between "mental planning" of management and "manual labor" of workers. His principles called for efficiency and scientific measurements in place of rule of thumb. Competition alone without the rigors of scientific management, he declared, is not enough to stave off creeping inefficiencies (De Cock, 1996). Incessant managerial intervention based on scientific measurements became part of management routines. Indeed, a clearly defined scientific control made mass-production revolution possible for the first time in history of industrial endeavors: "Taylor insisted that it is only through (1) Enforced standardization of methods, (2) Enforced adoption of the best implements and working conditions, (3) Enforced co-operation that the faster work can be assured" (De Cock, 1996, p. 234). However, tight control of scientifically designed management system devoid of emotions and feelings had their flaws. Distrust between management and labor, cold executive treatment, and ingrained hostility toward the workmen became synonymous with *Taylorism.* This kind of management attitude toward

labor was gravely resented by workers and led to many strikes (De Cock, 1996).

Even though entrepreneurial behavior is recognized as essential for economic growth of the modern economy, rational linear thinking denies creativity and innovation its rightful place in the recognition of organizational life cycles and development of new products and services (Vance et al., 2008). And yet innovation is a critical process by which firms recognize and exploit opportunities that ensure their future survival and growth (Vance et al., 2008). Pellister's (2012) empirical observations of management practices indicated overreliance on "stability and equilibrium in a machine-like, well-behaved universe…[Instead]…in today's super-competitive global economy, managers ought to question the validity of existing models and acknowledge the disruptive nature of ubiquitous business enablers and the consequent turning toward complexity" (p. 6). But today's world is far from "well-behaved" and "machine like." Change programs will generate unprecedented, novel forms and interpretations, creating action routines that are not consistent with the original formulation of the change strategy (Mintzberg, 1978). Organizational members undergoing such changes often experience a high degree of uncertainty and a need to make sense of the changes (Pasmore, 1994 cited in De Cock, 1996, p. 234).

Seger (2011) argued that the last few thousand years were defined by linear thinking in which we learned how to compete, first for food or mates, then for the corner office, "and we have learned to decide who's important or who's not, by who's on top and who's on the bottom of the corporate ladder" (p. 41). Those behavioral patterns take many forms and names:

> 'Linear thinking' since it's defined by a line that ranks and divides; 'hierarchical thinking' as it's defined by who's on the top of the hierarchy and who's at the bottom; 'competitive thinking' since it demands that we compete with each other; or sometimes 'patriarchal thinking' since the male patriarch got the respect and was considered the head honcho. (Seger, 2011, p. 41)

Recently, however, "a new form of thinking has been emerging called 'team thinking' or 'collaborative thinking' or sometimes 'web-thinking' since it focuses on the team rather than one individual, and, like a spider web, uses the metaphor of the line to connect us, rather than separate us" (Seger, 2011, p. 41). The strange duality of our times occurs partly because of the clash between our multi-dimensional humanity. It's not necessary. Many of the best businesspeople have moved from a linear business model to become more collaborative thinkers: "They are finding new thinking models, including the more inclusive circle model of teamwork and the web model of mutuality and interdependence that values all the people on the team, and creates synergy between its many parts" (Seger, 2011, p. 42).

Nonlinearity: Ludwig von Bertalanffy's (1976) Systems Theory

"In the knowledge-based economy, a knowledge worker's primary deliverable is a good decision."

–Milkman et al., 2008

It wasn't until the advent of the third millennium when scientists began to seriously question

Newtonian interpretations of the principles governing our universe. Nonlinear systems thinking was used as a contrast to linear representation of the reality and for a change presumed the universe to be a composite of complex networks of interdependent subsystems in mutual relationship to each other: "Systems thinking is the ability to understand (and sometimes to predict) interactions and relationships in complex, dynamic systems: the kinds of systems we are surrounded by and embedded in" (Senge et al., 2000, p. 239). Systems thinking encourages leaders to use such concepts as continuous incremental improvement and organizational learning with feedback loops. Systems thinking makes it incumbent upon leaders to see the whole [entire enterprise] as a complex organization with many interdependent components in its relationship with their surroundings (Thornton, 2004).

In the environments filled with systems thinking, managerial decisions often lead to unpredictable responses and ripple effects across the entire system (Chavalarias, 2020; Grobman, 2006; Grosas, 2017; Friedman, 2022; Jackson, 2009; & Senge, 2000). Systems theory is commonly conceptualized in social sciences as a theoretical underpinning of teamwork. Ludwig von Bertalanffy (1968; 1976), by emphasizing "holism" and "organism" over Newtonian's (1687) and Tayloristic's (1911) "reductionism" and "mechanism" respectively, provided an alternative prism of viewing social organizations thus formulating what is commonly known as *the General System Theory*. A thesis was put forth that classical science based on the principles of "closed system" models does not reflect properly complexities of living organisms, and by doing so opened nearly unlimited number of environmental influences onto the sphere of scientific inquiry (Bertalanffy, 1976). Bertalanffy built his scholarly career on deprecating classical conceptualizations of social systems and rejecting its reductionist closed-system mechanisms as inadequate and lacking depth of intellectual rigor. As a trained biologist, he appreciated inherent difficulties social scientists would confront while attempting to apply open systems into their own disciplinary domains (1976). Despite numerous challenges, however, Bertalanffy's conceptualization of studied realities influenced heavily not only social sciences but also wide range of academic pursuits that followed. Number of scientists in cognate disciplines redirected their research agenda in pursuit of internal and external linkages amongst the discrete elements of studied systems (Senge, 2000). Organizational thinkers, following biological scientists, embraced open systems perspective as an opportunity to solve ever more convoluted problems of modern economy. Kurt Lewin (1936), one of the pioneers of *Industrial Psychology*, developed work on systems thinking by introducing a *Topological Field Theory*. He speculated that neither "nature" (genetic predispositions) nor "nurture" (life experiences) alone can account for human behavior in its entirety. Instead, he recognized the interactive dynamics of both in shaping organizational performance. His work gained attention for attempting to introduce mathematical representation of Bertalanffy's theory. Lewin (1936) formulated an equation of $B = f(P, E)$; in which behavior (B) is a function of a person (P) and the environment (E). In his formula, function (f) asserts interdependence between human behavior and the surrounding environment. Although theory lacked requisite mathematical rigor and was merely descriptive in nature, it nevertheless constituted a noteworthy attempt to capture behavior as a scientifically validated construct.

Pellissier (2012), recognizing tremendous impact of 2008 global financial crisis, initiated by the collapse of Lehman Brothers, highlighted interdependencies of modern economies in which "a typical management system will consist of four activities–plan, act, analyze, measure (and repeat)" (p. 8). Contrary to what could be expected, Pellissier postulated developing economy's superior ability to deal with "change," "uncertainty," and "instability" over developed countries due to a more evolved capacity to deal with what he phrased as "discontinuous change"–something industrial nations of the Occident have long lost (p. 8). Developing economies especially are more prone to the implementation of nonlinear solutions because of the nature of the variables, the changes, and interplays between the variables. These variables introduce an unavoidable element of unpredictability. Complexity management allows for pattern recognition which requires focusing on competencies, activities, technologies, or resources signaling patterns: "Simply put, strategy refers to a set of products or services and their means of competing in the marketplace" (Pellissier, 2012, p. 8).

According to Kast and Rosenzweig (1996), systems theory comprises of "natural laws" such as: "holism" and "open systems," which evolved as a response to rapid developments confronting the fields of engineering, science, and business. It represented a radical departure from traditional science based on linear cause-and-effect formulations: "Systems theory seems to provide a relief from the limitations of more mechanistic approaches and a rationale for rejecting 'principles' based on relatively 'closed systems' thinking" (p. 47). Since systems theory engenders systemic paradigms of various assortment of knowledgebase, it can be regarded as interdisciplinary in its core. That is perhaps a reason why terms such as systems theory or systems thinking do not have clearly defined meaning and are frequently thought of as an accumulation of subsystems integrated to accomplish a specific goal (Senge, 1990). Senge (1990; 2000) further asserted that systems are comprised of inputs, processes, outputs, and ongoing feedback between individual subsystems–in which feedback serves as a self-regulating force. Consequently, if a single element of the system is changed, modified, or removed, the nature of the entire system morphs into a new entity, which frequently calls for a new leadership approach and is often referred to as "holistic management" (Senge, 2000; Mann et al., 2019). Even though the world is fraught with wide array of biological, mechanical, ecological, and social systems, not every "entity" however is a "system." The indispensable element of a system, indeed a test for its very existence, resides in the presence of a common goal and the interdependent nature of its subsystems to achieve this goal (Senge, 1990; Preise et al., 2018). For instance, a large crowd of shoppers in the shopping center is not a system. Removal of one person from the crowd does not change the functionality of the system. The absence of that individual is irrelevant. Despite losing a person, we still have a well-functioning crowd. Members of the crowd neither share a common goal nor are they interdependent in achieving it. On the other hand, employees of the shopping center do constitute a team and thus a system. Discharging of a cashier, for example, would disrupt the functionality of the entire system (the store). It is hence the presence of a common goal and the interdependent dynamics of personal relationships (synergism) to achieve the common goal that distinguishes a "team" from a mere "grouping" of individuals. It is what elevates a random collection of individuals (a group) to the status of a team (or a system). By extension, systems thinking performs the role of the organizational catalyst transforming amorphous

grouping of randomly amassed individuals into a purpose-driven enterprise. In the systemic paradigm, an error anywhere in the process affects everyone and everything else within it–directly and indirectly, forthwith and delayed (Senge, 1990). Research indicates that not thinking systemically "often lead to increasing comfort with the status quo, inertia, lower R&D investment, less concern with disruptive technologies, and subsequently failure" (Woodside, 2006, p. 25).

Despite a prolonged history of organismic and holistic thinking, the utilization of systems thinking has not arisen to the status of a sanctioned organizational model until *Total Quality Management* emerged as a commonly recognized management philosophy in the last couple of decades of the past century (Sterman, 2000). Conceptually, symbiotic union of total quality management and systems thinking implies continuous learning and process improvements through collaboration across the entire system (Macken-Walsh et al. 2022; Sterman, 2000). Systems thinking views organization and its respective environment as an intricate composite of inter-connected parts. It accentuates relationships and processes that make up the organizational context in lieu of the separate entities or even sum of their parts: "Systems theory emphasizes that systems are organized–they are composed of interdependent components in some relationship" (Kast & Rosenweig, 1996, p. 53). Systemic notion of organizational dynamics connotes an imperative to always view decision making processes in the context of its larger environment. Nevertheless, even though the acceptance of systems theory resulted in the rejection of mechanistic view of social organizations, the theory did not free us entirely from its cause-and-effect limitations (Kast & Rosenweig, 1996). Although companies' mission statements advocate systems approach, empirical observations of management practices indicate they frequently employ sub-systemic thinking: "The reason may very well lie hidden in managers' inherently myopic perceptions determined by the fact that each of us personally has limited perspective of the system we are studying" (Kast & Rosenweig, 1996, p. 54). It is natural that we know much more about the subsystem of an organization in which we work than the interconnectedness in-between subsystems: "While proclaiming a broad systems viewpoint, we often brush aside the variables outside our interest or competence as irrelevant, thus opening our minds only to those inputs that we can handle with our 'disciplinary bag of tools'" (Kast & Rosenweig, 1996, p. 54). As a result, problems persist and get augmented by larger pressures from the environment. Complex, global corporations are comprised of numerous subsystems which encompass their own inputs, processes, and outputs with a network of interdependent relationships among them. Despite the setbacks, the attempts may be worth pursuing: "Even though systems theory may not be a panacea for all organizational problems…it can facilitate more thorough understanding of complex situations and increase the likelihood of appropriate action" (Kast & Rosenweig, 1996, p. 63).

Nonlinearity: Stuart Kauffman's (1993) Complexity Theory

Complexity theory implies a nonlinear response to a need to capture and rationalize the behavior of large systems such as economy or business organization (Kauffman, 1993; 1995). Due to their inherent complexity, systems' patterns may not be easily detectable to managers, however, over time they can be observed and once recognized should be allowed to

self-organize bringing about order through natural evolutionary processes (*Self-Organizational Theory*). According to Sing et al., (2002), the emphasis on analytical science of the past 500 years has made managers and scientists alike "unidimensional," lacking the complexity perspective of nonlinear thinking:

> There is a sentiment in management to shun complexity, to simplify, to live in a world that we can control. Since none of us created the plants, animals, planet, or universe, it is unlikely that people can ever be in control… Hence, managers have to 'merge' into the complex–make it an ally rather than treat it as an adversary as traditional management wants to do. (p. 30)

Complexities of modern economy make traditional economic models lose their persuasive capacity calling for "nonlinear," "dynamic systems" to become their conceptual replacement (Liening, 2013; Thiétart & Forgues, 1999; Waddock & Kuenkel, 2020). Future processes within organizations are rarely a straightforward extrapolation of the past; its competitive conditions can change in unforeseen ways, including large systems such as climate change (Palaima, 2010; Smith-Nonini, 2017). A new perception of world phenomena is developing based on the complexity theory, conclusions of nonlinear dynamics, and the chaos theory: "Gestalt therapy, complexity theory, and chaos theory, which are important not only for mathematicians but for businessmen as well in order to understand the phenomena happening in the world no matter whether they are of a physical world or public ones" (p. 1).

It is of utmost importance to conduct research on new concepts in the field of complex dynamic systems. Writings of Nobel Prize winner in economics Frederick von Hayek reveal that "order is not necessarily a result of deliberate 'planning' but, on the contrary, aim at the formation of a spontaneous order based on general rules" (Liening, 2013, p. 305). Various other theories come to mind in this context: *Systems Theory, Complexity Theory, Chaos Theory, Theory of Thermodynamics or Theory of Self-Organization* (e.g., Bertalanffy, 1968; Pellissier, 2012; Senge, 2000) "Although these approaches seem to differ greatly from each other, they are all primarily concerned with questions related to the origination and analysis of complex order patterns" (Liening, 2013, p. 305). They all undertake study of systems that are too complex to precisely predict future events. New paradigm of management science, that finds its roots in hard sciences of mathematics, physics, and chemistry as well as humanities, with writing as a focal point, is frequently labeled today as chaos and complexity science (Mays, 2017; van Eijatten et al., 2004). The field of management, however, was last to adopt those concepts following social sciences at the end of 1980s and "its key words principally refer to nonlinear models, discontinuous developments, uncertainty and unpredictability. Themes such as self-organization, coherence, dissipative structures, bifurcation and emergence are important ideas within this framework" (van Eijatten & Frans, 2004, p. 431).

"The more general name for the field of 'chaos' is 'complexity theory,' under which 'chaos' is a particular mode of behavior" (Singh et al., 2002, p. 25). According to Singh (2002), chaos permeates science and affects all fields of study today. Even though several management theorists have associated chaos theory with nonlinear events, the topic of chaos and

complexity in organizational setting remains elusive in defining strategic approaches to deal with the world's complexities: "That is perhaps one important reason why chaos theory is difficult to understand. Our modern culture has been raised on the premise of analytical logic and the theory of rationality. However, nature is neither plainly logical nor rational. To the contrary, natural events are mostly super logical and non-rational (p. 24). Scientific definition of "chaos" arose from the realm of physics and mathematics as "an aperiodic, unpredictable behavior arising in a system extremely sensitive to variations in initial conditions, exhibited by phenomenon such as turbulent flow, long range weather patterns, and cardiac arrhythmia, among many others" (p. 25). A man missing his flight after an alarm clock failing to ring, only to learn subsequently that the very plane had crashed off the Atlantic coast would be a good example. Despite having all the intentions to be on the ill-fated plane, the man was saved. Minor irregularities in initial conditions (the alarm not ringing) has unusually significant consequences (Singh, 2002). A business enterprise can be compared to a "bounded instability," in which "advancing technology or other trends can easily shift a business system into an unstable spiral that takes it to failure" (p. 27). Indeed, often minute systemic alterations can have a snowball effect on the project–so called "the butterfly effect."

What is the "butterfly effect"? In physics, the idea implies that a very small difference in the initial state of a physical system can make a significant difference to the state at some later point in time (Lorentz, 1972). It has originated from the hypothesis that a butterfly flapping its tiny wings in one part of the world might cause a huge hurricane in some other distant part of the world. Lorentz (1972), a world-renowned meteorologist, propagated such sensitivity to initial conditions in certain systems. His paper: *Predictability: Does the Flap of a Butterfly's Wings in Brazil Set off a Tornado in Texas? (1972)* proposes that flapping of the butterfly's wings in Brazil can cause enormous damage in Texas. The prodigious leverage some tiny events might have on the future can be immeasurable.

Michael Chrichton (1990), a Harvard trained physician, believed that physics is successful at describing linear events such as planetary movements in the orbit or spacecraft traveling to the moon. It fails, however, to handle properly anything to do with turbulence. Crichton (1990), like Lorenz (1972), points to a weather system as a single most unpredictable system in the world; with fairly accurate weather predictions of one week ahead being just about the most one should expect. Other "dynamical systems" that do poorly in that arena include such sophisticated systems as blood flowing through the heart or air moving over an airplane's wings. Chaos theory originally grew out of attempts to make computer models of weather in 1960s. Weather is a big complicated system, namely the earth's atmosphere "as it interacts with the land and the sun" (Crighton, 1990, p. 76). Even a seemingly static activity of playing pool constitutes a dynamical system in which one can predict barely a few seconds into the future, "because almost immediately very small effects–imperfections in the surface of the ball, tiny indentations in the wood of the table–start to make a difference" (Crighton, 1990, p. 77). Are all chaotic systems unpredictable? Not at all: "We actually find hidden regularities within the complex variety of a system's behavior. That's why chaos has now become a very broad theory that's used to study everything from the stock market to brain waves during epilepsy. Any sort of complex system where there is confusion and unpredictability, we can

find an underlying order" (Crichton, 1990, p. 76).

According to Singh et al. (2002), despite an enormous influence that Newtonian paradigm exerted on economic theories and national monetary policies, most natural events are nonlinear, chaotic, and complex in their very essence. Nevertheless, Western managers have touted management philosophies that extol stability, harmony, regularity, discipline, and predictability–all of which are unrealistic in the real world: "Newtonian thinking has helped the development of engineering, but has failed to explain management, behavioral, economic, and natural systems" (p. 26). Of all the companies comprising the Dow Jones Index at its inception in 1896, General Electric is the only one that survived till today–the remainder died young (Singh et. al., 2002).

Within the peak of its popularity in the 1990s, chaos theory became a theory of a new world explanation (Lienin, 2013). Even though it is widely promulgated that chaos theory is a theory of disorder, this belief is entirely misleading, "Chaos theory neither disproves determinism nor considers ordered systems impossible" (Lienin, 2013, p. 307). For the most part, "complex ordered systems" were impossible to prove prior to the arrival of modern computer technology (Lienin, 2013). Even though the fervor behind chaos and complexity theory waned somewhat in recent years in the disciplines of physics and mathematics, "The number of scientific publications attempting to transfer important aspects of chaos theory to other areas of science has increased. In this regard, economics is not excluded because one expects a better approach to economic reality from chaos theory than, for example, the neoclassical paradigm can render" (Lienin, 2013, p. 307). "We will never be able to physically predict the minute-by-minute movements of our universe. We will, however, be able to find order and organization in the systems and structures of nature through chaos theory" (Singh et al., 2002, p. 31).

> Thus, chaos and complexity theory propose a new mindset and managerial approach–an evolved mental state with greater strength to handle information and knowledge overflow of this new century. It is humankind's destiny to evolve through learning new systems. The systems that will survive in the future will be those that will be in harmony with nature. Those systems will be nonlinear. Yet, given the human's penchant for control at all levels, we can perceive that the next round of survival systems will be based on chaos, not…plain linear simplicity. Thus, managers will seek the pattern in hidden events with greater frequency and determination than before. (Singh et al., 2002, p. 31)

Research Methodology

A literature review comprises of a comprehensive summary of extant published works on a specific topic. It involves searching, evaluating, analyzing, and synthesizing the issues that ultimately uncover the proposed "truths" such as trends that leads to novel theoretical hypotheses about the current issues and future trends. Literature review leads to highlighting the areas that needs further investigation. This literature review included search of academic journals, books, and conference proceedings. In the management discipline, the researchers utilize the comprehensive reviewing strategies that involve analysis of past research–both quantitative and qualitative in nature. Quantitative research focuses on collecting and

analyzing numerical data to identify patterns and test hypotheses, while qualitative research gathers non-numerical data like words and observations to explore subjective experiences. Quantitative research aims to measure and quantify, while qualitative research aims to interpret and understand the meaning of studied phenomenon. Quantitative research uses numerical data to test hypotheses and identify relationships between variables using statistical analysis to search for trends and patterns. Qualitative research uses non-numerical data (such as observations, focus groups, or interviews) and seeks to explore constructs to gain in-depth insights into participants' perspectives.

Results

The objective of the paper has been to analyze past theoretical models and managerial practices with special attention given to the concept of intuition in managerial decision-making processes and contrast them with the current emerging trends via the empirical literature review. The article also intends to analyze those trends and propose practices that managers should prepare for in the future. Those emerging trends are discussed below.

Intuition in Decision-Making Process

There are several misconceptions about "intuition." One of them is that it relies on "another sense"–"the sixth sense" (Bhattacharjee, 2024; Lakomski & Evers, 2010; Miluskova, 2017; Sinclair, 2010).

Intuition has always been interpreted as a type of information processing different from "rational." It has often been distinguished between "logical" and "nonlogical"/"rational" and "nonrational," and dates back to Aristotle (Dane & Pratt, 2007).

> By 'logical processes' I mean conscious thinking which could be expressed in words, or other symbols, that is, reasoning. By 'non-logical processes' I mean those not capable of being expressed in words or as reasoning.... This may be because the processes are unconscious, or because they are so complex and so rapid, often approaching the instantaneous, that they could not be analyzed by the person within whose brain they take place (1938: 202). (Barnard, 1932 cited in Dane & Pratt, 2007, p. 35)

Dane & Pratt (2007) define intuition as "affectively charged judgments that arise through rapid, nonconscious, and holistic associations" and de facto differentiate the construct from decision-making processes based on "insight" or "rationale" (p. 1).

In popular literature, intuition often bypasses cognitive processes entirely, being commonly described as resulting from "behavioral habituation,"

> having to do with mind's subconscious sphere devoid of the ability to reason, rationalize, or differentiate between discrete notions. It's as if the subconscious domain of mind accepts whatever is impressed upon it indiscriminately without any pre-thought or after-thought. (Lakomski & Evers, 2010, p. 441)

Lakomski & Evers (2010) further presuppose that since upwards ninety-nine percent of

managers' daily decisions results from subconscious processing, it would seem imperative to control habituation processes enabling managers to make most optimal decisions at moment's notice at any point in time.

Parikh (1994) proposed that,

> intuition could be a form of intelligence at a level we simply cannot access with rational thought…[it] consists of accessing the internal reservoir of cumulative experience and expertise developed over a period of years…without being able to understand consciously how we get the answers. (Cited in Khatri & Ng, 2000, p. 59)

Carl Jung, on the other hand, is commonly known for his observation that intuition does not denote something contrary to reason, but something outside the province of reason: "Psychological function transmitting perceptions in an unconscious way" (Dane & Pratt, 2007, p. 35). It is neither a magical sixth sense nor a paranormal process. Intuition is not the opposite of rationality, nor is it a random process of guessing. It is a sophisticated form of reasoning based on "chunking" that an expert hones over years of job-specific experience (Prietula & Simon, 1989 cited in Khatri Ng, 2000; Schaefer, 2024).

Artemis (2011) argued that for some of us connection to this world are "electrical" in nature and in keeping with laws of physics and electrical engineering all people possess their own "electrical system" and more evolved of us ("those sensitive to energy") can already "pick some of the vibratory transmissions and translate them into information similar to how the other five senses pick up information from our environment" (p. 4). "It's through the sensory organs bringing information to the brain that we have become the 'conscious' beings we are today," she added (p. 2).

> Developing those additional senses required of us to create a much more complex information processing systems in order to translate received by the eyes and ears…. Our evolution, however, has not ended: There have always been people who were able to detect much more from their environment than what these five senses might account for…. There has been an explosion in the numbers of people who now declare themselves to be among the 'sensitive' population in the last three to four decades. The increase in those among us who call themselves sensitive may correlate to the birth of the Information Age. (p. 3)

Discussion

Rational / Intuitive Decision-Making Model

Researchers point to the impact of human emotions on decision-making. Leaptrott & McDonald's (2008) research focus on likely challenges that will be encountered by field researchers investigating managerial decision-making using theoretical frameworks based on the *Dual Systems of Reasoning: Rational–Logical* versus *Intuitive–Experiential*. "This decision-making theoretical framework is currently the subject of theory building research in the management literature. The conceptual modelling based on those two systems of reasoning draw a distinction between the reasoning processes employed in making these

decisions (Sloman, 1996 cited in Leaptrott & McDonald, 2008, p. 77). One system is purposeful and rational (logical), the other automatic and affective (emotional) (Hamilton, Sherman & Maddox, 1999 cited in Leaptrott & McDonald, 2008, p. 77). These systems coexist and influence decision-making behavior in everyday life (Pacini & Epstein, 1999). This dichotomy has been also defined as *System 1* (*Effortless Intuitive Reasoning*) and *System 2* (*Deliberate Rational Reasoning)* with the assumption the usage of both types of reasoning will lead to better solutions to more convoluted problems (Stanovic & West, 2000; Kahneman, 2003).

Rational decisions have traditionally been thought of as heuristic applications of human senses including sight, hearing, taste, smell, and touch (e.g., Fox & Tversky, 1995; Bechara & Damasio, 2005). By ignoring the influence of "emotions" on decision-making, modern economic theory denies feelings its rightful place in the interaction between environment and human decision-making processes (Bechara & Damasio, 2005; Sarmány-Schuller et al., 2012). That relationship expresses itself in the hypothesis that "the somatic marker provides a systems-level neuroanatomical and cognitive framework for decision-making and its influence by emotion (Bechara & Damasio, 2005, p. 1). "Modern economic theory assumes that human decision-making involves rational Bayesian maximization of expected utility, as if humans were equipped with unlimited knowledge, time, and information processing power" (Bechara & Damasio, 2005, p. 1). Often criticized, due to its practical limitations, a rational decision-making theory of "bounded rationality" continues to influence management theory (Lakomski & Bacigalupo, 2010). Acknowledging the limitations of human rationality, they further expanded on a less demanding standard of "satisficing" process in decision-making processes. In their view, human behavior falls short of rationality in the following ways:

> 1. Rationality requires a complete knowledge and anticipation of the consequences that will follow on each choice. In fact, knowledge of the consequences is always fragmentary. 2. Since these consequences lie in the future, imagination must supply the lack of experienced feeling in attaching value to them. But values can be only imperfectly anticipated. 3. Rationality requires a choice among all possible alternative behaviors. In actual behavior, only a very few of all these possible alternatives ever come to mind. (Lakomski & Bacigalupo, 2010, p. 442)

Organizational managers are involved in a constant decision-making. Even though in most cases innovation and creativity replaced good old-fashioned problem solving as a dominant function of managerial thinking processes, rational planning retained its legitimacy as a response to long-term objectives (Jekel et al., 2012). In short terms, however, managers may not even be fully aware why they do what they do. Bounded by time, access to information, and capacity to process data quickly enough make them seem sluggish, inefficient, even paralyzed. Considering nature of "bounded rationality," where decisions are made with reliance on limited information, *Intuitive Decision-Making Model* has become an enticing alternative (Jekel et al., 2012). That model, however, stands in contrast to still desired nowadays *Rational Decision-Making Model* in which most sensible and logical alternative is chosen to solve the problem (Jekel et al., 2012). Each model has its pros and cons and should be used in different situations. Rational model represents two major challenges: 1)

Assumption that there is one best (or optimal) answer to the problem–thus search for the perfect solution may never end or delay decision-making significantly, and 2) Assumption that all future consequences can be predicted (Jekel et al., 2012). Since both models have their proponents and detractors, the time may have arrived for a different conceptualization that better reflect the environmental complexities.

Analytical Individual / Intuitive Individual in Decision-Making Process

Even though classic discernment in decision-making has to do with the departure of intuition from rationality, most recent research has focused on intuition in the real-world scenarios. For example, "Borrowing from both approaches, we investigate to which extent competing models of intuitive probabilistic decision-making overlap with choices according to the axioms of probability theory and how accurate those models can be expected to perform in real-world environments (Artemis, 2011). According to Sarmány-Schuller et al., (2012), managerial decision-making process, apart from heavy reliance on rational methods, is heavily influenced by emotions: "According to the general opinion, successful solutions are achieved by rational decisions based on declarative knowledge. However, there are also contrary opinions that assign emotions and intuition a much larger role in decision-making" (Sarmány-Schuller et al., 2012, p. 95; see also Speights et al., 2020). Sarmány-Schuller (2010) believed we can distinguish between "analytical" and "intuitive" individuals. Decisions of analytical individuals tend to rely on rational thinking. Intuitive individuals, on the other hand, conduct prompt evaluation of the situation relying on emotions and overall situational awareness. Even though Sarmány-Schuller et al.'s (2012) study showed that intuitive processes are an important element of the decision-making processes, they drew a conclusion that individuals exhibiting preference to intuitive strategies tended to choose more secure and less varied solutions. In situation of high uncertainty, "It is likely that intuition helps us to avoid situations with possible higher potential risk, or higher potential loss" (Sarmány-Schuller et al., 2012, p. 107).

Analytic Thinking / Holistic Perception in Decision-Making Process

According to Leaptrott & McDonald (2008), much of the discussion is based on gaining a perspective on how frequently each type of reasoning is employed in an important decision-making endeavor by examining the decision processes involved. Four elements were chosen to represent the extent to which the decision process reflects the reasoning method:

> 1) The number of people that serve as sources of information, 2) The length of time it takes the decision maker to gather information and make the decision, 3) The number of alternatives considered, 4) The number of factors the decision maker considers when choosing between alternatives. The frequency of responses displays a consistent pattern that tends to reflect primarily intuitive reasoning among studied entrepreneurs. (Leaptrott & McDonald, 2008)

They conclude these results have serious implications for future research and theory building: "If we truly live in a world where intuitive decision-making is by far the predominant decision-making method, research priorities and methodologies should reflect that reality" (p.

91).

Number of intrinsic and extrinsic variables affects quality of organization's decisions. Some of those variables are more controllable than others. In general, however, "The management of extrinsic variables may be more difficult to control, the identification and management of human variables such as emotion and logic are pivotal in the effort to increase the quality of decisions and decision-making processes" (Hess & Bacigalupo, 2011, p. 710). "Recent debates on philosophy of science have pointed out that the crisis of rationality extends across all sciences" (Lane & Down, 2010, p. 513).

> Considerable evidence suggests that feelings and emotions at both unconscious and conscious levels influence thinking, decision-making, and subsequent behavior. Both conscious and unconscious levels of feelings and emotions are potentially useful in facing complex challenges within a seemingly endless presentation of data and possibilities in nonlinear systems. (Vance, 2008, p. 237)

Pilarik et al. (2009) argue that "Decision-makers facing more complex decisions often use various methods and heuristics that do not comply with the deductive and inductive principles" (p. 319). For many cognitive scientists, they add, "Emotions are only a peripheral part of human thinking, a surviving artifact of our evolution from more primitive forms of life" (Thagard, 2001 cited in Pilarik et al., 2009, p. 319; see also Bhattacharjee, 2024; Grabarczyk, 2024). Damasio (2001, 2004) is opposed to the belief that emotions hinder rational thinking and point to how emotions participate in even the tiniest of rational decision-making (see also Pilarik et al., 2009). Krishnakumar et al. (2012) believed that "The more skilled a person is in dealing with his/her emotions, the more likely that person is to make more ethical decisions" (p. 321). Research further recognized multiple factors that impact ethical decision making which include an issue-contingent model of moral intensity (Jones, 1991) and stages in individual growth and development (Kohlberg, 1969; Rest, 1986).

Conclusion

"Line is not natural."

–Seger, 2011

Holbrook Jackson (1932) is credited with defining intuition as "reason in a hurry" and as such is often applied to the circumstances in which one must make a quick decision without relying extensively on conscious reasoning. Similarly, most psychologists contrast logic with intuition by juxtaposing "reasoned reflection" with "immediate insight." Many argue, however, that both should not be treated as opposites but for the most optimal decision-making blended, one reinforcing the other.

Organizations have been searching for management tools that would perform satisfactorily under uncertain and ambiguous conditions like today. Pointing to earlier research on decision-making processes driven partially by emotions and imagination, Sinclair et al. (2005) stressed the importance of intuition suggesting the need for an integrated model of analytical/intuitive decision-making models in which both approaches are used in a

"complementary" and "iterative fashion": "In the western business world, governed for centuries by reason, the pendulum seems to be swinging back to the midpoint, allowing for reintegration of such fuzzy concepts as intuition (Schulz, 1998; Ferguson, 1999 cited in Sinclair et al., 2005, p. 354).

Despite the rational models having strong support primarily among economists, Betts (2009) observed that managerial decisions often involve "leaps of faith." By allowing tacit knowledge and implicit processes to positively influence decisions and their implementation, managerial risk aversion is being lowered allowing for quality decisions to be made quickly. Similarly, Hilary and Hui (2008) also found that both individuals and organizations exhibiting a high degree of "religiosity" display lower levels of risk aversion in decision-making (Hess et al., 2011).

"The main challenge therefore is how to study this evasive and mostly non-conscious phenomenon objectively using scientific methods" (Bastick, 1982; Petitmengin-Peugeot, 1999 cited in Sinclair et al., 2005, p. 354). As we move deeper into the twenty-first century, management, as a science, confronts a systemic shift in where environmental analysis morphs from "analytical thinking" to "holistic perception" of knowledge which allows for a better understanding of "complex" realities (Skarzauzkiene, 2010). Neumann (2013) differentiated between "complicated" and "complex" phenomena. Even though everything that is complex is also complicated, not everything that is complicated must be complex. With sufficient effort, we can understand complicated concepts because they are predictable: "Things that are complex, however, cannot be fully understood, [because] their behavior cannot be exactly predicted" (Mitchell, 2009 cited in Neumann, 2013, p. 81). Events become complex the moment "unpredictable variables" appear:

> Today's challenges are complex and include everything from the financial markets to demographic change, environmental concerns, and wars in various parts of the world as well as the success of a product or a company. Our own lives, too, and the behavior of the people around us also often present us with complex challenges. (p. 81)

At present, decision makers continue to favor logic in a world where sheer analytics is necessary but no longer sufficient. Woodside (2006) argued that all systems include intermingled complex relationships that are impossible to be comprehended by any one person: "As humans, we have limited capacity and willingness in seeking information and in making decisions" (Payne et al, 1993 cited in Woodside, 2006, p. 26; Simon, 1957). Consequently, we end up deploying "local rationality" and "satisficing rules" by focusing on isolated fragments of the system, failing to identify most optimal solutions (Simonj, 1990 cited in Woodside, 2006, p. 26).

A need for ability to tap to one's intuition is transparently obvious when managers progress through the levels of the corporate career ladder and their challenges become broader, deeper, and more complex:

> Very often, people will do a brilliant job through the middle management levels, where it's very heavily quantitative in terms of the decision-making. But then they reach senior

> management, where the problems get more complex and ambiguous, and we discover that their judgment orientation is not what it should be. And when that happens, it's a problem; it's *a big* problem (Hayashi, 2001: 61). (Dane & Pratt, 2007)

Seger (2011) concludes that it is necessary to change our organizational thinking model from linear to nonlinear simply because, as he puts it: "The line is not natural" (p. 41). If you look at nature, you'll notice that there are few straight lines:

> Rivers meander, trees bend, galaxies swirl in spiral shapes. Even our DNA is a spiral, not a line. Some of the few straight lines in nature are in crystals, which grow in a straight line. But crystals can become rigid and break, just as we can break by getting ill, or getting too stressed out when we are too rigid and always stay within the lines. Our rigidity diffuses our ability to be innovative and to free up our imagination. (Seger, 2011, p. 41)

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