

SHIFTS IN THEMES OF KNOWLEDGE MANAGEMENT FIELD– TOWARDS DYNAMIC FRACTAL ORGANIZATIONS

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ABSTRACT: Recently, (Ikujiro Nonaka, Kodama, Hirose, & Kohlbacher, 2013) have proposed a new paradigm to look at organizations. Drawing on the fractal theory of natural sciences, the authors proposed that organizations are made up of dynamic fractals that are enabled by dynamic ba's, organizational synthesizing capability and leader's phronesis. Furthermore, Dynamic Fractal Organizations facilitates dynamic synthesis of knowledge exploitation and exploration, which is essential for becoming sustainably innovative and hence getting sustainable competitive advantage in the knowledge economy. The present article undertakes review of the literature on the theme of exploration and exploitation and proposes that shifts in (1) ontology of knowledge, (2) operational orientation of exploration and exploitation, and (3) distinct KM systems to holistic design of organization, have dovetailed the conception of dynamic fractal organization. The proposed dynamic fractal organizational design has opened foray of scholarly debate by knowledge researchers in the years to come. The current paper has made an initial attempt in this regard.

Keywords: T.

1. INTRODUCTION

There have been two fundamental questions amidst the evolution of theory of knowledge management. First, how does an organization acquire knowledge; and second, how does an organization make use of the acquired knowledge. Implicit in these two questions is another realm of inquiry that either both acquisition and usage phases are distinct, contributing or mutually existent arenas. Insofar, question of acquiring knowledge is concerned, there exists debates on what knowledge is, and how can it be explored and created [13]. Whereas, referring to question of making use of knowledge, discussions on knowledge exploitation and commercialization are found in literature [11]. The present paper contributes towards above highlighted three questions. Since, knowledge creation, exploration, commercialization and exploitation are central to these questions; the paper undertakes review of these themes of knowledge management theory and furnishes propositions. The paper is structured as follows.

To begin with, it discusses the transition of traditional industrial economy towards knowledge based economy, characterized by increased prominence of operant resource (i.e. knowledge). The second section argues that the knowledge economy emerged along with the transformation of traditional organizational management practices to knowledge based organizations. This transition brought into the concepts, and their requisite systems, like exploration, exploitation, creation and commercialization. The third section proposes that knowledge exploration can be viewed as creation, whereas exploitation can be seen as commercialization of knowledge. The fourth section, thus, review literatures and finishes that three major shifts concerning exploration and exploitation (or in other words, creation and commercialization) theme are evident in literature. First, at ontology level, there is a transition from knowledge as information to knowledge as tacit, explicit and phronesis. Secondly, at operational level, it has been realized that exploration and exploitation are not either or

processes, rather both are inextricably linked and mutually existent dynamic process within organization. Finally, the above noted shifts at ontology and operational level combine together with the shift in specific and distinct process and systems for exploration and exploitation to dynamic fractal organizational design, which ensures dynamic & mutual existence, as well as augmentation, of both exploration and exploitation. In the fifth section of the paper, implications of the proposed assertions are discussed.

2. Emergence of Knowledge Based Organizations

Knowledge management is an emerging realm of inquiry in contemporary organizational research. Increasing number of studies has reported that though Knowledge Management field is embryonic [12]; its importance is spreading out among both the practitioners as well as academicians. In his recent study, Hislop [13] undertook analysis of the reception of knowledge management during last two decades; and concluded that “*knowledge management has evolved into a legitimate academic discipline in its own right*” (p. 787). This viewpoint is consistent with a new discourse of organizational and economic studies which posits that the world economy has shifted from traditional industrial economy – characterized by economic theories of utility and significance of material resources – to a knowledge based economy which takes into account the endeavors to gain value from operant resources like knowledge. In the knowledge economy, the economic scientists are viewing knowledge as a source of value creation by instigating sustainable innovation in products and services [18].

As noted by [19] knowledge has become new premise of economic success owing to the fact that “*in an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge*”. The significance of knowledge resources as a driver to economic growth has lead to the emergence of knowledge based view of the firm, which underscores knowledge and its management as primary source of sustainable competitive advantage. Sasson and Douglas [25] noted that as per data of

American Management Association, by close of 20th century, approximately every one out of three large American companies had embarked on Knowledge management initiatives. In a more recent study, Shu and Chuang [27] reported that *“American businesses, as a whole, invest more in their own intangible assets than in tangible assets like plants and equipment, indicating a major shift toward a knowledge-based economy”*.

Nonetheless, the recognition of knowledge as an operant resources; which promises continual organizational revival, growth and vis-à-vis sustainable competitive advantage; is indeed a new phenomenon in corporate world, and so is the realization of the dire need of investing in organizational knowledge management, creation, and exploitation initiatives to seize benefit of this intangible asset [7]. In response to the pressing needs of knowledge economy, it is quite recent that organizations have introduced systems and tools to be able to capitalize on knowledge assets. The literature suggests that knowledge becomes source of innovation and growth if it is embedded in distinctive activities of the organizations. These organizations, hence, use knowledge as mean of production and are referred in literature as *“knowledge-intensive firms”*, *“knowledge-intensive organizations”*, and *“knowledge-based organizations”* [14].

The pertinence of knowledge is immense for knowledge based organizations because they use knowledge as input as well as an output product. Such organizations, therefore, give due deliberations to capturing and augmenting the knowledge which is embodied among the workers (knowledge workers), culture, and organizational processes and routines. However, it has been reiterated in literature that knowledge creation process in knowledge based organization is *“an idiosyncratic, ‘black box’ activity that is difficult if not impossible to manage as a process”* [5]. Put it simple, it is deemed rather difficult to identify the patterns and design structures to augment the process of knowledge creation.

Furthermore, the knowledge created by the organization is inextricably linked with knowledge commercialization [10]. However, although creation and commercialization of knowledge are complementary to each other, both require different processes and management styles. A conducive environment, characterized by free flow of knowledge sharing, open and supportive culture etc, is required for creation of knowledge. Whereas, controlled, standardized and methodical processes are required for knowledge commercialization.

Given this ambiguity in knowledge creation and contradictory requirements of knowledge creation and commercialization, there exists an ongoing debate on the subject. The debate is closely linked with another related theme of research on exploration and exploitation of knowledge within organizations [16]. The thread in literature on knowledge creation can be seen with knowledge exploration lens, whereas knowledge exploitation lens could be applied on the commercialization process. Accordingly, the following section reviews the theme of creation and

commercialization of knowledge with exploration and exploitation knowledge lens.

3. Knowledge creation as exploration, and knowledge exploitation as knowledge commercialization

The earlier theories, or one may call the western point of view, posits that creation of knowledge is actually collating knowledge that exists there in individuals and systems (organizations). For instance, Desouza and Awazu [10] proposed that knowledge creation *“consists of knowledge sharing, storage, transfer, and application, while the knowledge commercialization phase represents the practice perspective, i.e., the innovation processes, where an invention is transformed into an innovation”*. The definition elucidates that emphasis is on ‘sharing’ of knowledge, thereby stressing the need to develop systems through which knowledge of individuals gets shared with each other. In contrast to this ‘sharing’ phenomenon, Nonaka and colleagues brought in a new idea that knowledge creation takes place with conversion of tacit to explicit knowledge [22]. These authors presented knowledge creation theory which rests on the conception that knowledge is created through four different modes namely *“socialization, externalization, combination, and internalization”*. The theory of knowledge creation suggests that in socialization, conversion of tacit knowledge to tacit knowledge occurs; in externalization tacit knowledge is converted to explicit knowledge; whereas in combination explicit knowledge converts into explicit knowledge; and finally in internalization explicit knowledge gets converted into tacit knowledge [21]. In the theory of knowledge creation, Nonaka and colleagues used knowledge exploration term as analogous to knowledge creation. This tradition, henceforth, have been suggesting that transfer of explicit to explicit and implicit to implicit knowledge is knowledge transfer, whereas conversion of knowledge from tacit to explicit is creation of knowledge. Following the same tradition, hereinafter, the present paper will be using creation and exploration interchangeably.

To understand the commercialization of knowledge, the famous definition by John Wilkins provides a foundation. The author defined commercial knowledge as *“Commercial knowledge is set of rules, tools and guidelines that produce according to the expertise and sensitivity of the craftsman, not the empirical accuracy of the rules, tools and guidelines”*[8], furnished that this conception has been drawn from Chinese encyclopedia which underscores that knowledge that we acquire may be of use or not. For organizational purpose, researchers are concerned to create knowledge for the purpose of exploring truth; rather the aim is to use the knowledge commercially. Accordingly, Demarest [9] asserts that *“the goal of commercial knowledge is not truth, but effective performance: not ‘what is right’ but ‘what works’ or even ‘what works better’ where better is defined in competitive and financial contexts”*. As in above discussed case of knowledge creation and exploration, the tradition promulgated by Nonaka and colleagues refer the notion of financial viable knowledge as *“exploitation of knowledge”*. Accordingly, the commercialization and exploitation of knowledge can be use alternatively.

4. Knowledge Creation and Commercialization in Knowledge Based Organizations, with perspective of Knowledge exploitation and exploration

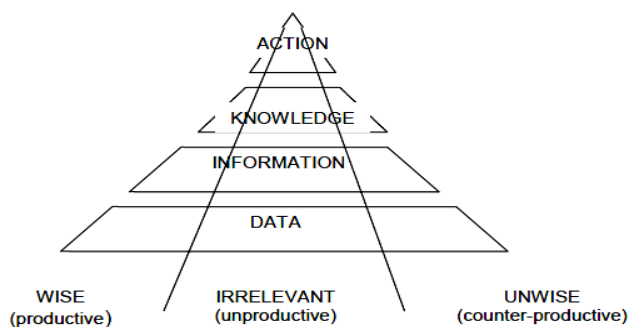
The question of knowledge creation requires a clear position on the ontology of knowledge. More superficially, it is pertinent to discern the difference between information and knowledge. Accordingly, at the outset the following section discusses the knowledge and information discourse. Subsequently it discusses the knowledge theme on exploration and exploitation. Finally, the transition from computer like processing to context embedded knowledge systems and its corresponding dynamic fractal model of organization is discussed.

4.1 From Information to Knowledge discourse—the explicit, tacit and phronesis knowledge

Though it is customary in almost every field of social science that core concepts have been conceptualized and defined in diverging manner, it is accrued that usage of a term in different ways create ambiguity that serves as a hindrance to develop appropriate systems and processes, concerning that specific concept. Same is true about the field of knowledge management. Researchers have pointed out that confusion on definition of knowledge, caused by its divergent conceptualizations, impedes the development of suitable knowledge management systems and tools. The way knowledge is defined has, therefore, profound implications for discussion on creation and commercialization of knowledge. Notable conceptualizations of knowledge can be traced in literature as “experience or information that can be communicated” [2], “truths and beliefs, perspectives and concepts, judgments and expectations, methodologies and know-how” (Wiig, 1999), “a fluid mix of framed experience, values, contextual information, and expert insight” [5], and “actionable information” [1]. It is evident the common element in these definitions is reference to information. Some authors, particularly from computer and information sciences, tend to use knowledge and information as fundamentally same thing. However, many authors have argued that “data, information and knowledge are not interchangeable concepts” [7] and that “equating information with knowledge is one of the fundamental mistakes that companies repeatedly make” [29]. This assertion dovetails with the old Einstein’s definition that “Knowledge is experience and everything else is information” [32]. The definition, explicates that knowledge is different than information. Growing number of scholars concur with this position that knowledge is not information and that knowledge is more valuable than information [17]. Furthermore, Knowledge is envisaged as value added form of knowledge, as defined by Davenport, Long, and Beers, 1998 [6] “information combined with experience, context, interpretation, and reflection”. As noted by Ikujiro Nonaka & Von Krogh [23] from early 1990s scholars started challenging the traditional notion of information centric conceptualization, which preoccupied organization theory from 1950s, and disposition of equating knowledge with the information. The problem with information centric conceptualization of knowledge is its implicit undermining of tacit knowledge. If information, even refined and

contextualized, is knowledge, it can essentially be reproduced in explicit information form, thereby implying that knowledge is inherently explicit.

The review of literature suggests that there exist two major strands of researchers on internal and external forms of knowledge. Accordingly we see that knowledge have been construed as “tacit”, “implicit”, and “explicit”. One strand argues that knowledge could be implicit and explicit. As Barsalou, Simmons, Barbey, and Wilson [3] stated, “explicit knowledge is knowledge that can be articulated, codified or communicated; while implicit knowledge is expressible but previously unexpressed knowledge”. Firestone and McElroy [12] noted that Polanyi has referred to implicit knowledge as beliefs that exist in the form of conceptual framework and are expressed through language. The expression of the implicit knowledge is what we call explicit knowledge. Another strand of knowledge scientists, on the other hand, suggests that knowledge is either tacit or explicit. Unlike the simple process of expressing implicit knowledge to make it explicit, as described before, this strand argues that internal knowledge, called tacit, is imbedded within individual and can be characterized as “*fluid mix of framed experience, values, contextual information and expert insight that provide a framework for evaluation and incorporating new experiences and information*” [7]. Foremost work, concerning conversion of tacit to explicit knowledge – also referred as knowledge creation theory, has been undertaken by Nonaka and colleagues. Nonaka and Takeuchi [21] argue that “*tacit knowledge is a rich source of problem signals and ideas about possible solutions and its conversion into explicit knowledge can make valuable knowledge available to others in the organization*”.



(Source: Marche, personal communication, February 7, 2011)

Over the period of time, there has been increasing agreement among knowledge researchers that besides information, Knowledge also pertains to senses, perceptible experience, skills and cognitive mental models etc.—a type of knowledge named as ‘tacit’. Nonaka et al. [20] proposed that the “tacit knowledge is rooted in actions, procedures, routines, commitment, ideals, values, and emotions. Recently, Nonaka et al. [20] has gone beyond this point and have proposed that knowledge is combination of tacit, explicit and phronesis. Phronesis here is conceptualized as practical wisdom that stems out of triad relationship of knowledge within organization, synthesis tacit and explicit knowledge and thus create a new form of knowledge ‘Phronesis’ [20]. This third

type of knowledge is connoted with practical knowledge which stems out of objective teleology, common good as value and practical wisdom that manifests in actions. KM practices in organizations should therefore be laid on the foundations that “*there is also a practice side to knowledge which has to be balanced with the process perspective*” [5]. As depicted in the model [15], knowledge researchers have reached to the point that action is part of the knowledge. The concept of Phronesis is same postulation, with more robust theoretical and conceptual rigor. As discussed in the following sections of present paper, Nonaka et al. [20] proposed that there exists an ongoing and dynamic process of synthesis of knowledge exploration and exploitation, in which conversion of tacit to explicit and vice-versa keeps on happening, thereby creating a practical wisdom that is referred as Phronesis.

The above mentioned broad conception of knowledge has

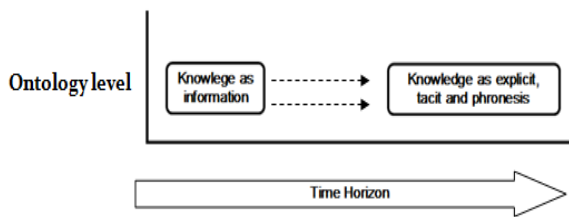


Figure 1

high implications for knowledge creation, commercialization, exploration and exploitation endeavors. Given that knowledge is not only explicit, which can be systematically collected, stored and made available to the employees, the conceptualization of knowledge as tacit, explicit and phronesis highlights that explicit and phronesis parts of knowledge needs innovative solutions to create knowledge and also calls for innovative forms of organization that augment exploration and exploitation process of knowledge [20]. In conclusion to the above discussion, following proposition can be construed;

Proposition One: *Over the period of time, ontological stance on knowledge has been moved from knowledge as information to knowledge as tacit, explicit and phronesis.*

4.2 From knowledge exploitation ‘versus’ exploration to ‘mutually existent and dynamic’ exploration and exploitation

March [16] noted that debate on exploration and exploitation has lead to the emergence of a new branch of inquiry in knowledge management literature. Desouza & Awazu [10] suggested that there exists “*two-phased approach to knowledge management i.e., the knowledge creation phase and the knowledge commercialization phase*”. In other words, one stream of research, which has been dominating for a very long time, posits that knowledge exploration and exploitation are two distinct phases and organization must create a balance of both the options. Accordingly, it has been suggested that though exploration (or creation) and exploitation (commercialization) dovetail each other, both of these require different and conflicting systems and processes within the organization. Desouza and Awazu [10] pointed

out that “*knowledge creation requires an environment that is fluid and nurtures creativity, debate and the creation of new ideas, whilst knowledge commercialization demands well regulated and systematic processes*”. Tushman & O'Reilly [30] have argued that though their simultaneous quest is incongruous and paradoxical, both knowledge exploration and exploitation are essential for organization; and therefore researchers have been attempting to find out solutions for reconciliation of the two processes. In a recent attempt, Nonaka et al. [20] suggested that reconciliation of exploration and exploitation is not only possible rather inextricably linked with each other. The underlying assumption of this assertion is the conception that exploration and exploitation are not two distinct processes; rather are embedded in each other. The authors argued that this dualistic approach of knowledge exploration and exploitation is rooted in Carnegie School, which is no more valid. Moreover, it suggests that neither there exists pure tacit or explicit forms of knowledge (every knowledge has both forms embedded into each other), nor the exploration and exploitation processes exists independent to each other. The knowledge created within organization has commercialization manifestation and similarly every exploitation or commercialization involves creation of knowledge.

In purview of the above discussion, following propositions is suggested;

Proposition Two: *Over the period of time,*

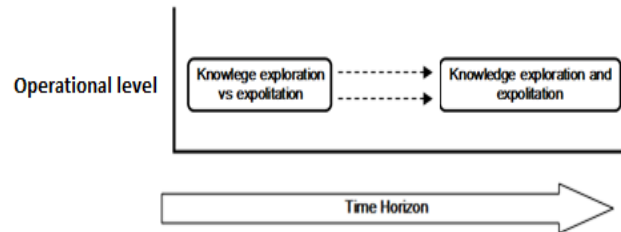


Figure 2

conceptualization of knowledge exploration versus exploitation has been moved from mutually existent knowledge exploration and exploitation.

4.3 From computer metaphor to contextual dimensions of knowledge management – a journey towards dynamic fractal organization

As concluded in the above section, knowledge is tacit, explicit and phronesis. Knowledge management practices, therefore, would have to be made in purview of all these three types of knowledge and should be comprehensive enough to enable an organization to make use of it. The following section undertakes review of related literatures on the subject and postulates that initially knowledge was considered to be predominantly mind's function and hence was explained with cognition (thinking pattern of mind) theories. Gradually, the extended branches of cognition theory, namely social cognition and situated cognition, emphasized that context is also very important in knowledge

discourse. Later on, the present paper discusses how the notion of 'context' dovetails with contemporary dynamic fractal organizational forms.

If an individual is custodian of the knowledge, it is important to understand where that knowledge is stocked within individual. Psychology science tells us that knowledge exists in the cognitive structures of individuals. The traditional cognition theory suggests that individuals acquire information from the environment, process it in purview of their exiting believes and information in mind, contextualize it and then make actions. Accordingly, the information keeps on converting into knowledge. The cognitive psychology recognizes that impertinence of the context, in which mind works, has lead to another branch named social cognition. This particular branch focuses on the influence of environmental conditions on mental processes of individuals [24]. However, scholars have argued that despite having its roots in cognition research, field of social cognition has excessively incorporated computer metaphor as underlying assumption while framing research context [26]. This metaphor, however, is inadequate to encapsulate the effects of emotions and motivations on human cognition, and is somewhat insensitive to embrace the social context under which individuals do perform their thinking [4]. This reorientation of the cognition paradigm with increased realization that patterns of individual's thinking, or in other words cognition, develop and evolve in response to the environmental context lead to the emergence of a new, an a rather broad, branch of cognition research namely, *situated cognition* [28].

In major divergence to the old computer metaphor, which has had dominated cognition research during the decades of seventies and eighties, situated cognition advocated that human cognition was heavily influenced by the individual's motivations and that his cognitive patterns were adaptive, rather than being static, to the environmental context around him. Situated cognition described individual as fully mindful thinker who develops assorted cognitive strategies and based on his needs, goals and motivations—selects among available strategies [24]. The situated cognition perspective, therefore, advanced the field of cognition sciences by conceptualizing that human as thinking creature was a rather complicated entity who performs his thinking function in a broad context of his knowledge, desires, motives, perception, experiences and personal values [24]. The perspective impelled researchers to contemplate that cognition is not only to study the structure and innate capacity of mind and its thinking functions; it also fosters the insights that cognition, to a certain extent, is function of the environment, or in other words context. To sum up the discussion, it can be observed that knowledge management has had a transition from computer metaphor, embedded in information processing based cognition theories, to context dependent cognition theories. Given this importance of context, it is understandable that contemporary knowledge theorist have proposed organizational designs have immense impact on knowledge creation and commercialization. Accordingly, these theorists have been in pursuit to propose organizational

designs that best enable knowledge creation and exploitation. Furthermore, as proposed in the above section organizations need forms, or design in other words, that could facilitate dynamic co-existent exploration and exploitation of knowledge. In their recent article, Nonaka et al. [20] have proposed the required conceptualization of said design or form of organization is dynamic fractal organizational designs. The said article forwards a new paradigm to look at organizations. Drawing on the fractal theory of natural sciences, it proposes that organizations are made up of dynamic fractals that are enabled by dynamic ba's, organizational synthesizing capability and leader's phronesis. The authors furnish that the new proposed form of organization (Dynamic Fractal Organizations) make use of triad relationship of knowledge that synthesis tacit and explicit knowledge, which thus create a new form of knowledge 'Phronesis'. The triad knowledge relationship facilitates dynamic synthesis of knowledge exploitation and exploration, which is essential for becoming sustainably innovative and hence getting sustainable competitive advantage in the knowledge economy. The new paradigm takes organization as 'invisible organization' which gets configure through dynamic synthesis of fractals, constituting dynamic ba's of internal and external actors.

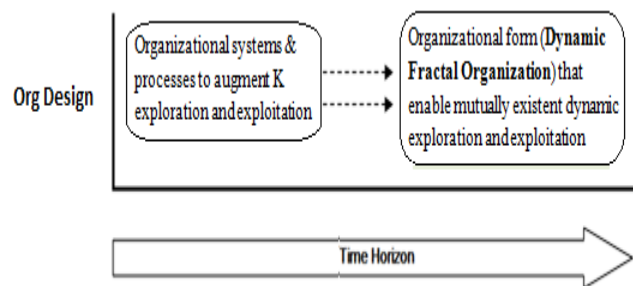


Figure 3

In view of the foregoing discussion, following proposition is furnished;

Proposition Three: *Over the period of time, debate on specific organizational systems & processes to augment exploration and exploitation of knowledge has reached at the concept of Dynamic Fractal organization, which enables mutually existent dynamic exploration and exploitation*

5. CONCLUSION

Combining the discussion of the paper, the following model of evolutionary emergence of knowledge based economy, knowledge organization, dynamic fractal organizational form, co-existent exploration and exploitation of knowledge and ontological shift from knowledge as information to knowledge as tacit, explicit and phronesis is furnished.

The model summarizes that postulation of the article. In a nutshell, it suggests that transition from traditional industrial economy towards knowledge based economy and transformation of traditional organizational management practices to knowledge based organizations have

emphasized the need to conceptualize dynamic

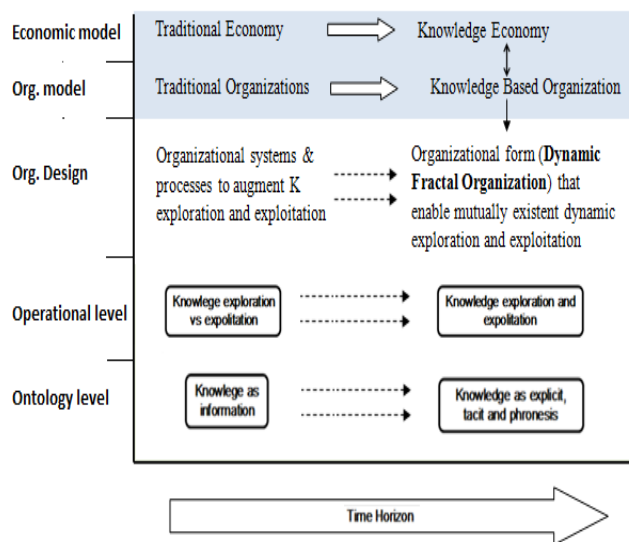


Figure 4. Model for demonstrating how transition at ontology and operational level of exploration and exploitation dovetail conception of Dynamic Fractal Organization

organizational design. Furthermore, three major shifts have dovetailed the said dynamic design, referred by Nonaka et al. [20] as Dynamic Fractal Organization. These transitions include (1) transition from knowledge as information to knowledge as tacit, explicit and phronesis; (2) exploration and exploitation as distinct process to mutually existent dynamic process; and (3) from specific and distinct process and systems for exploration and exploitation to dynamic fractal organizational design, which ensures dynamic & mutual existence, as well as augmentation, of both exploration and exploitation.

6. IMPLICATIONS

There are numerous schools of thought regarding theory of organization, including population, resource based view, institutional view etc. Organizational scientists have pointed out that the diversity of these conceptions present polarized and fragmented view of organization, which needs new dynamic and robust theories of organization which are comprehensive enough to encompass complex and dynamic nature of organizational phenomena. The proposed dynamic fractal model by Nonaka et al. (2013) is a major mile stone in this regards. The model has opened foray of scholarly debate by knowledge researchers in the years to come. The current paper has made an initial attempt in this regard. Drawing on the prominent stream of knowledge creation and commercialization with exploration and exploitation lens, it has discussed the evolution of related branches of knowledge management theory which are proposed to provide theoretical underpinnings to the dynamic fractal model. Proposition have also been furnished, which may be verified through systematic review of literature on the subject.

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